

**Lee County Board Of County Commissioners
Agenda Item Summary**

Blue Sheet No. 20060883

1. ACTION REQUESTED/PURPOSE:

Approve the Estero Marsh Preserve (EMP) Land Stewardship Plan.

2. WHAT ACTION ACCOMPLISHES:

Approving of the Estero Marsh Preserve Land Stewardship Plan establishes guidelines for restoration activities at the Preserve.

3. MANAGEMENT RECOMMENDATION:

Approve the land stewardship plan so Land Stewardship staff can begin implementation.

4. Departmental Category:

CIIA

5. Meeting Date: 08/01/06

6. Agenda:

- Consent**
- Administrative**
- Appeals**
- Public**
- Walk-On**

7. Requirement/Purpose: (specify)

- Statute**
- Ordinance** **Lee Plan**
- Admin. Code**
- Other**

8. Request Initiated:

Commissioner _____
Department Parks & Recreation
Division _____
By: John Yarbrough, Director

9. Background:

A Land Stewardship Plan is necessary for appropriate and planned restoration, and management of all Conservation 20/20 Preserve. The CLASAC (Conservation Lands Acquisition and Stewardship Advisory Committee) unanimously passed a motion on October 13, 2005, accepting the Estero Marsh Preserve Land Stewardship Plan.

The plan was available for public review on the internet, as well as at the Lakes Regional Public Library. A public meeting was held June 27, 2006.

10. Review for Scheduling:

Department Director	Purchasing or Contracts	Human Resources	Other	County Attorney	Budget Services				County Manager/P.W. Director
<u>Ken</u>				<u>11/20/06</u>	Analyst	Risk	Grants	Mar	
<u>5-30-06</u>					<u>7/12/06</u>	<u>7/11/06</u>	<u>7/10/06</u>	<u>5/13/06</u>	<u>[Signature]</u>

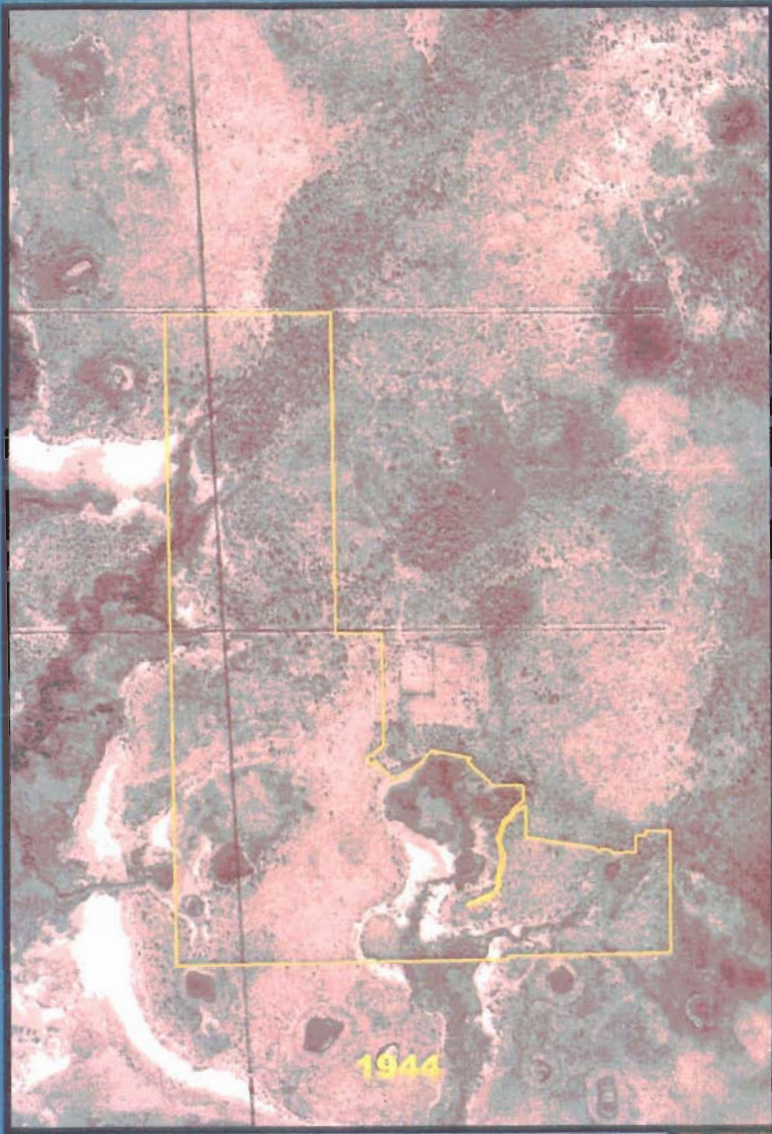
11. Commission Action:

- Approved**
- Deferred**
- Denied**
- Other**

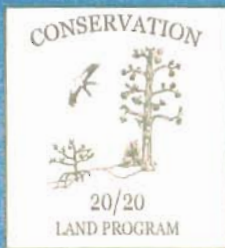
Rec. by CoAtt. _____
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 Time: 12:50pm
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7/12/06
11 AM
 COUNTY ADMIN
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7/17/06
9 AM

Estero Marsh Preserve



*Land Stewardship
Plan - 2006*



Estero Marsh Preserve
Island Park Road, Fort Myers, FL 33908
Land Stewardship Plan
2005

Approved by Lee County
Board of County Commissioners: -----

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VISION STATEMENT

It is the vision of the Lee County Department of Parks and Recreation to restore, improve, and protect the natural functions of the Estero Marsh Preserve to provide an important addition to the Estero Bay Preserve State Park and the Hendry Creek Watershed. This preserve will continue to serve as refuge and foraging habitat for wading birds, Florida black bear, gopher tortoise and other wildlife species, while providing for the treatment of stormwater runoff and pollutants that would otherwise directly enter the fragile Estero Bay estuary. The Preserve will serve as a valuable buffer between encroaching development and the natural estuarine ecosystem. As a natural barrier, the preserve will continue to provide upland properties with a level of protection from wind, flood and storm surge.

I. EXECUTIVE SUMMARY

The Estero Marsh Preserve was purchased as two separate parcels, Parcel 66 on Dec. 15, 1999 and Parcel 128 on July 9, 2001, through Lee County's Conservation 20/20 Program. The Conservation 20/20 Program was established in 1996 after Lee County voters approved a referendum that increased property taxes by up to 0.5 mil for the purposes of purchasing and protecting environmentally sensitive lands. The purchase and perpetual preservation of this site will provide protection for over 243 acres of saltwater marshes, mangrove swamps, salt barrens, pine flatwoods, and live oak hammocks. A total of 109.6 acres of exotic wetland hardwoods will be removed to restore the native vegetative communities and to provide new habitat for wildlife and plant species.

The Estero Marsh Preserve is located in Section 12, Township 46S, Range 24E, southwest of US 41. The Preserve lands are located directly adjacent to and contiguous with the existing Estero Bay Preserve State Park, and one-half mile west of Island Park Road. A Florida Power & Light (FP&L) easement bisects the Preserve. Residential communities associated with Island Park Village are located to the north and east. The County-maintained drainage canals, historically known as the Iona Drainage District (IDD) canals, extend along the northern boundary and along the FPL easement. These canals, known as IDD Canal T and U respectively, convey surface water flows from properties north and east of the Preserve.

The Estero Marsh Preserve has significant ecological importance, given its relationship to Estero Bay. Estero Bay is one of the most productive estuaries in the state (Florida State Parks web page, <http://www.floridastateparks.org/EsteroBay/default.cfm>). Its mangroves shelter important nesting colonies of wading birds, as well as feed and shelter many aquatic animals that are the foundation of a valuable commercial and sport fishery. The Estero Marsh Preserve includes large marshes, which filter upstream waters and protect water quality within the bay. In addition, removal of non-native vegetation within the preserve lands will help the growth of native plants and provide habitat for animals.

The Estero Marsh Preserve provides a large area that is periodically inundated and available for wading bird foraging. In its pre-restoration/ pre-enhancement condition, the Preserve contains extensive coverage by melaleuca. The density of melaleuca coverage lessens the value of the Preserve as significant wading bird habitat. Utilization of the Preserve as a regional mitigation area, as currently proposed by Lee County, will provide the opportunity to conduct extensive stewardship and restoration activities on the property which will hopefully improve use of the site by wildlife. Management will include enhancement via exotic vegetation removal, allowing native plants to recolonize the site. A prescribed burning regimen will also be implemented for the site, which will assist with the restoration of mesic flatwoods. Pine flatwood communities are dependent on fire for their ecological health and diversity (Main and Tanner 2003).

Restoration activities within the Preserve include hydrologic improvements that will redirect water flow to a historic flow pattern and into large created marshes before emptying into Hendry Creek and the waters of Estero Bay Aquatic Preserve. Redirection of surface water to the southern wetlands in the Preserve will provide additional storage and water treatment areas for

stormwater, prior to its discharge into Hendry Creek and Estero Bay; ultimately enhancing the water quality of those water bodies.

The goal of this land stewardship plan is to identify the Preserve's natural resources, and to develop ways to restore, enhance, protect and manage those resources to ensure that the Preserve maintains a viable, functioning ecosystem, functional buffer qualities and water treatment abilities. The Preserve will be managed through stewardship activities, monitored by County Staff, assisted by volunteer support, and promoted through educational outreach to the community.

II. INTRODUCTION

The Lee County Estero Marsh Preserve (EMP) consists of two adjacent parcels totaling approximately 243 acres, located in western Lee County, specifically west of Island Park Road, and north of Palm Road. These parcels were purchased by Lee County as part of the Conservation 20/20 program for the purposes of conserving and restoring a natural buffer to Estero Bay and to provide a source of mitigation for future County infrastructure projects.

The Preserve consists primarily of four major vegetative communities: exotic-invaded wet flatwoods, estuarine tidal marsh, estuarine tidal swamp and mesic flatwoods. Altered historic hydrologic regime and a lack of stewardship by prior owners have led to the invasion of this land by exotic vegetation. The largest community in the Preserve, in its pre-restoration/enhancement condition, consists of exotic-invaded wet flatwoods. These areas are dominated by exotic melaleuca (*Melaleuca quinquenervia*) and Brazilian pepper (*Schinus terebinthifolius*).

These rapidly spreading exotics are detrimental to the natural maintenance of historic hydrologic stability within Preserve wetlands, thereby decreasing ecosystem function and biological diversity of the Estero Marsh Preserve. Restoration and enhancement activities outlined in this plan provide for the control of exotic species and the improvement of hydrologic features. Existing ditches which route stormwater runoff and pollutants from development directly into Hendry Creek and Estero Bay will be replaced with three strategically created filter marshes. The historic hydrologic patterns will be restored through the installation of culverts through the existing FP&L easement, ultimately improving the water quality of Mullock Creek, Hendry Creek, Estero Bay and the Gulf of Mexico.

Exotic plant control, restoration of native plant communities, and increased hydrologic connectivity are goals that are expected to expand the diversity of native species within the preserve, and to improve the quality of waters entering the fragile Estero Bay estuary, thereby improving both terrestrial and marine ecosystems important to southwest Florida.

III. LOCATION AND SITE DESCRIPTION

The Estero Marsh Preserve is located in Section 12, Township 46S, Range 24E of southern coastal Lee County. When purchased by Lee County, the Preserve consisted of two Conservation 20/20 nominations, #66 and #128, located southwest of US 41 (Figure 1). Nomination #128 contains 160.4 acres and is located directly adjacent to and contiguous with

the existing Estero Bay Preserve State Park, one-half mile west of Island Park Road and Island Park Village, and south of The Forest Country Club Community. Nomination #66 is approximately 83 acres in size and is located south of the Island Park Village on the northwest corner of Island Park Drive and Park Road. It shares its western border with the southeast boundary of Nomination #128. A Florida Power & Light (FP&L) easement occurs on Nominations #128 and #66. Residential communities associated with Island Park Village are located north and east of nominations 66 and 128. Iona Drainage District (IDD) canals extend along the northern boundary of Parcel #128, and along the FPL easement that bisects Parcel #128. These canals, known as IDD Canal T and U respectively, convey surface water from properties north and east of the Preserve. The total acreage of the Estero Marsh Preserve is approximately 243 acres (Figure 2).

The Estero Marsh Preserve consists of seven native plant communities: mesic flatwoods, wet flatwoods, mesic hammock, prairie hammock, tidal swamp, tidal marsh, and tidal salt barren. These community designations are based upon Florida Land Use, Cover and Forms Classification System (FLUCCS, FDOT 1999). It also includes other land use types including berms, dikes and levees, previously cleared land, primitive trails, electrical power transmission lines, tidal swamp lake, as well as a large area of wet flatwoods – exotics community.

Exotic, invasive melaleuca trees alter natural wetland hydrologic function by soaking up water, and forming dense, impenetrable, rapidly growing stands, which crowd out native vegetation and prohibit free movement of many wildlife species. Melaleuca opportunistically spread millions of windborne seeds during fire and other disturbance events. Brazilian pepper, related to poison ivy, also forms dense impenetrable monocultures, which shade and crowd out native plant species. Brazilian pepper also leaches allelopathic chemicals into surrounding soils that inhibit the growth of native plant species (National Parks Service 2002).

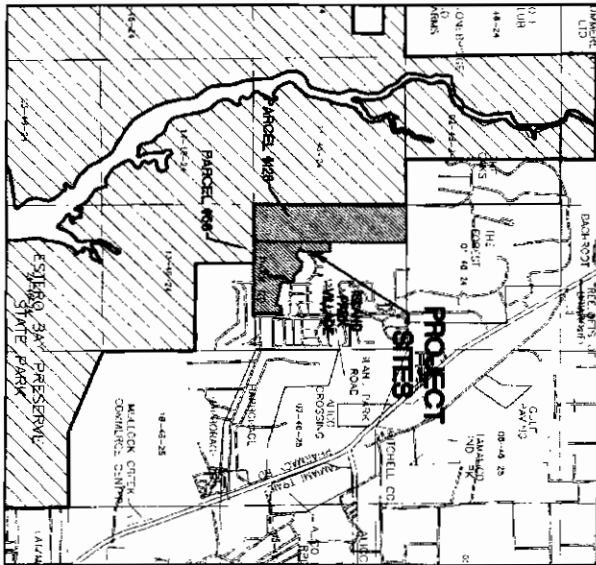
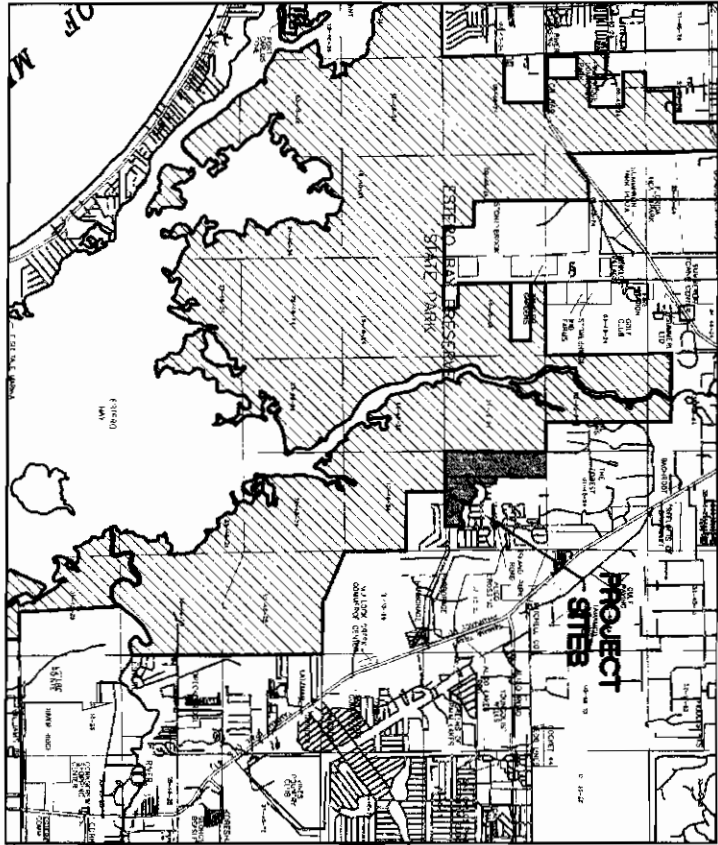


FIGURE 1

NOT TO SCALE

LEE COUNTY
 CONSERVATION 2020 PARCELS #66 AND #128
 PROJECT LOCATION MAP

PREPARED FOR: LEE COUNTY DEPARTMENT OF TRANSPORTATION

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 Landscape Architects • Transportation Consultants
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Author: J. L. Lutz
 Date: 11/11/2008
 Title: AS SHOWN
 Project: 08-0377-10-001-1000A
 File # 2-1177-01
 Scale: 1" = 1'
 Date: 11/11/2008
 Approved by: S.K.S./J.S.S.
 Drawn by: S.K.S./J.S.S.
 Checked by: S.K.S./J.S.S.
 Design by: S.K.S./J.S.S.
 City of Lee County
 SEC 12, TWP 46S, R6E, ZONE



Figure 2

Estero Marsh Preserve
Aerial Map



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IV. NATURAL RESOURCES DESCRIPTION

A. Physical Resources

i. Climate

Southwest Florida has a humid sub-tropical climate, with a cool dry season and warm rainy season due to its maritime influence from the Caribbean Sea and the Gulf of Mexico. The Bermuda high-pressure cell prevents convective clouds from building into thunderstorms in the fall and winter and as the Bermuda High weakens in late spring, thunderstorms occur regularly. Superimposed on the pattern of daily showers and thunderstorms is precipitation resulting from large-scale circulation systems such as tropical storms and hurricanes. In the late fall, winter, and early spring, fronts from the northeastern United States sweep over the state. These fronts can bring on significant swings in temperature and humidity, causing the weather to oscillate between maritime tropical and continental winter weather. Short periods of low temperatures and infrequent freezes, can damage or kill some of the more tropical plant species. Low rainfall in the winter can lead to drought in the spring, which consequently can influence plant growth and survival from one growing season to the next.

Rainfall data have not been previously collected for the Estero Marsh Preserve. However, local annual rainfall averages 54.7 inches at Lakes Regional Park; a Lee County facility located approximately 2 miles north of the Preserve. The entire Preserve lies within Lee County's Coastal High Hazard area and is vulnerable to both tropical storms and hurricanes during June-November.

ii. Geology:

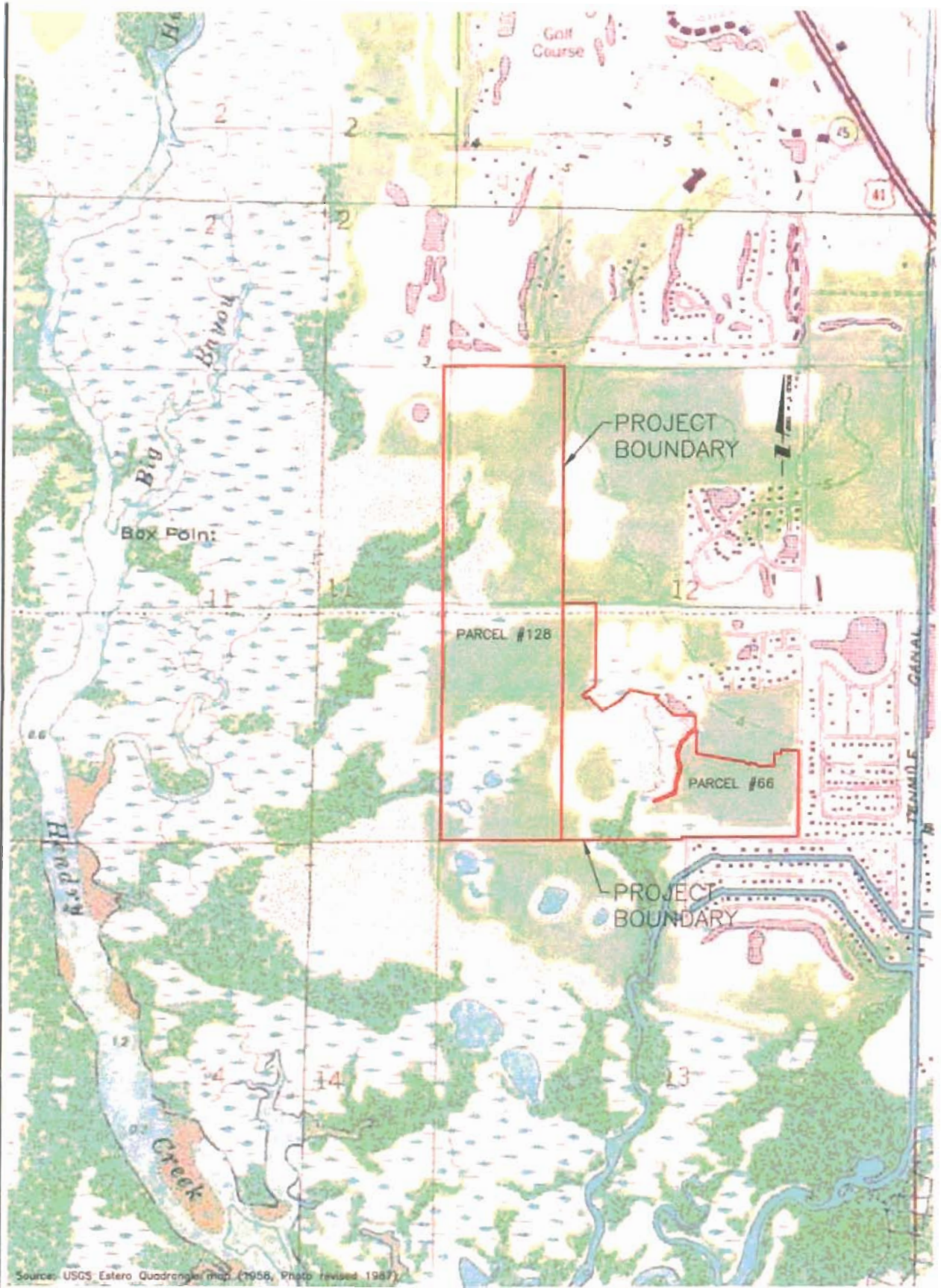
The Estero Marsh Preserve is located adjacent to Hendry Creek and Estero Bay Aquatic Preserve (Outstanding Florida Waters). The Estero Bay estuary complex began to form approximately 5,000 years ago when a sea level rise flooded the mouth of the Caloosahatchee River and the smaller rivers and creeks in the area. As the floodwaters receded, sediments were deposited in these areas forming beaches, tidal bars, shoal areas, mud flats and barrier islands. This combination of geologic activities generated shallow depths and created lagoon characteristics common to Estero Bay. This low-lying, relatively flat region developed on rocks and sediments that that formed between the Miocene and Pleistocene time periods of the Cenozoic era (24 million – 5 million years ago). Surficial materials are dominantly sand (often with relatively clayey substrata), limestone, and organic deposits.

iii. Topography

A review of the United States Geological Survey (USGS) 7.5 minute Estero Quadrangle (Figure 3) indicates that the Preserve is situated at an elevation of

approximately 4 feet above National Geodetic Vertical Datum. The contour lines in the area of the Preserve indicate that the area is sloped gradually to the southwest toward Estero Bay. Site-specific topographic information is provided in Figure 3. Manmade structures such as the spoil berms created from canal and ditch excavation, and the FPL easement have created topographic high spots, which divert natural sheetflow.

Aerial photographs from 1944 verify that the IDD canals were already excavated at that time (Figure 4). During the late 1920s the excavation of Ten Mile Canal was completed and permanently severed offsite flows into the property from the east. In the mid 1950s the FPL easement was constructed adjacent to the central IDD Canal, effectively severing a north - south flowway that appeared to breach the canal during the wet season. By 1958 excavation of the manmade canals serving the Island Park Subdivision were under construction. These canals eventually connected directly into the north-south tributary to Mullock Creek and adjacent wetlands. In the 1980s construction of the surrounding subdivisions of Island Park Village, Royal Woods, and The Forest were underway.



Source: USGS Estero Quadrangle map (1956, Photo revised 1987)

FIGURE 3

**LEE COUNTY
CONSERVATION 2020 PARCELS #66 AND #128
TOPOGRAPHIC MAP**

PREPARED FOR LEE COUNTY DEPARTMENT OF TRANSPORTATION

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CHECKED BY: J. B. BROWN
SCALE: AS SHOWN
PROJECT NO.: 18-001
SHEET NO.: 1 OF 1
DATE: 11/13/2018

Aerial Photography: Florida

707 x 712 pixels - 12% zoom

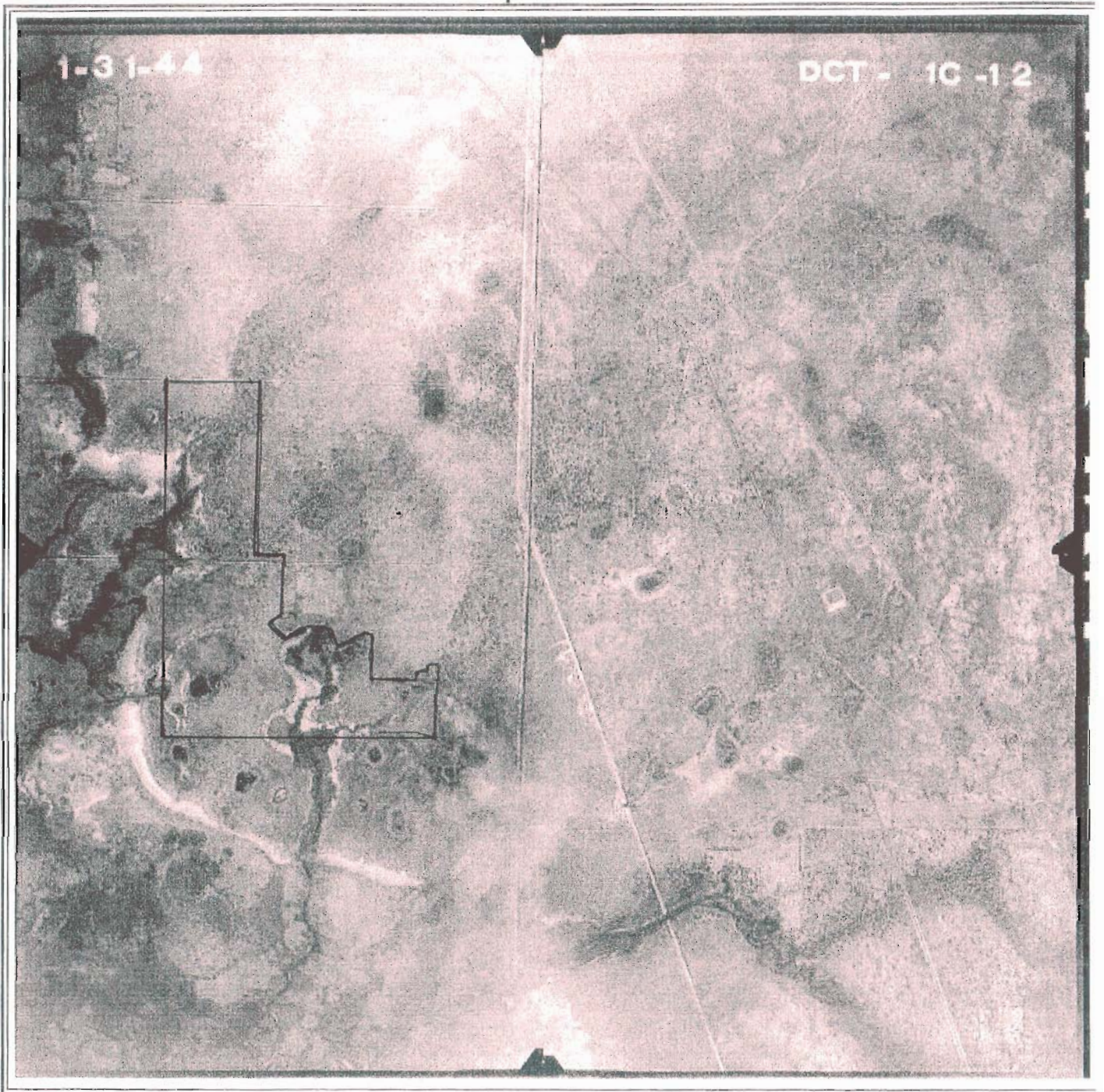


Figure 4

Historic Aerial Photograph
January 31, 1944

iv. Soils

The soils on the Estero Marsh Preserve include: 6 - Hallandale Fine Sand, 8 - Hallandale Fine Sand (tidal), 10 - Pompano Fine Sand, 13 - Boca Fine Sand, 34 - Malabar Fine Sand, 39 - Isles Fine Sand (depressional), 44 - Malabar Fine Sand (depressional), and 56 - Isles Muck (Figure 5). All the soils found on the site, except 6 - Hallandale Fine Sand and 13 - Boca Fine Sand, are classified as hydric by the Natural Resources Conservation Service (NRCS Soil Survey of Lee County, USDA, 1984). Vegetative communities present within the hydric soil profiles generally consist of saltwater marshes and mangrove swamps. The vegetative communities present within the non-hydric soil profiles consist mainly of pine flatwoods, hydric pine flatwoods and exotic wetland hardwoods.

The soils maps are based on vegetation and landscapes as interpreted from aerial photos, along with fieldwork. Major fieldwork conducted for the Lee County Soil Survey was completed in 1981. Accuracy of soil mapping is often around 70 to 80%, with a typical 3-acre mapping limit.

6 - Hallandale Fine Sand - This nearly level, poorly drained, smooth sloped soil is found in the upland pine flatwoods areas located in the northernmost portions of the Preserve. Fractured limestone bedrock occurs at a depth of 12 inches and contains solution holes extending to a depth of 25 inches. The water table is generally located less than 10 inches below the soil surface for 1 to 3 months out of the year, Hallandale fine sand has moderate to moderately rapid permeability. Typical native vegetation found within this soil type includes slash pine (*Pinus elliotii* var. *densa*) with an understory of saw palmetto (*Serenoa repens*), along with other subcanopy species such as winged sumac (*Rhus copallinum*), myrsine (*Rapanea punctata*), wax myrtle (*Myrica cerifera*), rusty lyonia (*Lyonia fruticosa*) and cabbage palm (*Sabal palmetto*).

8 - Hallandale Fine Sand (tidal) - This is a nearly level, poorly drained soil typically found on the outer edges of tidal flats. It is found within mangrove swamp, exotic wetland hardwood and saltwater marsh communities. Soil slopes are smooth to concave and range from 0 to 2 percent. Hard, fractured limestone bedrock with solution holes is present up to 26 inches deep below the soil surface. The water table fluctuates with the tide. The available water capacity of the soil is low, and permeability is moderately rapid. Native vegetation found within the mangrove swamps consists mainly of red (*Rhizophora mangle*), white (*Laguncularia racemosa*) and black mangroves (*Avicennia germinans*). Native vegetation within the salt marshes is dominated by needle rush (*Juncus roemerianus*) in most areas, with coastal spike rush (*Eleocharis cellulosa*), sand cordgrass (*Spartina bakeri*) and salt grass (*Dictichlis spicata*) present to a smaller degree in other areas. The exotic wetland hardwoods are dominated by exotic melaleuca and Brazilian pepper. Sparse native vegetation within exotic wetland

hardwoods consists mainly of slash pine, cabbage palm, buttonwood (*Conocarpus erectus*), myrsine and swamp fern (*Blechnum serrulatum*).

10 - Pompano Fine Sand - This is typically a nearly level, poorly drained soil found in sloughs. However, on this site it is located in an upland pine flatwood system in the extreme northern end of the Preserve. Slopes are smooth to concave and range from 0 to 1 percent. The water table is typically located at a depth of less than 10 inches for only 2 to 4 months out of the year. During periods of high rainfall, the soil is covered by slowly moving water for periods of about 7 to 30 days or more. The available water capacity is very low, and water permeability is rapid. Typical native pine flatwoods vegetation found on this soil type is similar to that found on Hallandale fine sand, consisting of slash pine with an understory of saw palmetto and other upland subcanopy species mentioned previously.

13 - Boca Fine Sand - This soil is typically characterized by nearly level, poorly drained soil located in flatwoods. Within the Preserve, this soil type is associated with exotic wetland hardwoods, pine flatwoods, and hydric pine flatwoods. Slopes are smooth and range from 0 to 2 percent. A layer of fractured limestone is typically located at a depth of 30 inches below the soil surface. The water table is generally located within 10 inches of the soil surface for 2 to 4 months out of the year, and recedes below the limestone for approximately 6 months/year. Native vegetation present in these communities is the same as previously discussed in other pine flatwoods and exotic wetland hardwood communities. Native vegetation present in hydric pine flatwoods with Boca fine sand soils consists of a dominant slash pine overstory with no saw palmetto present in the understory. Subcanopy species consist of cabbage palm, bald cypress (*Taxodium distichum*), myrsine, wax myrtle (*Myrica cerifera*), laurel oak (*Quercus laurifolia*), and dahoon holly (*Ilex cassine*). Native groundcover species include wiregrass (*Aristida stricta*), and gulfdune paspalum (*Paspalum monostachyum*).

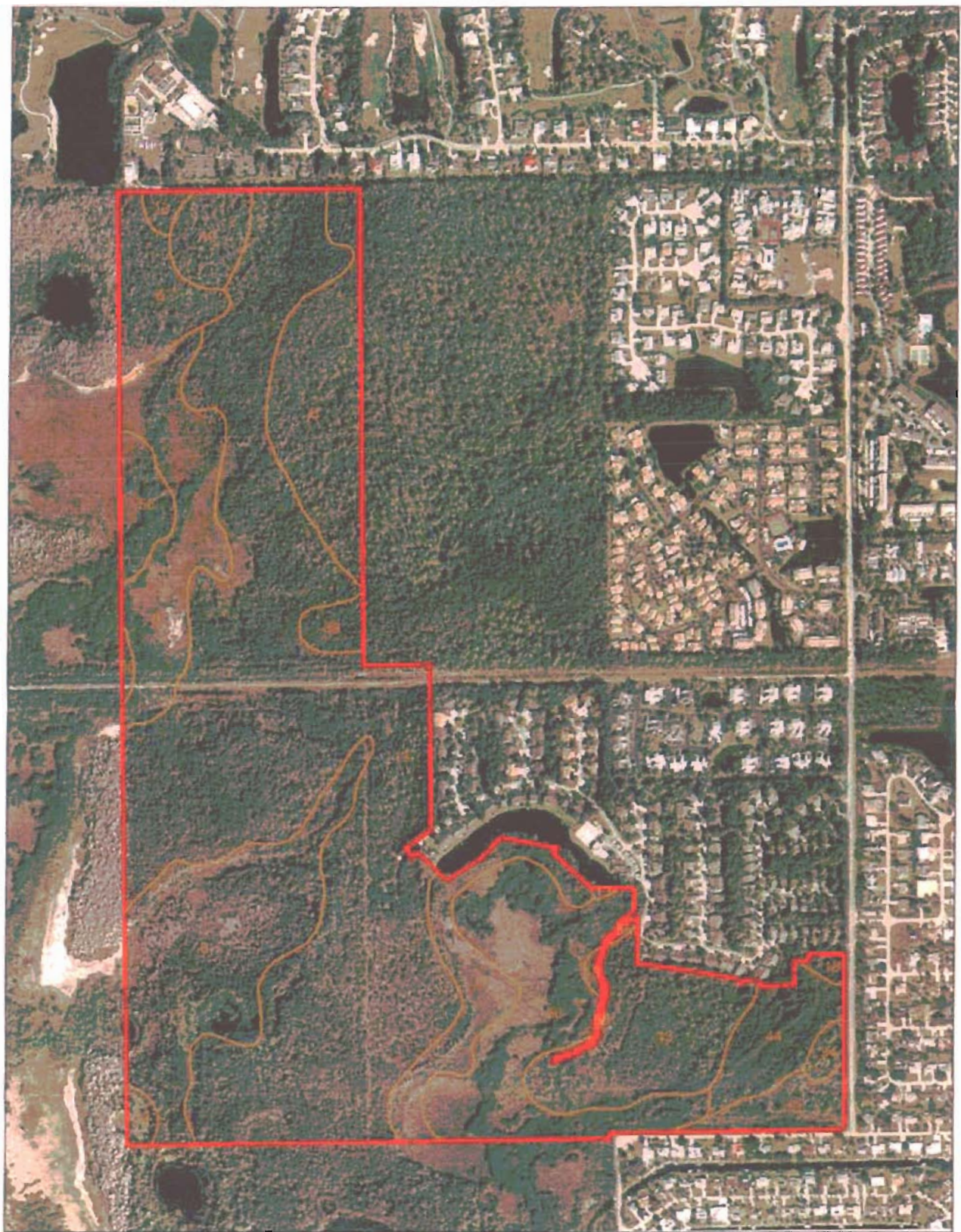
34 - Malabar Fine Sand - This is a nearly level, poorly drained soil typically found in sloughs. However, it is found in a small area within the upland pine flatwoods in the southeastern portion of the Preserve. Soil slopes are smooth to concave and range from 0 to 1 percent. The water table is typically found at a depth of less than 10 inches for 2 to 4 months. The available water capacity is low in the surface and subsurface layers. Permeability is rapid in the surface and subsurface layers. Native vegetation consists of slash pine with an understory of saw palmetto, and includes the same species found in other non-hydric pine flatwoods communities mentioned previously.

39 - Isles Fine Sand (depressional) - This is a nearly level, very poorly drained soil found in depressions. This soil profile is found within a small area on the east/central portion of the Preserve in an exotic wetland hardwood community.

Soil slopes are smooth to concave and less than 1 percent. Limestone bedrock is typically present at a depth of 47 inches. Under natural conditions, the water table is above the surface for 3 to 6 months. The available water capacity is low. Permeability is rapid in the surface and subsurface layers and moderate in the subsoil. The vegetation within this soil profile and the exotic wetland hardwood community consists of the same species previously listed for this vegetative community.

44 - Malabar Fine Sand (depressional) - This is a nearly level, poorly drained soil in depressions. This soil type is found in the far eastern end of the Preserve within the exotic wetland hardwood community. Slopes are concave and are less than 1 percent. Under natural conditions, the soil is ponded for about 4 to 6 months or more. The available water capacity is low in the surface and subsurface layers and medium in the subsoil. Permeability is rapid in the surface and subsurface layers and slow or very slow in the subsoil. Vegetation on this soil is the same as in other exotic wetland hardwood communities on the site.

56 - Isles Muck - This is a nearly level, very poorly drained soil typically found in tidal swamps. This soil type is found in mangrove swamps and saltwater marshes within the Preserve. Soil slopes are smooth and range from 0 to 1 percent. Fractured limestone bedrock is located at a depth of 47 inches. The water table fluctuates with the tide. The available water capacity is low in the surface and subsurface layers and medium in the subsoil. Permeability is rapid in the surface and subsurface layers and moderate in the subsoil. Native vegetation present in the mangrove swamps consists of red, black and white mangroves. Needle rush and coastal spike rush dominate the saltwater marsh areas.



Legend
 Boundary
 NRCS Soils



Legend

MUSYM	COMPNAME	LSPOS	HYDRIC
6	HALLANDALE FINE SAND	6	N
8	HALLANDALE FINE SAND TIDAL	2	V
10	POSPANO FINE SAND	7	V
13	BOCA FINE SAND	6	N
34	MALABAR FINE SAND	7	V
39	ISLES FINE SAND DEPRESSIONAL	6	Y
44	MALABAR FINE SAND DEPRESSIONAL	6	Y
56	ISLES MUCK	2	V

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Figure 5

Estero Marsh Preserve
 NRCS Soils Map

v. Hydrologic Regime and Watershed

The Preserve lands are located along the eastern boundary of the existing Estero Bay Preserve State Park at the north end of the Estero Bay estuary and watershed (Figure 6). The Preserve includes wetlands that serve as the headwaters of Hendry Creek and Mullock Creek. Hendry Creek and Mullock Creek are classified as Outstanding Florida Waters by the Florida Department of Environmental Protection and serve as a major surface water conveyance into Estero Bay, also classified as an Outstanding Florida Water. The Preserve is located within a Tropical Storm Surge zone and within the Coastal High Hazard Area.

The Preserve is bordered along the north boundary by IDD Canal T which conveys water discharged from residential projects located north of the canal and west of Island Park Road. IDD Canal T prevents sheetflow from entering the northern part of the Preserve. A second IDD Canal extends along the northern edge of the FPL easement within the center of the Preserve. This canal, although not as well defined as IDD Canal T, also directs flows from residential projects east and west of Island Park Road towards Hendry Creek. Drainage ditches border the FPL easement and also serve to channelize flow exiting Island Park Road into the southeastern portion of the Preserve. These drainage features serve to interrupt natural sheetflow patterns within the Preserve and to provide direct flow paths into Hendry Creek. As part of the planned restoration activities within the Preserve, portions of these ditches will be rerouted and/or culverted to improve and restore sheetflow within the site.

The southern portion of the Preserve historically provided sheetflow into an unnamed tributary of Mullock Creek, which then flows into Estero Bay. While wetlands are present onsite, historic hydraulic sheet flow onto the site has been altered by tributary channelization and their connection to a manmade canal system. Water onsite exhibits sheetflow offsite in a southerly direction. Three filter marshes will be created to provide water quality filtering and reduce point discharges into Hendry Creek before reaching Estero Bay (Figure 7).

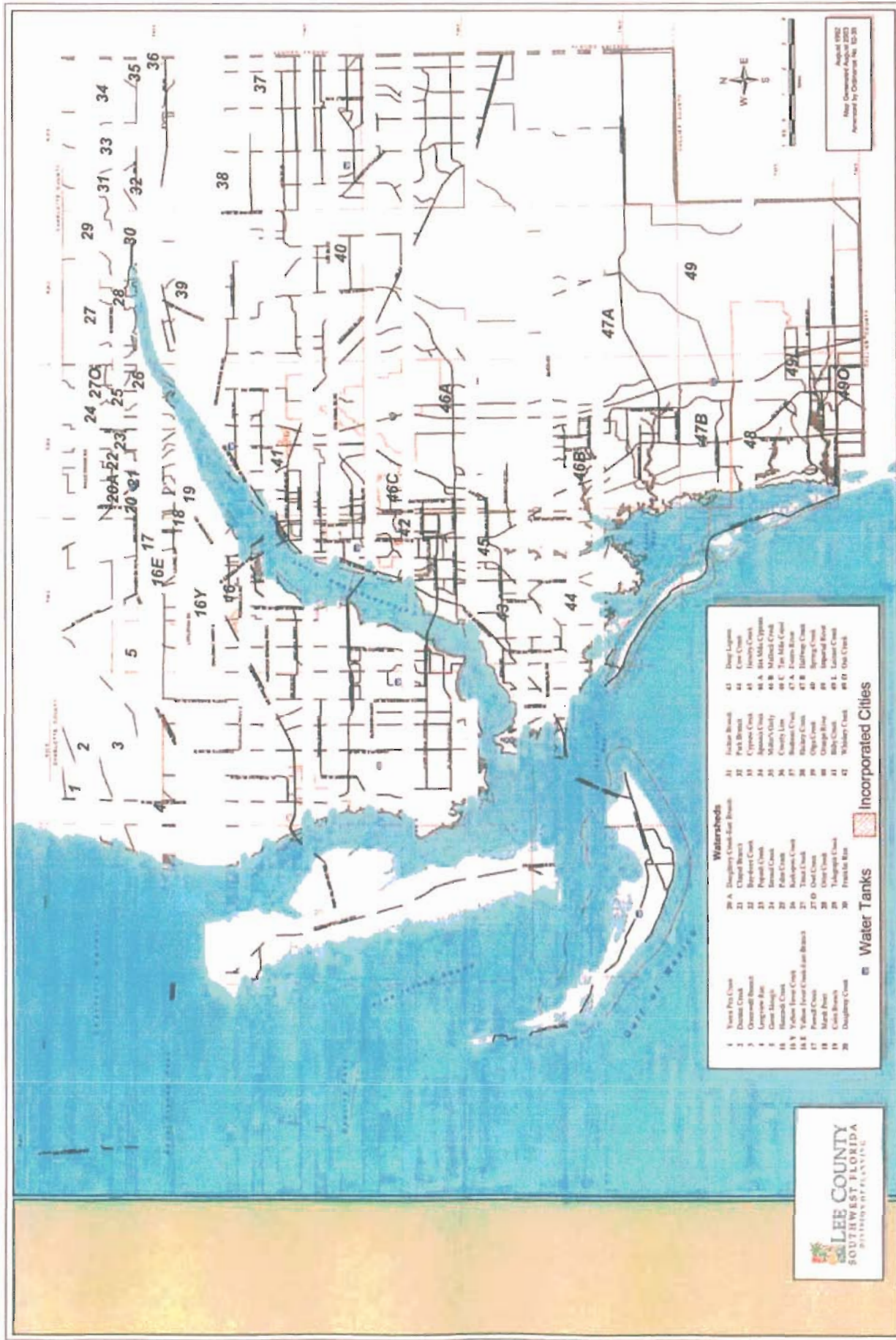


Figure 6
Lee County Watershed Map

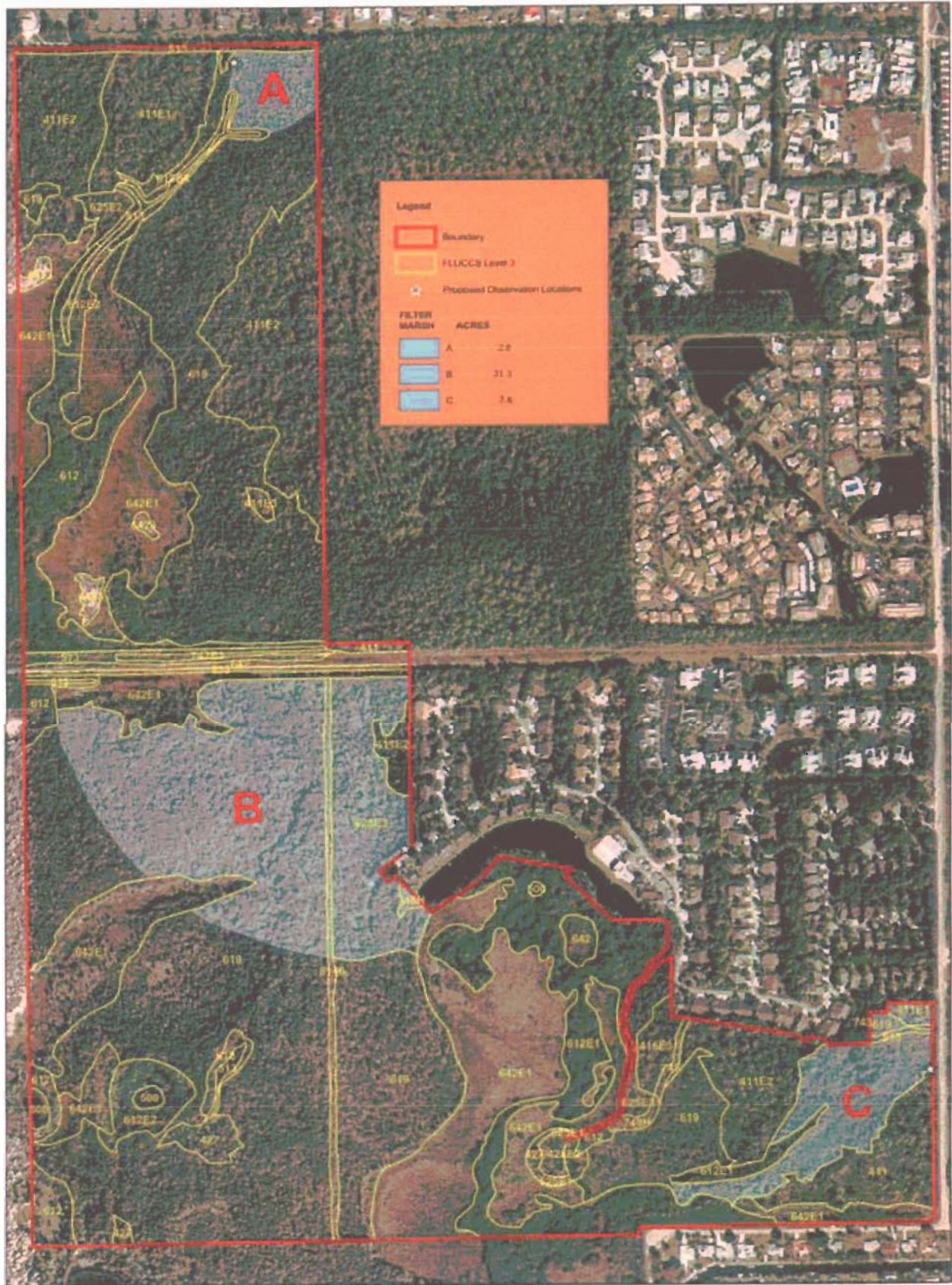


Figure 7



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**Estero Marsh Preserve
 Filter Marsh Location Map**

B. Biological Resources

i. Ecosystem Function

The Estero Marsh Preserve contains a mix of saltwater and brackish wetland communities as well as upland pine flatwoods. The northern portion contains two large pine flatwoods, which remain in fair condition with exotic vegetation present at moderate levels. The parcel also contains a remnant ditch/swale that extends from the northeast to the southwest through mangrove wetlands (Figure 8). Exotic vegetation is dense along the upper limits of the ditch, but decreases toward the southern limits where the ditch approaches the saltwater marsh. South of the ditch limits, the saltwater marshes and the mangrove wetlands remain high quality, containing little exotic vegetation. The southern portions exhibit heavy exotic vegetation infestation within the western half, with most areas exhibiting greater than 75% coverage by melaleuca (Figure 8). Some isolated mangrove areas and the saltwater marsh along the western boundary exhibit moderate invasion by exotics. The eastern half of the southern parcel contains better quality wetland communities, with the exception of melaleuca areas just west of the lake and adjacent to Island Park Road. Melaleuca infestation within the project site is heavy, particularly within wetland areas south of the FPL easement. These melaleuca wetlands extend from the FPL easement southward to the southern property boundary, and eastward towards the lake and saltwater marsh edges. Additionally, thick melaleuca stands are located north of the FPL easement, specifically within the northeast and southeastern corners of that parcel. Given the present condition of the site, its ecological function has been significantly degraded. However, through the preservation and restoration of these ecologically significant areas, the site has the potential to offer significant water quality benefits. Table 1 on page 22 provides a list of existing vegetative communities and corresponding acreages.

Approximately twelve percent of the Preserve (29.6 acres) consists of mangrove swamp, which is influenced by tidal flow and freshwater runoff. Mangroves (FLUCCS 612), such as those found at the Estero Marsh Preserve, are a significant plant community because they function as a nursery ground for most of Florida's commercially and recreationally important fish and shellfish (<http://www.sfrc.ufl.edu/Extension/pubtxt/for43.htm>). Mangrove swamps also provide breeding grounds for substantial populations of wading birds, shorebirds and other animals (FNAI 1990). In addition, species such as mangrove cuckoo (*Coccyzus minor*), black-whiskered vireo (*Vireo altiloquus*) and gray kingbirds (*Tyrannus dominicensis*) may utilize the Preserve's mangrove swamps for nesting. Two butterfly species, the mangrove skipper (*Phocides pigmalion*) and the black mangrove buckeye (*Junonia evarete*), depend on mangroves as a larval food source. Additionally, mangroves can produce up to 80% of the total organic material available in the aquatic food web through the continuous shedding of leaves and other plant components (FNAI, 1990). Mangroves are also valuable for their ability to stabilize intertidal sediment in environments with

moderate erosional forces. They protect shorelines and stabilize dredged spoil in suitable locations. The tides bring relatively clean water to the mangroves, and in turn, flush out accumulations of hydrogen sulfide and salts. The mangrove swamp also filters nutrients such as phosphorus and nitrogen from terrestrial runoff, which helps to buffer the estuary from water pollution. Mangrove forests and associated waters are valuable habitat for a diverse range of invertebrate, fish, amphibian, reptile, bird, and mammal species. Having this community within the Estero Marsh Preserve site adds to the Preserve's significant overall ecological function and value.

In addition, there are approximately 3 acres of salt marshes and barrens. The barrens exist within portions of the salt marshes unoccupied by vegetation. Salt marshes and barrens exist where the land and marine waters interface, and produce one of the highest rates of net primary production (photosynthetic production minus plant respiration) in the world. The few species adapted to live in this harsh environment are abundant. The food and cover available are utilized by a significant variety of juvenile estuarine fish. The salt marsh is considered to be the nursery ground for many of the species with commercial and recreational importance.

ii. Natural Plant Communities

The following descriptions provide a general summary of each of the FNAI Vegetative Communities and FLUCFCS/vegetation associations mapped on the preserve.

Mesic Flatwoods - 39.23 acres, 16.1% coverage

The mesic flatwoods community is synonymous to the Florida Land Use Cover and Forms Classification System (FLUCCS) codes and descriptions: 411 - Pine Flatwoods with Palmetto Understory and 416 – Pine Flatwoods with Graminoid Understory. Mesic flatwoods are concentrated in the northern and southeastern portions of the Preserve. These upland areas provide valuable foraging, roosting and burrowing habitat for many species of birds, mammals and reptiles, including the State listed gopher tortoise.

These areas are dominated by slash pine in the canopy and varying densities of melaleuca in the subcanopy. Subcanopy plant species also include winged sumac, myrsine, wax myrtle, rusty lyonia and cabbage palm. Running oak (*Quercus pumila*), saw palmetto, wiregrass, snowberry (*Chiococca alba*), American beautyberry (*Callicarpa americana*), pennyroyal (*Piloblephis rigida*), chocolate weed (*Melochia* spp.), poison ivy (*Toxicodendron radicans*), grapevine (*Vitis rotundifolia*), cat briar (*Smilax auriculata*), caesar weed (*Urena lobata*), love vine (*Cassytha filiformes*), dog fennel (*Eupatorium capillifolium*) and various grasses are the dominant species in the groundcover stratum. Melaleuca is present at levels ranging from 10 to 49% in pine flatwoods.

Listed wildlife species observed utilizing the mesic flatwoods community include: the Florida black bear (*Ursus americanus floridanus*), gopher tortoise (*Gopherus polyphemus*), bald eagle (*Haliaeetus leucocephalus*) and American kestrel (*Falco sparverius*).

Mesic Hammock – 1.24 acres, 0.5% coverage

This community is synonymous to the FLUCCS code and description 427 - Live Oak. These areas consist of small isolated upland communities located in the southern portion of parcel 128 and the central portion of parcel 66 (refer to Figure 1 to reference parcel #s). They have a sparse canopy dominated by live oak (*Quercus virginiana*). Ground cover in these areas includes saw palmetto, rusty lyonia, myrsine and various other upland shrubs and herbaceous species. Brazilian pepper is present, but not a significant component in the vegetative composition.

The relatively small size of these isolated communities limits their individual capacity to harbor listed plant and animal species, but they do provide dry refuge for small mammals during high water events. Some listed bromeliads such as reflexed wild pine (*Tillandsia balbisiana*) and common wild pine (*Tillandsia fasciculata*) may be found in this community.

Prairie Hammock - 0.48 acres, 0.2% coverage

This community is synonymous to the FLUCFCS code 427/428 Live Oak/Cabbage Palm: These palm/oak hammocks are often found adjacent to depression marshes. A sparse mixture of live oak and cabbage palm in the canopy dominates this community. Scattered saw palmetto and various incidental upland shrubs and grasses are also present in the midstory and groundcover. Brazilian pepper and melaleuca are present throughout this community, but comprise less than 50% of the dominant vegetation.

Tidal Swamp Lake- 0.62 acres, 0.3% coverage

(FLUCCS code 500 - Open Water): These areas consist of open water within mangrove-dominated wetlands. Water depth is sufficient to prevent vegetation from becoming established. These open water systems vary in size from 0.1 acres to 0.4 acres. The water is usually brackish to saline and supports little vegetation except for red, white and black mangroves around the perimeter.

Ditch/Swale – 3.38 acres, 1.4% coverage

(FLUCCS code 513). These areas are highly disturbed and usually contain a high percentage of bare ground. Exotics and nuisance species are prevalent in these areas. There are several ditch features within the Preserve. Ditches parallel the FPL easement, extend from culverts beneath Island Park Road, and

remain within the northern and southwestern wetlands. Golden leather fern (*Acrostichum aureum*) is present along the majority of the ditches where standing water is present, with melaleuca and mangroves growing in the larger ditch sections.

Estuarine Tidal Swamp – 29.61 acres, 12.2% coverage

(FLUCCS code 612 – Mangrove Swamp) This coastal hardwood community is composed of red, white and/or black mangroves. Buttonwood and myrsine are also associated with many of the mangrove swamps. Golden leather fern and giant leather fern (*Acrostichum danaeifolium*) tend to be the dominant species in the groundcover. Melaleuca is present at levels ranging from 0 to 85% in mangrove habitats of the site, with most containing <50%. Brazilian pepper is also present as 10-25% of the subcanopy vegetation in these areas.

Wet Flatwoods - 11.34 acres, 4.7% coverage

(FLUCCS code 625 - Hydric Pine Flatwoods): These areas are dominated by a slash pine canopy with scattered cabbage palm, bald cypress, myrsine, wax myrtle, laurel oak, and dahoon holly in the subcanopy. The majority of the cypress trees found on site are dead or severely stressed and dying. Saltwater intrusion seems to be the reason for the mortality of these trees. Groundcover species often include wiregrass, gulf paspalum, yellow-eyed grass (*Xyris elliotii*), love grasses, panic grasses, muhly grass (*Muhlenbergia capillaris*), camphor weed (*Pluchea purpurascens*), little blue maiden-cane (*Amphicarpum muhlenbergianum*), and caesar weed. Saw palmetto, where present, is widely scattered. Vines include muscadine grape, poison ivy, and catbrier. Exotic species, such as melaleuca and Brazilian pepper, occur in varying amounts throughout this community.

Wet Flatwoods – Exotic – 109.56 acres, 45.0% coverage

(FLUCFCS 619 Exotic Wetland Hardwood (Melaleuca / Brazilian pepper Mix)): These areas are typically dominated by melaleuca in the canopy and may contain varying densities of Brazilian pepper in the subcanopy. Slash pine, cabbage palms and scattered oaks are found in these systems. Minor amounts of buttonwood and myrsine are also associated with some of these areas. Due to the high degree of canopy closure, the groundcover stratum contains minimal cover. Swamp fern (*Blechnum serrulatum*), swamp lily (*Crinum americana*), and leather fern are occasionally present in the groundcover. Most of these areas exhibit evidence of standing water and demonstrate strong wetland characteristics.

Estuarine Tidal Marsh - 47.06 acres, 19.3% coverage

(FLUCCS code 642 - Saltwater Marsh): These areas are dominated by needle rush, coastal spike rush, saltmarsh cordgrass, and salt grass. Saltwort (*Batis maritima*), fringe rushes (*Fimbristylis castanea*) and (*Fimbristylis spathacea*), glasswort (*Salicornia virginica*), coastal dropseed (*Sporobolus virginicus*), sea oxeye daisy (*Borrchia frutescens*), joint-tail grass (*Manisuris rugosa*) and leather fern are also present at various locations. Some saltwater marsh habitats of the site contain 10 to 24% melaleuca.

Tidal Salt Barren - 0.81 acres, 0.3% coverage

(FLUCCS code 6423 - Salt Barren): These are areas located in the interior of saltwater marshes that are dominated by bare substrate. Minor amounts of needle rush or coastal spike rush are present in some areas. These areas have been subjected to occasional disturbance by off-road vehicles in the past resulting in sparse ruts and tracks that hold water.

Berms - 0.01 acres, 0.004% coverage

(FLUCFCS 743 Berms): This area comprises the eastern berm of the stormwater pond constructed at the southeastern corner of the residential subdivision north of parcel 66. It is dominated by Brazilian pepper and Caesar weed.

Dikes and Levees – 0.44 acres, 0.2% coverage

(FLUCCS code 747 - Dikes and Levees): The FP&L easement represents the most predominant berm within the project site. In addition, smaller berms that are overgrown and unmaintained extend along the northern property boundary adjacent to IDD canal T, and along the FPL easement and IDD canal U.

Previously Cleared Land – 0.74 acres, 0.3% coverage

(FLUCCS code 748 - Previously Cleared Land): These areas are commonly vegetated with melaleuca and ear-leaf acacia (*Acacia auriculiformis*) seedlings along with various herbaceous groundcover species. Widely scattered immature trees are also present along the previously cleared edges.

Primitive Trails – 1.43 acres, 0.6% coverage

(FLUCCS code 8146 - Primitive Trails): A primitive trail occurs along the common boundary of Parcel #66 and #128, and may have originally been cleared by a survey crew to facilitate a boundary survey of the site. Periodic foot and off-road vehicle traffic has prevented this area from revegetating.

Electrical Power and Transmission Lines- 0.77 acres, 0.3% coverage

(FLUCCS 832 Electrical Power Transmission Lines): There is an east-west trending FPL power line that bisects the property. Various grasses inhabit the area that is regularly mowed and maintained.

Table 1: FLUCFCS Codes and Acreages for Existing Communities at the Estero Marsh Preserve

FLUCFCS CODE	FLUCFCS DESCRIPTION	UPLAND ACREAGE	WETLAND ACREAGE	TOTAL ACREAGE
411	Pine Flatwoods – Palmetto Understory	5.12		5.12
411E1	Pine Flatwoods – Palmetto Understory (10-24%exotics)	6.13		6.13
411E2	Pine Flatwoods – Palmetto Understory (25-49% exotics)	23.21		23.21
411E3	Pine Flatwoods – Palmetto Understory (50-75%exotics)	.24		.24
416E3	Pine Flatwoods – Graminoid Understory (50-75% exotics)	1.15		1.15
427	Live Oak	1.24		1.24
427/428E2	Live Oak/Cabbage Palm (25-49% exotics)	.48		.48
500	Water		.62	.62
513	Ditches	.91	2.47	3.38
612	Mangrove Swamps		10.57	10.57
612E1	Mangrove Swamps (10-24% exotics)		14.71	14.71
612E2	Mangrove Swamps (25-49%exotics)		3.29	3.29
612E4	Mangrove Swamps (>75% exotics)		1.04	1.04
619	Exotic Wetland Hardwoods		109.56	109.56
625E1	Hydric Pine Flatwoods (10-24% exotics)		.69	.69
625E2	Hydric Pine Flatwoods (25-49% exotics)		.72	.72
625E3	Hydric Pine Flatwoods (50-75% exotics)		9.93	9.93
642	Saltwater Marshes		1.91	1.91
6423	Salt Barren (a.k.a. Salt Flat, Salt tern, etc.)		.81	.81
642E1	Saltwater Marshes (10-24% exotics)		45.15	45.15
743	Spoil Areas	.01		.01
743E3	Spoil Areas (10-24% exotics)	.44		.44
748	Previously Cleared Land	.26		.26
748H	Previously Cleared Land with Hydric Indicators		.48	.48
8146	Primitive Trails		1.43	1.43
832	Electrical Power Transmission Lines		.77	.77
	TOTALS	39.19	204.15	243.34

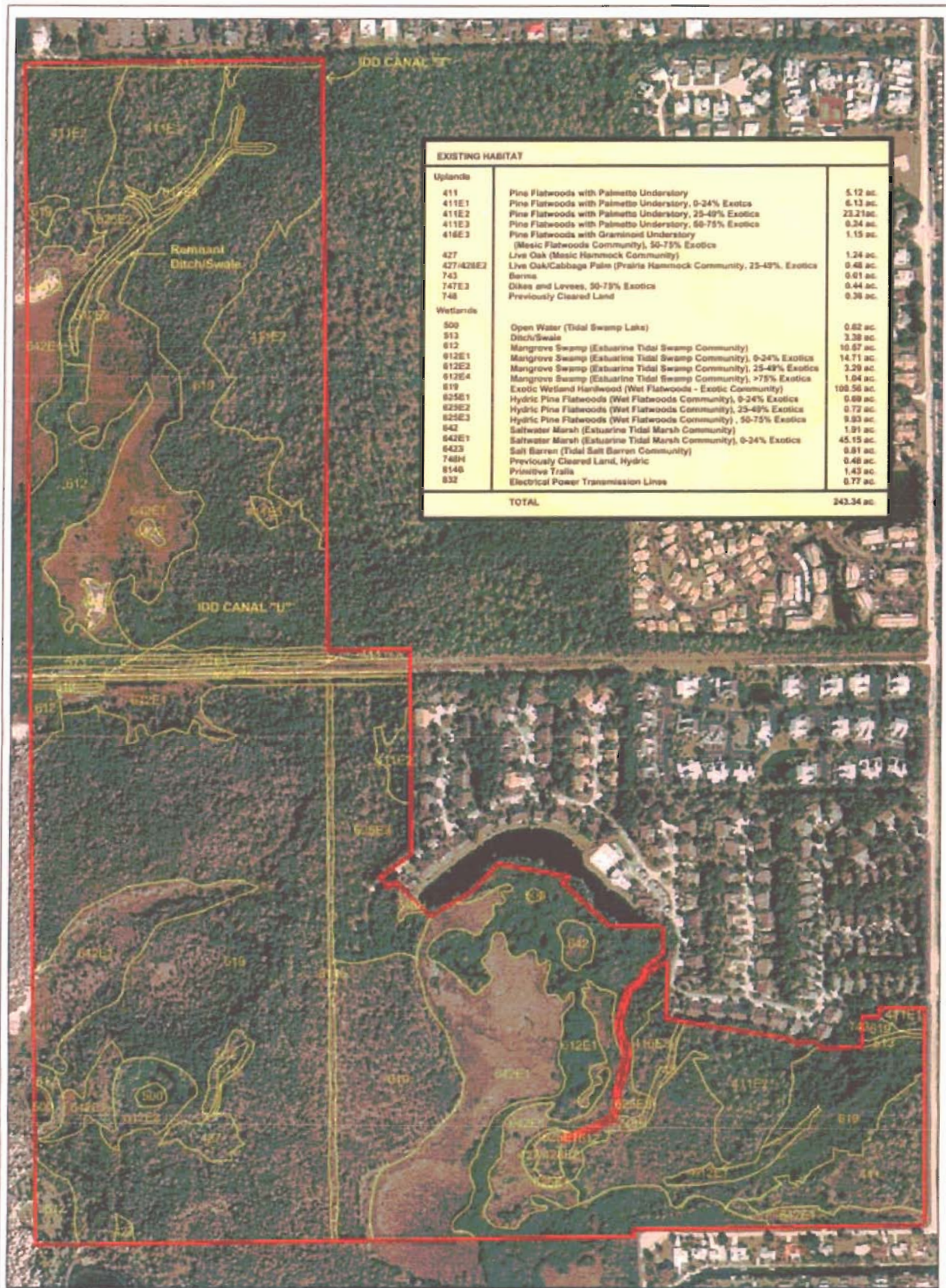


Figure 8

Estero Marsh Preserve
FLUCFCS Map



1 inch equals 400 feet



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iii. Fauna

The Estero Marsh Preserve provides a unique combination of estuarine wetlands and mesic flatwood uplands which offer habitat to a diversity of coastal wildlife. Bird species seen at EMP include a variety of wading birds and most notably, four species of woodpeckers: pileated (*Dryocopus pileatus*), red-bellied (*Centurus carolinus*), downy (*Picoides pubescens*) and hairy (*Picoides villosus*) woodpeckers. These birds may be found utilizing cabbage palms, slash pines and old snags, adjacent to the tidal marsh areas, for foraging and nesting. The Florida Black Bear has been confirmed as being on-site, as evidenced by scat and roughed-up cabbage palms. A small number of gopher tortoise burrows have been observed on-site, and it is hoped that through habitat management practices, the population will increase. The Estero Marsh Preserve is located adjacent to the Estero Bay Preserve State Park, thus expanding wildlife habitat for a diversity of species. For a complete list of species observed by WilsonMiller staff during wildlife surveys at Estero Marsh Preserve, refer to Table 3.

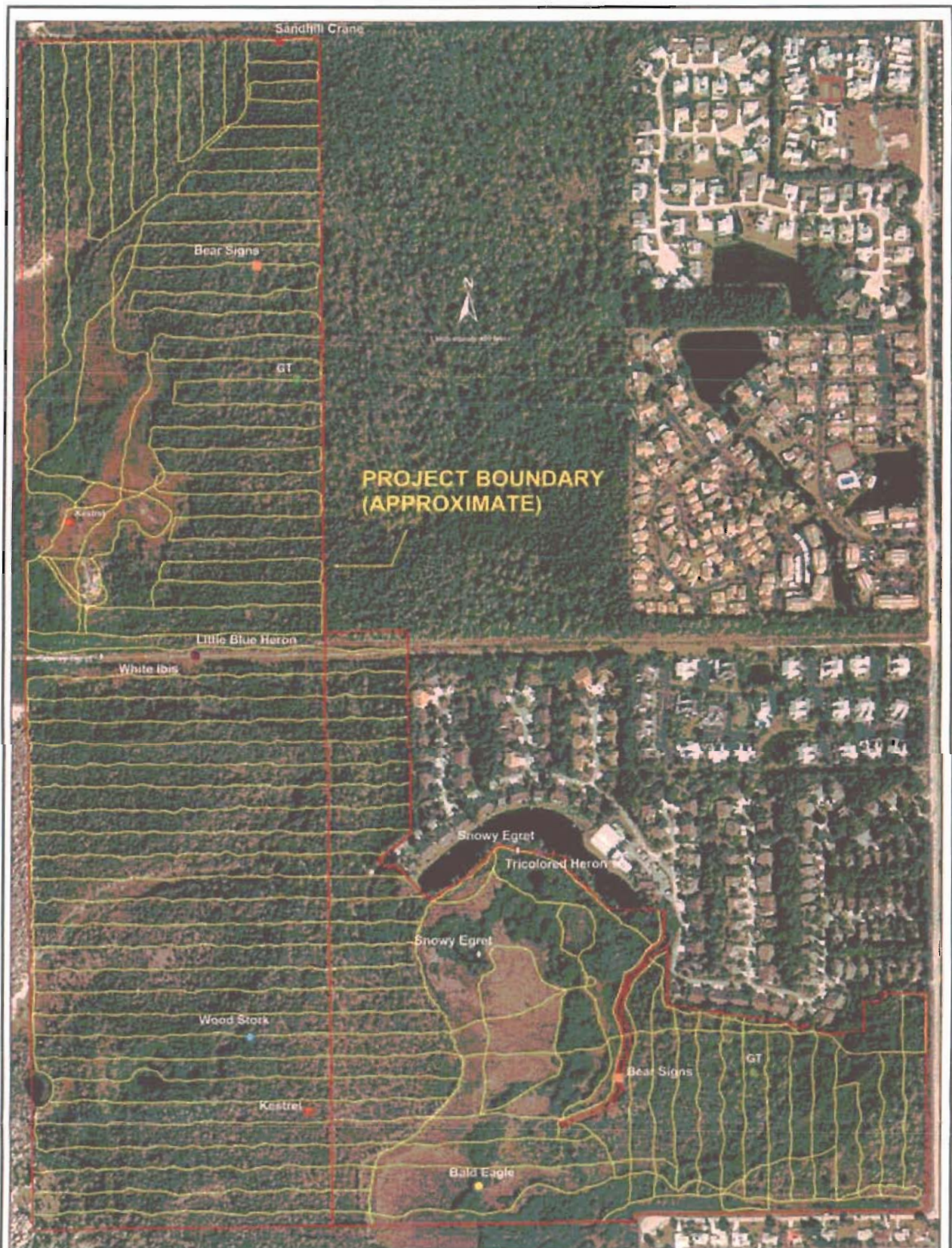
Exotic wildlife species have also been observed at the Estero Marsh Preserve. These species are listed in Table 2 below. The feral hog (*Sus scrofa*) is an important species to be concerned about since it often disturbs the natural landscape in search of food. Feral hogs often uproot and eat newly planted herbaceous vegetation, causing wide-spread destruction of planted marsh vegetation, and leaving a craterous landscape in their path. Lee County Parks and Recreation currently traps feral hogs through a private contractor.

Table 2: Exotic Wildlife at Estero Marsh Preserve

Scientific Name	Common Name
<i>Osteopilus septentrionalis</i>	Cuban treefrog
<i>Anolis sagrei</i>	Brown anole
<i>Sus scrofa</i>	Feral hog

iv. Designated Species

A summary of wildlife and plant species (listed by FWC, FWS, FDA, FNAI) that were either observed during the December 2003 listed survey performed by WilsonMiller ecologists or have the potential to occur on-site is presented in Table 3. Their State and Federal listed status and FNAI classification as well as occurrence are included in this table. The locations of the listed wildlife species observed during the field surveys are shown in Figure 9.



LEGEND

Listed Species

- Bald Eagle
- Bear Signs
- Greater Turtledove Burrows or Signs
- Kestrel (Observed 12/12/15)
- Little Blue Heron
- Sandhill Crane
- Snowy Egret
- Tricolored Heron
- White Ibis
- Wood Stork

— Project Boundary

— Species Transects

Listed Species and Transect Exhibit

Figure 9

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PROJECT: ESTERO MARSH PRESERVE
 CLIENT: LEE COUNTY PARKS & RECREATION

PROJECT : 04325-001-000 - FPCIP
 SEC. 7, 8, 17 & 18 TWP. 46S, RNG. 35E, Lee County, Florida

Table 3: Designated Species and Their Occurrence at the Estero Marsh Preserve

SCIENTIFIC NAME	COMMON NAME	STATUS			OCCURRENCE
		FWC	FWS	FNAI	
AMPHIBIANS					
<i>Rana areolata</i>	Gopher frog	SSC	NL	NL	Possible/Unlikely
REPTILES					
<i>Gopherus polyphemus</i>	Gopher tortoise	SSC	NL	G3/S3	*Confirmed
<i>Drymarchon corais couperi</i>	Eastern indigo snake	T	T	G3/S3	Possible
BIRDS					
<i>Egretta thula</i>	Snowy egret	SSC	NL	G5/S3	Confirmed
<i>Egretta caerulea</i>	Little blue heron	SSC	NL	G5/S4	Confirmed
<i>Egretta tricolor</i>	Tricolor heron	SSC	NL	G5/S4	Confirmed
<i>Egretta rufescens</i>	Reddish egret	SSC	NL	G4/S2	Possible
<i>Eudocimus albus</i>	White ibis	SSC	NL	G5/S4	Confirmed
<i>Mycteria americana</i>	Wood stork	E	E	G4/S2	Confirmed
<i>Platalea ajaja</i>	Roseate spoonbill	SSC	NL	G5/S2	Possible
<i>Grus canadensis pratensis</i>	Florida sandhill crane	T	NL	G5/S2S3	Confirmed
<i>Haliaeetus leucocephalus</i>	Bald eagle	T	T	G4/S3	Probable
<i>Vireo altiloquus</i>	Black-whiskered vireo	NL	NL	G5/S3	Probable
MAMMALS					
<i>Sciurus niger avicennia</i>	Big Cypress fox squirrel	T	NL	G5/S2	Probable
<i>Ursus americanus floridanus</i>	Florida black bear	T	NL	G5/S2	*Confirmed
SCIENTIFIC NAME	COMMON NAME	STATUS			OCCURRENCE
		FDA	FWS	FNAI	
PLANTS					
<i>Acrostichum aureum</i>	Golden leather fern	E	NL	G5/S3	Confirmed
<i>Zamia floridana</i>	Florida coontie	CE	NL	NL	Possible
<i>Tillandsia fasciculata</i>	Stiff-leaved wild pine	E	NL	NL	Confirmed
<i>Tillandsia balbisiana</i>	Reflexed wild pine	T	NL	NL	Confirmed
<i>Tillandsia utriculata</i>	Giant wild pine	E	NL	NL	Confirmed
<i>Tillandsia flexuosa</i>	Twisted air plant	E	NL	G5/S3	Confirmed
<i>Acrostichum danaeifolium</i>	Giant leather fern	CE	NL	NL	Confirmed
<i>Encyclia tampensis</i>	Butterfly orchid	CE	NL	NL	Confirmed
<i>Eulophia alta</i>	Wild-coco	T	NL	NL	Possible

* Denotes that this species was not observed directly, but through the identification of scat, burrows and/or tree scratchings that were observed

** Denotes that this species could not be positively identified as the protected subspecies but is included as if it were

FWC = Florida Fish and Wildlife Conservation Commission

USFWS = U.S. Fish and Wildlife Service

T(S/A) = Threatened by similarity of appearance

NL = Not Listed

T = Threatened

SSC = Species of Special Concern

E = Endangered

CE = Commercially Exploited

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

S2 = Imperiled in Florida because of rarely (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)

Gopher tortoise (*Gopherus polyphemus*) - During the 2003 listed species field surveys, five gopher tortoise burrows were observed. Since this survey, WilsonMiller ecologists returned to the site to perform additional surveys and found that only one of the original five gopher tortoise burrows remains active. The other four burrows have since been abandoned. The one remaining active burrow is located in the mesic flatwoods on the northeast section of parcel 128. Signs of gopher tortoises (scat) were observed in the mesic pine flatwoods area in the northeast end of Parcel 66. Florida Fish and Wildlife Conservation Commission (FWC) considers a minimum of 40 to 50 individual breeding tortoises to be a long-term viable population.

Gopher tortoise burrows that were observed were ribboned in the field and recorded on color aerials. The Listed Species Map Exhibit (Figure 9) may be referenced for this gopher tortoise burrow location. Careful attention to burrow locations will be paid during control of exotic plant species and during the creation of filter marshes to avoid damage to the burrows/tortoises. An additional bright pink ribbon or a barricade will be placed with a minimum 25-foot diameter around the active burrow prior to removal of exotics in this area. Conservation 20/20 Land stewardship or consulting staff will conduct burrow surveys in upland communities (primarily pine flatwoods) prior to exotic plant treatment that requires mechanical methods. Any additional burrows observed will be flagged off or barricaded in a 25-foot diameter circle as well, with additional ribbon directly marking the burrow. Heavy equipment operators will be advised to avoid these areas. Exotic vegetation within the flagged areas will be removed by hand only without causing any damage to burrows or gopher tortoises. Ribbon or barricades shall remain in place until all initial exotic removal and filter marsh creation has been completed.

During post-burn evaluations, Conservation 20/20 stewardship staff will record any new gopher tortoise burrow locations. If any new burrows are observed, a more thorough search within the burn unit will take place, and all burrow locations will be recorded using GPS.

Florida sandhill crane (*Grus canadensis pratensis*) - One individual was observed during the 2001 preliminary listed species survey. Based upon typical life history needs, the two most frequently used habitats for the Florida sandhill crane are pasture/prairies and emergent palustrine wetlands dominated by pickerelweed (*Pontederia cordata*) and maidencane (*Panicum hemitomon*). Since neither of these two communities is present on this site, the observance of this species on-site indicates probably only incidental usage. However, the creation of the three on-site filter marshes will substantially expand the amount of suitable habitat for this species.

Southeastern American kestrel (*Falco sparverius paulus*) - It cannot be accurately determined whether the individuals that were observed were indeed the protected subspecies since the subspecies cannot be differentiated in the

winter months when the surveys were completed. Two individuals were observed utilizing the fringe between the mangrove and saltwater marsh communities and between the melaleuca and saltwater marshes. Kestrels are secondary cavity-nesters, depending on cavity excavators such as woodpeckers and natural processes to produce nesting sites. No nesting sites were observed on-site though abundant woodpecker usage of the site and the presence of slash pine and snags make the site suitable for kestrel nesting. Kestrels also require open areas to forage for food, which this site also contains, increasing the likelihood of persistent usage by this species.

White ibis - The white ibis's (*Eudocimus albus*) foraging areas available on the Preserve include low tidal marshes and ditches. Red mangrove prop roots also offer a fishing platform for the white ibis and other wading birds. No wading bird nests were observed on the project site.

Snowy egret – The snowy egret's (*Egretta thula*) numbers have declined over the years due to historic use of its plumage and feathers for fashionable women's hats, loss of wetlands to development, pollution and DDT. Foraging and roosting areas of the Estero Marsh Preserve include the estuarine tidal marsh and estuarine tidal swamp. Removal of exotics such as melaleuca and Brazilian pepper trees and hydrologic restoration, including the creation of filter marshes will provide increased foraging habitat for the snowy egret at this preserve.

Little blue heron – The little blue heron (*Egretta caerulea*) has been observed in ditches and estuarine tidal swamps on the site. Their numbers have declined over the years due to pesticide use and loss of wetland foraging, nesting and roosting habitat. Wetland restoration and enhancement will greatly increase foraging areas for the little blue heron at the EMP.

Wood stork – Historically, the wood stork (*Mycteria americana*) was exposed to DDT and hence, showed evidence of the same effects (i.e. birth defects, soft/weak egg shells that were inadvertently crushed by the parents during the incubation period) as other listed birds. Due to the development of wetlands within the home range of the wood stork, valuable foraging and nesting habitat has been lost. Amazingly, this species has adapted to foraging in many man-made ditches as well as shallow wetlands. Wetland restoration, enhancement and management activities listed previously will provide the same benefits to the wood stork. However, the wood stork is primarily a freshwater forager and the Preserve provides mainly estuarine wetland habitats.

Tricolored heron – The tricolored heron (*Egretta tricolor*) has been historically threatened due to the harvesting of individuals for the sale of its plumage for ladies' decorative hats. DDT affected the fecundity of this species as well. Loss of wetlands has also posed a problem for this wading bird. Restoration, enhancement and management practices on the Preserve should provide the tricolored heron with increased habitat for foraging, nesting and roosting. The

tricolored heron has been observed along ditches and mangrove fringes bordering estuarine tidal lakes within the EMP.

Roseate spoonbill (*Platalea ajaja*) – This wading bird is considered rare and forages in shallow marine, brackish, or freshwater sites including the communities found on-site. The possibility of the site being used by roseate spoonbills is moderate. The roseate spoonbill has not yet been documented at the EMP.

Reddish egret - Reddish egrets (*Egretta rufescens*) are limited to the coast and nest exclusively on coastal islands located near suitable foraging habitat and are protected from terrestrial predators. They forage on broad, barren sand or mud flats, which are present on this project site. While there is potential for utilization of the Preserve by reddish egrets for foraging, nesting is not likely.

Bald eagle (*Haliaeetus leucocephalus*) - One immature bald eagle was observed flying over the site during the field surveys. Although bald eagles occur in a wide variety of communities throughout their range, proximity to open water is important. Preferred habitat includes a high amount of water-to-land edge where prey is concentrated. While this property does have open water bodies, they are small (10 acres or less) and not conducive to significant bald eagle foraging. Nesting habitat generally consists of older, taller trees with an unimpeded view of the surrounding area, which is scarce to non-existent on the project site. The observance of an individual flying overhead may indicate incidental usage of the Preserve.

Black-whiskered vireo – The black-whiskered vireo (*Vireo altiloquus*) is a small bird species, which is not listed by FWC or FWS, but is listed by FNAI as S3 which means it is found locally in a restricted range. Their range is restricted to the mangrove swamps and mesic flatwoods of Florida's southern coasts and Keys. Nesting occurs from May to June, and only south of Cedar Key. These small, greenish colored birds migrate to South America in mid-September and begin their return to Florida in late March (Kale et al, 1990). Though this species was not observed during the wildlife survey, removal of exotic species such as Brazilian pepper will open up habitat for this species.

Florida Black Bear – The Florida black bear (*Ursus americanus floridanus*) is the largest mammal in Florida. Florida black bear habitat in Florida has been characterized as consisting of large tracts of undeveloped forests containing diverse vegetation types. Evidence of Florida black bear (i.e., tracks, scat, claw marks) was observed on the property during field surveys. The Florida black bear has a large home range and could utilize the EMP. Prescribed burns conducted during the growing season will ensure suitable habitat is maintained for the black bear.

Big Cypress fox squirrel - The Big Cypress fox squirrel (*Sciurus niger avicennia*) is typically found in pine communities that have a relatively sparse midstory and

an open groundcover. They feed on slash pine seeds as well as nuts from other tree species. No Big Cypress fox squirrel individuals were observed on the parcel, though several squirrel nests were identified in the extreme southeastern portion of the site. These nests were monitored for 10-15 minutes each and no activity was observed. As a result, we could not confirm use by Big Cypress fox squirrels or non-listed gray squirrels (*Sciurus caroliniensis*). In addition, no scratching and peeling of the bark was observed on the nesting trees.

Eastern indigo snake - The Eastern indigo snake (*Drymarchon corais couperi*) has the limited potential of occurring on the project site. No individuals or signs of this species were observed on the site during listed species surveys; however, they are assumed to be present where gopher tortoise burrows exist. Standard protection measures during earth moving or exotic vegetation eradication activities will be implemented.

American alligator – Due to the similarity in appearance to the American crocodile (*Crocolylus acutus*), the American alligator (*Alligator mississippiensis*) is listed as Threatened by the FWS and as a Species of Special Concern by the FWC. The American alligator utilizes a variety of aquatic communities, from ditches and canals to ponds and lakes, both fresh and brackish. Since ditches and lakes exist on the site, the American alligator may be utilizing portions of the site though no individuals of this species were observed. Hydrologic restoration activities will benefit this species.

Gopher frog – The gopher frog (*Rana areolata*) is primarily dependent upon large expanses of upland communities as well as gopher tortoise burrows for shelter and the source of a large part of its diet. The Preserve contains a few gopher tortoise burrows; however, the Preserve site is at the very southern-most extent of the gopher frog's range. Therefore, due to the limited availability of burrows and the project site's geographic location, the likelihood of occurrence for the gopher frog is low, but measures will be taken to protect burrows during any earthmoving or exotic vegetation removal projects. Continued amphibian call monitoring at EMP could help determine this species occurrence at the preserve.

Stiff-leaved wild pine – Stiff-leaved wild pine (*Tillandsia fasciculata*), also named the common wild pine is listed as endangered by the FDA and is not listed by FWS. This epiphytic plant can be found growing on the trunks and branches of trees within mesic flatwoods, estuarine tidal swamps, wet flatwoods – exotics, mesic hammocks, and other areas.

The protection afforded plants listed by the FDA entails restrictions on harvesting or destroying plants found on private lands or public lands, without permission and/or a permit from the FDA. There are no restrictions for landowners, unless the sale of plants is involved. These provisions can be found in Section 581.185, FDA under State law. These observed plant species, although listed by the FDA, are relatively common in southwest Florida. County staff is exploring the option

of relocation of some of the listed air plants growing on melaleuca trees prior to land clearing activities.

Reflexed wild pine – The reflexed wild pine (*Tillandsia balbisiana*) is another epiphytic plant commonly found in various wetland and upland areas of the site. It is listed by the FDA as threatened and is not listed by FWS.

Giant wild pine – The giant wild pine (*Tillandsia utriculata*) is an epiphytic plant commonly found in various wetland and upland areas of the site. It is listed by the FDA as endangered and is not listed by FWS.

Twisted air plant – Twisted air plant (*Tillandsia flexuosa*) is an epiphytic plant commonly found in various wetland areas of the site. It is listed by the FDA as endangered and is not listed by FWS.

Butterfly orchid – The butterfly orchid (*Encyclia tampensis*) is an epiphytic plant commonly found in various wetland and upland areas of the site. It is listed by the FDA as a commercially exploited species and is not listed by FWS.

Golden leather fern - Golden leather fern (*Acrostichum aureum*) is a plant commonly found in various wetland areas of the site. It is listed by the FDA as endangered and is not listed by FWS.

Wild-coco – Wild-coco (*Eulophia alta*) - is a plant which has not been documented on the Preserve, but has the potential to be found based on its presence in similar habitats (mesic and wet flatwoods) elsewhere. It is listed by the FDA as threatened and is not listed by FWS.

Florida coontie – Florida coontie (*Zamia floridana*) - is a plant species which has not been documented on the Preserve, but has the potential to be found based on its presence in similar habitats, mesic flatwoods and elsewhere. It is listed by the FDA as a commercially exploited species and is not listed by FWS.

Giant Leather Fern - Giant leather fern (*Acrostichum danaeifolium*) is a plant commonly found in various wetland areas of the site. It is listed by the FDA as a commercially exploited species and is not listed by the FWC or the FWS.

v. Biological Diversity

The Estero Marsh Preserve provides estuarine wetland and upland habitats for a diversity of birds, mammals, reptiles, and invertebrates. However, the Preserve's present exotic plant infestation and altered historic hydrologic regime may have impacted the overall abundance and diversity of native floral and faunal species. Once restoration and enhancement activities have been completed, it is expected that new native species will recruit to the area and existing native and listed species will thrive based on increased foraging, roosting and nesting habitat. It is vital that on-going maintenance to control exotic plant species such

as melaleuca and Brazilian pepper occur. It may be beneficial for the County to explore the option of relocating individuals of these species from areas that are scheduled for removal of dense exotic vegetation, and filter marsh creation. Some of these species, such as the butterfly orchid and various bromeliads have been observed growing right on the bark of exotic plant species such as the melaleuca tree. The creation of three filter marshes and the placement of culverts underneath the existing east/west FP&L easement will help restore historic flows and hydroperiods thereby increasing the possibility of recruitment of native wetland species and improving water quality. Regular monitoring and management of exotics and supplemental plantings will ensure the preserve ecosystem meets success standards and sustains a healthy, diverse, functional ecosystem.

Proposed restoration and enhancement activities will help the preserve regain its historic native plant communities and offer increased functional habitat for wildlife.

The Estero Bay Preserve State Park and Estero Marsh Preserve provide wildlife habitat, flood protection for upland properties, recreational bird-watching opportunities and water quality protection. The fragile Estero Bay Estuary provides a nursery for sport fish such as redfish (*Centroberyx gerrardi*), trout, snook (*Centropomus undecimalis*), and tarpon (*Megalops atlanticus*), and commercially harvestable species such as shrimp, crabs, and shellfish. The waters of this estuary also provide a valuable resource for ecotourism such as kayak tours and canoe trips (Florida Department of Environmental Protection webpage: <http://www.dep.state.fl.us/>).

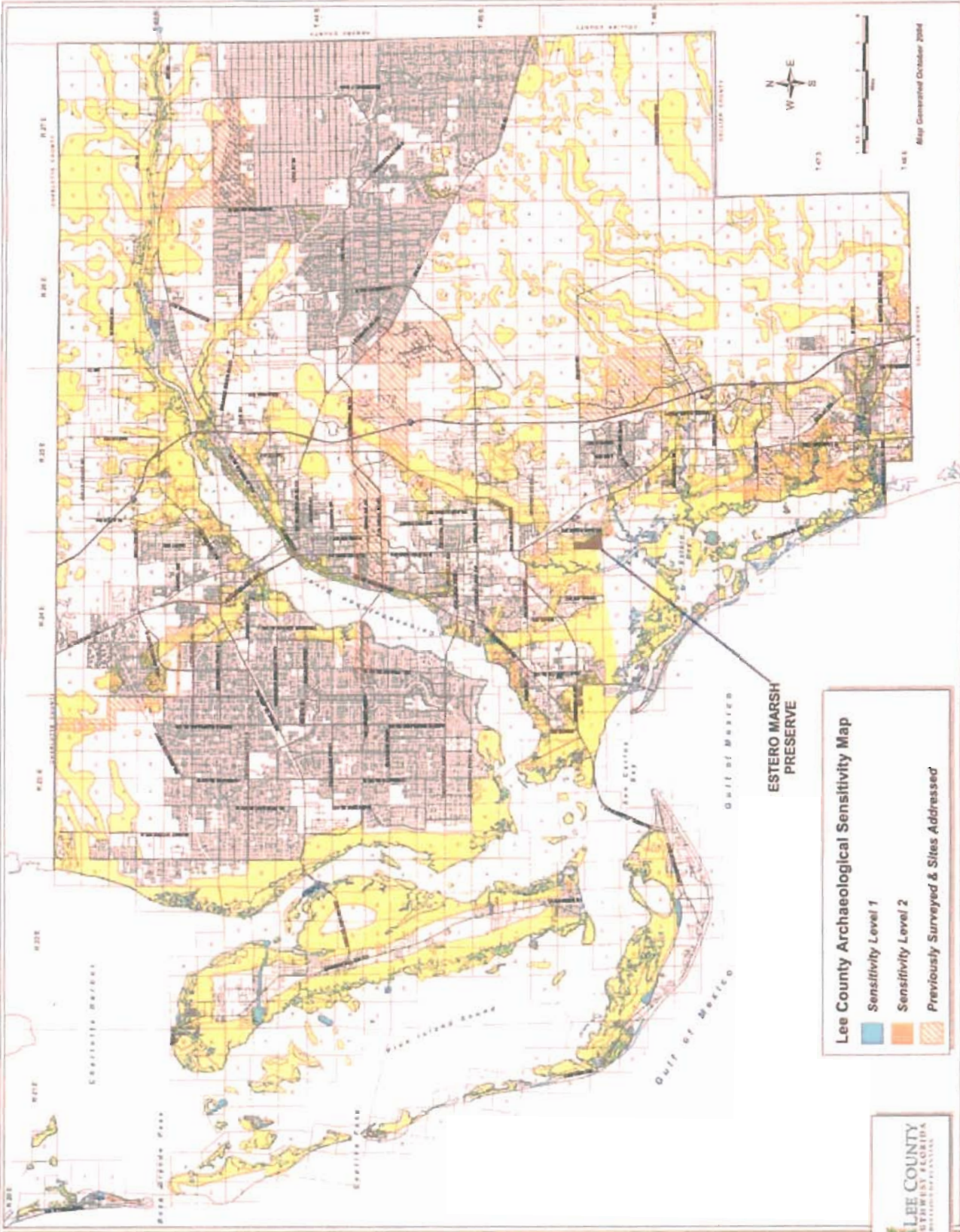
C. Cultural Resources

i. Archaeological

In 1987, Piper Archaeological Research, Inc. conducted an archaeological site inventory of Lee County. They were able to identify 53 sites increasing the total number of known archaeological sites in Lee County to 204. They also created a site predictive model and archaeological sensitivity map for the county that highlighted areas likely to contain additional archaeological sites. The majority of the Estero Marsh Preserve is located within an area designated as archaeological Sensitivity Level 2 by Lee County (Figure 10). The study defines this level as "areas that contain known archaeological sites that have not been assessed for significance and/or conform to the site predictive model in such a way that there is a high likelihood that unrecorded sites of potential significance are present. If these areas are to be impacted by development activities, then they should be subjected to a cultural resource assessment survey by a qualified professional archaeologist in order to 1) determine the presence of any archaeological sites in the impact area and/or 2) assess the significance of these sites." (Austin 1987).

Because of EMP's proximity to well defined creeks, the potential for use by the Calusa Indians exists. No historic or archaeological resources have been documented at the Preserve to date. Prior to conducting activities that may disturb the soil, such as filter marsh creation and removal of exotics with heavy equipment, a professional archaeologist will be hired by DOT to conduct a survey of the areas to be impacted. If evidence of shell middens or other artifacts are found in the area, the Division of Historical Resources will be immediately contacted and protection procedures will comply with the provision of Chapter 267, Florida Statutes, Sections 267.061 2(A) and (b). Collection of artifacts and/or any disturbance of the archaeological site will be prohibited unless prior authorization has been obtained from the Department of State, Division of Historical Resources. The site will be managed in coordination with recommendations of the Division of Historical Resources and, if necessary, the site will be kept confidential with periodic monitoring for impacts. If any significant archaeological resources are found and confidentiality is not found to be necessary, they will be incorporated into the public educational program.

ARCHAEOLOGICAL SENSITIVITY MAP



Lee County Archaeological Sensitivity Map

- Sensitivity Level 1
- Sensitivity Level 2
- Previously Surveyed & Sites Addressed



ESTERO MARSH PRESERVE



Map Generated October 2004

Figure 10
Lee County Archaeological Sensitivity Map

ii. Land Use History

The Estero Marsh Preserve, located within the Hendry Creek watershed, serves an important role in filtering fresh-water runoff from surrounding uplands before entering Mullock Creek, Hendry Creek and the Estero Bay Estuary. Urban development has encroached on the Preserve's boundary. The quickly growing population of Lee County is more than 6.5 times greater than what it was 44 years ago. This population growth has caused Lee County to provide homes, workplaces, schools, recreation and infrastructure to over 500,000 people (CensusScope webpage, <http://www.censuscope.org/>).

No site-specific prior historical land uses of the Estero Marsh Preserve have been documented beyond that of the historical land uses of the regional area surrounding Estero Bay. With the exception of ditches, canals, etc. the EMP land is generally devoid of human land uses. Historic aerials show remnant farm field on lands south of the FPL easement and immediately east of the Preserve boundary (Figures 11-15). This area has been developed as part of Island Park Village. The general low topography of the two parcels and saline soils may suggest that even after years of draining and ditching of the surrounding lands to the north, homestead and agricultural activity probably did not exist on the majority of the property. Ditching and drainage activities, along with urban development and the construction of I-75, U.S.41 and the FP&L easement have altered the historic hydrologic regime of the two parcels, leaving native communities vulnerable to exotic plant invasion.

Historic land uses of the Estero Bay regional lands may well date back to 10,000 years B.C., when it is believed that southwest Florida was inhabited by humans with organized societies, representing four distinct cultural periods lasting at least 400 years prior to Spanish arrival (State of the Bay Report, 2004). The Calusa Indians occupied most of southwest Florida around the time of Columbus. Often referred to as the "shell people", they were responsible for building cities on mounds of seashells. One Calusa Indian military defense and ceremonial landmark still exists today, and is referred to as Mound Key, a Calusa shell mound island located in Estero Bay. Cultural differences between the Spaniards of Ponce De Leon's time and the Calusa Indians ultimately resulted in the disappearance of the Calusa people in this area for a 250-year period. Causes included disease brought by the Spaniards, slavery, indenture, rebellion, and religious and ethnic conversion.

Following the construction of the Tamiami Trail (US 41) in the late 1920's, increased farming and fishing villages were established in the Estero Bay region, followed by ranching. Farm crops in the area included watermelon, pineapples, coconuts and peppers. Urbanization of the area followed farming and ranching shortly afterward. Two railroad lines historically passed just east of the Preserve. These rail lines are evident on a 1932 map of the area. The two rail lines originated north of Punta Rassa, converged at the Punta Rassa Junction and

extended southward to Naples and Marco Island.

All of south Florida was intensely logged from 1870 until 1930 (U.S. Fish and Wildlife Service webpage, <http://www.fws.gov/>). Old growth slash pine stands were virtually eliminated for shipbuilding and turpentine production. Evidence of logging impacts is present on portions of the Preserve.

Environmental activist groups successfully lobbied to create Estero Bay Aquatic Preserve as the state's first aquatic preserve in 1966. Later, the Estero Bay Buffer Preserve was established largely as a result of the need to protect the bay from development, runoff and to enhance wildlife habitat (<http://www.dep.state.fl.us/coastal/sites/estero/info.htm>).

Aerial Photography: Florida

707 x 712 pixels - 12% zoom

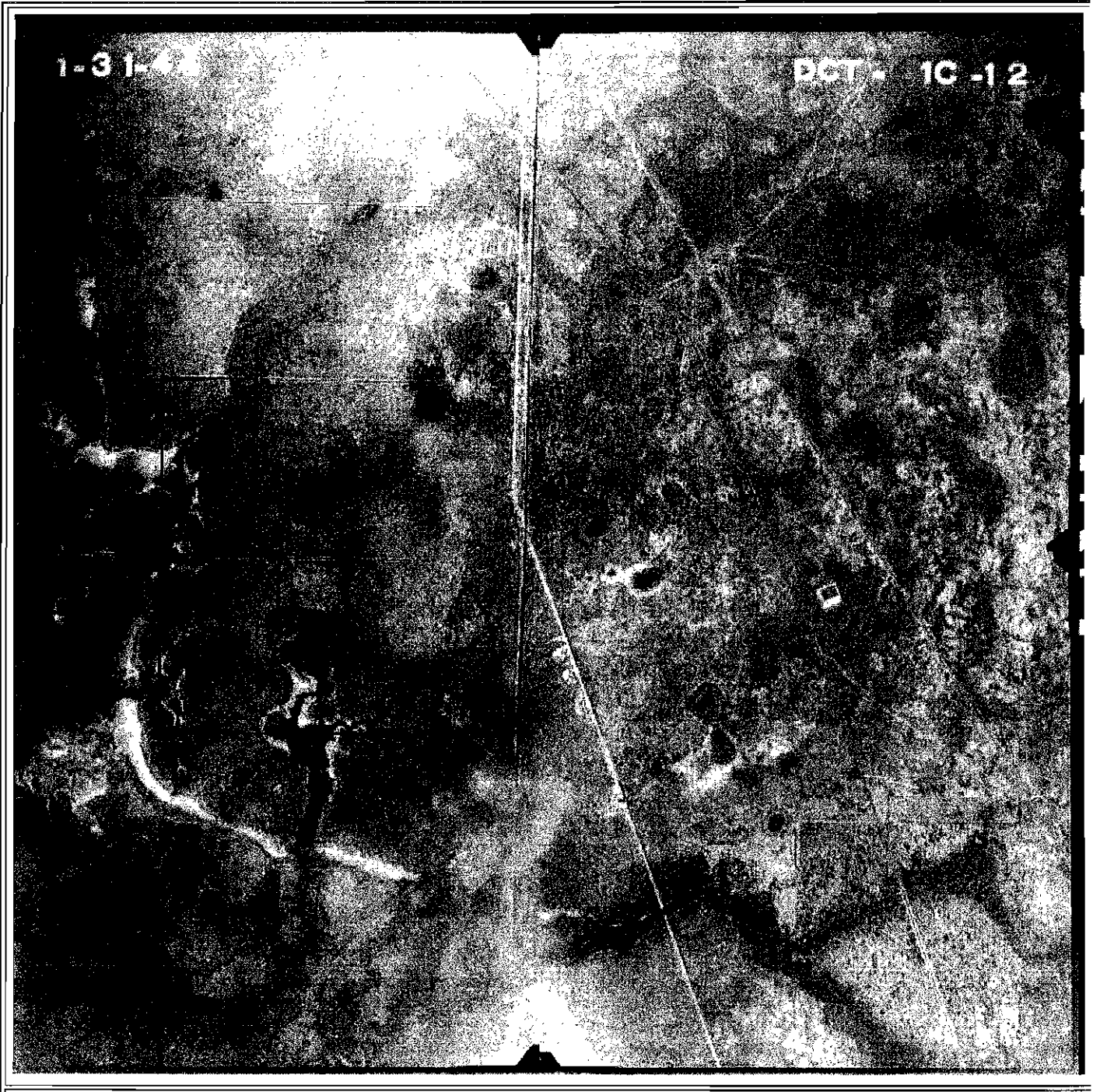


Figure 11

**Historic Aerial Photograph
January 31, 1944**

Aerial Photography: Florida

716 x 723 pixels - 12% zoom



Figure 12

**Historical Aerial Photograph
January 26, 1953**

Aerial Photography: Florida

726 x 723 pixels - 12% zoom

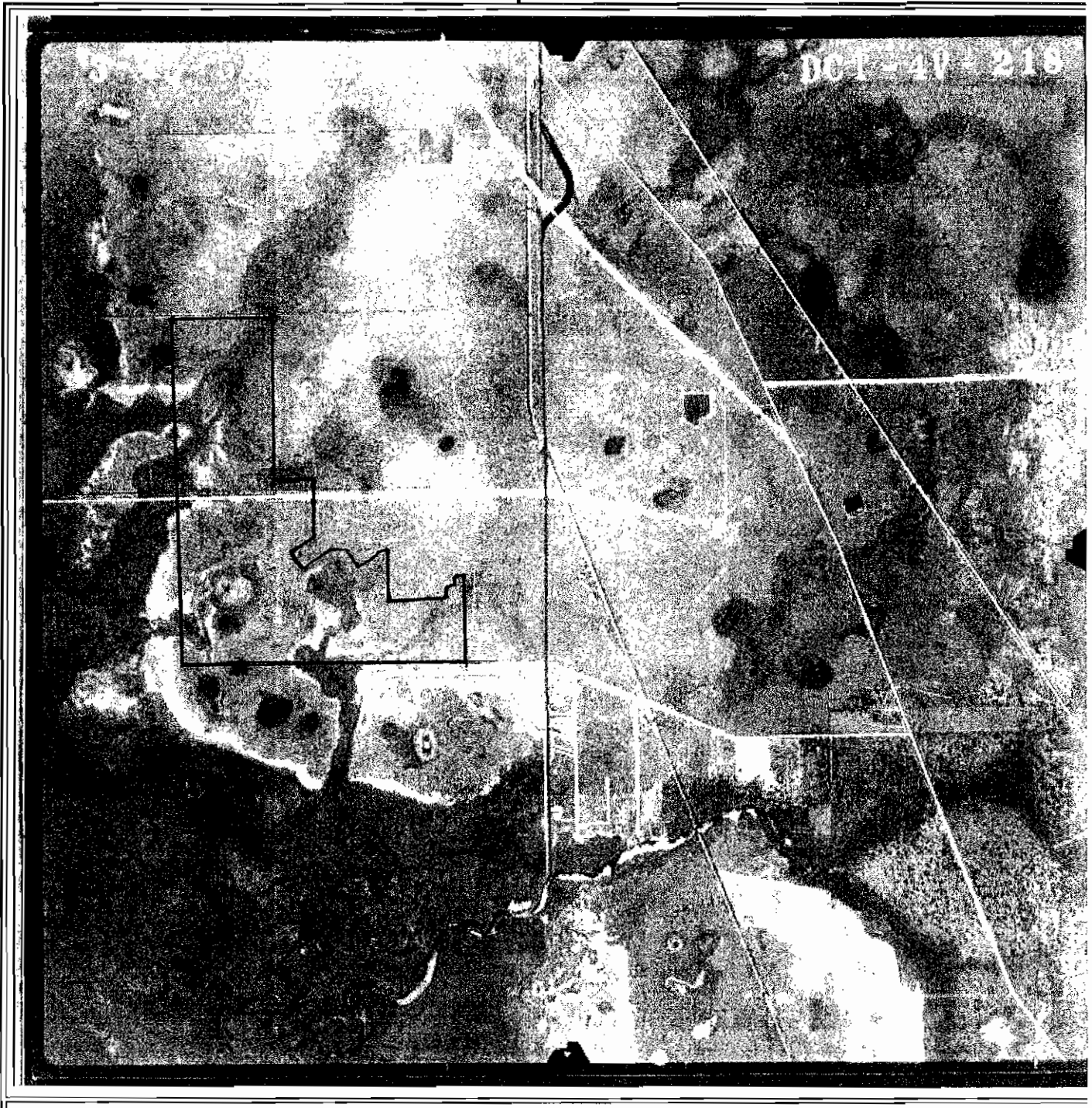


Figure 13

**Historical Aerial Photograph
March 15, 1958**

Aerial Photography: Florida

716 x 723 pixels - 12% zoom



Figure 14

**Historical Aerial Photograph
February 26, 1970**



Figure 15

Historical Aerial Photograph
2002

iii. Public Interest

Dense vegetation, the absence of defined trails, and limited access to the Preserve lands limits the public from utilizing the Estero Marsh Preserve for hiking, bird watching or wildlife viewing. Some of these opportunities may be opened up through the establishment of access areas from Island Park Road.

V. FACTORS INFLUENCING MANAGEMENT

A. Natural Trends and Disturbances

Like any other natural coastal community, the Estero Bay Marsh Preserve is influenced by events such as storms and hurricanes, flooding, wildfires, and sometimes drought. Citizens of adjacent Island Park Village are concerned about the possibilities of wildfire in the Preserve. In response, Conservation 20/20 staff contracted out the clearing of two firebreaks where this community and the Preserve share a boundary. This work has been successfully executed and is being maintained.

Invasion by exotic plant species such as melaleuca and Brazilian pepper may have been facilitated by historic logging activities as well as hydrologic alterations caused by the construction of Tamiami Trail, residential development, the FP&L easement, and a number of ditches. The wet and dry seasons will affect the way exotic removal is implemented. The majority of the effort for control of exotic vegetation will occur during the dry season to minimize disturbance to wetland soils and water quality.

B. Internal Influences

The existing FP&L easement and associated borrow ditches have severed the natural flow of water from north to south and have routed stormwater directly into Hendry Creek, bypassing wetland areas within the southern portions of the preserve. Renewed stormwater treatment functions and wildlife habitat will be established through the creation of filter marshes, restoration of the historic hydrologic regime in the southern portion of the preserve through the placement of culverts under the filled portion of the FP&L easement, and the enhancement of natural communities through exotic vegetation removal and native plantings. Once restoration is completed, the Estero Marsh Preserve will be maintained and monitored regularly to ensure the preserve meets success criteria and project objectives relevant to a diversity of native flora and fauna, as well as providing essential pretreatment of surface water thereby enhancing water quality entering the fragile Estero Bay ecosystem.

C. External Influences

Approximately half of the Estero Marsh Preserve is surrounded by residential communities associated with Island Park Village, primarily to the east and north, followed by U.S.41 and Ten-Mile Canal. The southern portion of the preserve boundary

and the western preserve boundary are located adjacent to and contiguous with the Estero Bay Preserve State Park. The boundaries of the preserve adjacent to residential communities have no physical barriers other than an occasional ditch. Possible external influences to the preserve may include exotic and landscape plant invasion, domestic pet invasion, dumping of debris, off-road vehicle use and hunting. Legal Obligations and Constraints

1. Permitting

The Estero Marsh Preserve was purchased by Lee County under the Conservation 20/20 program. Consistent with the objectives of Conservation 20/20, and with the approval of South Florida Water Management District (SFWMD) and the U.S. Army Corps of Engineers, Lee County has proposed to restore the Estero Marsh Preserve and create a regional mitigation area where credits would be available for Lee County Public Works Projects. To that end, permit applications for the Island Park Regional Mitigation Project, or EMP, have been submitted to the regulatory agencies for review. A copy of the proposed restoration activities proposal can be found in Appendix C.

2. Relationship to Other Plans

In general terms, the Lee Plan 2003 Codification is used as a guide to a vision for the future. Three broad objectives were stated in the first chapter of the Lee Plan. These objectives were part of the plan for the future of Lee County and were referred to in what Lee County calls "A vision for 2020 ". Those objectives are quoted below.

"First of all, certain day-to-day public and private activities within each jurisdiction must be consistent with the goals, objectives, and policies in the adopted plan. Second, the plan is a source of authority for the local government's land development regulations and for a wide range of official discretionary actions, including, but not limited to, the capital improvement program. Finally, the plan represents the community's vision of what it will or should look like by the end of the planning horizon".

The entire Lee Plan can be found on the Internet at: <http://www.lee-county.com/dcd1/Leeplan/Leeplan.pdf>. The two chapters of the Lee Plan that affect the management of EMP are Chapter V-Parks, Recreation and Open Space and Chapter VII-Conservation and Coastal Management.

Under Chapter V, land stewardship staff will ensure that any public use facilities constructed at the Estero Marsh Preserve comply with Goal 60: Park Planning and Design. Staff will also work to provide, whenever staffing and funding permit, appropriate environmental programs to the public in order to meet Goal 61: Environmental and Historic Programs.

Under Chapter VII, and within Objective 74.1: Environmentally Critical Areas,

land stewardship staff has the responsibility of managing to conserve and enhance the natural functions of environmentally critical lands such as the wetland habitats found at the Estero Marsh Preserve.

Within Objective 76.1: Coastal High Hazard Area Expenditures, same chapter, Policy 76.1.1 describes the need to seek approval from the county commission for the use of public funds in a Coastal High Hazard Area, in which the entire Estero Marsh Preserve is located (Figure 16), for the development of public use facilities. No public use facilities other than the possibility of natural pedestrian trails are proposed at the Estero Marsh Preserve.

LEE COUNTY COASTAL HIGH HAZARD AREA (CHHA) (Lee Plan Map 5)

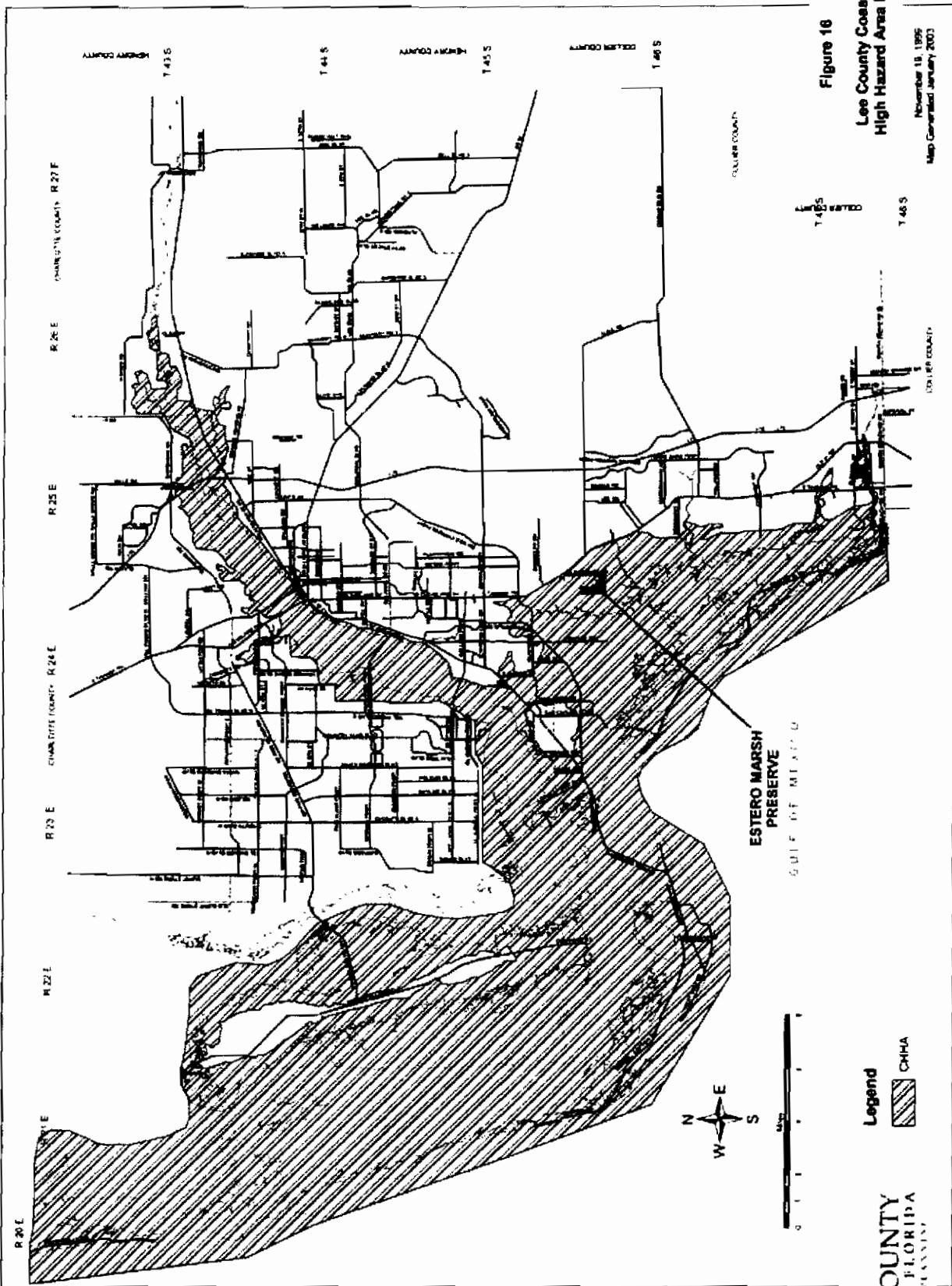


Figure 16
Lee County Coastal
High Hazard Area Map
November 15, 1995
Map Generated January 2003

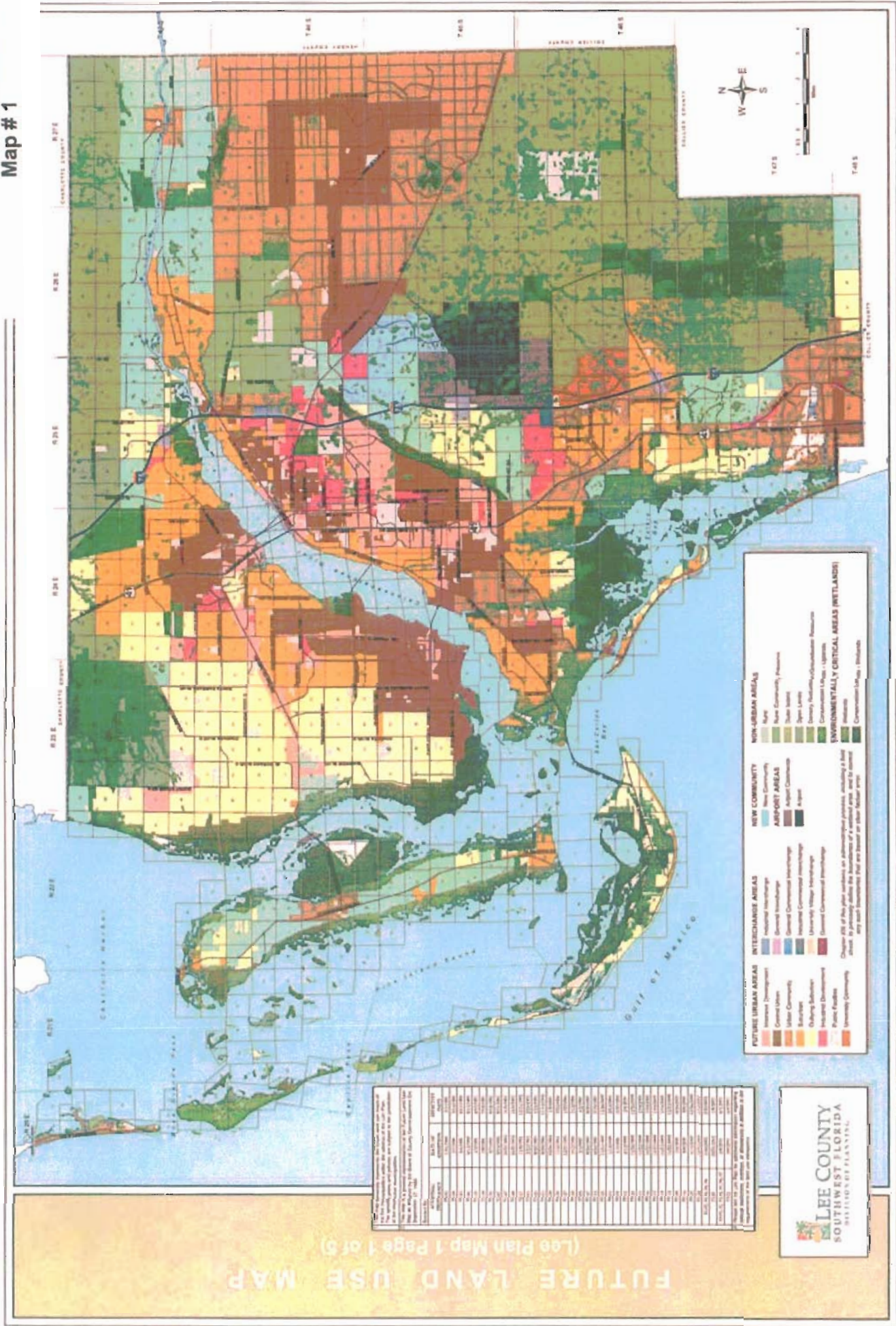
Within Objective 77.1, Policy 77.1.1 section 4.e. a management plan is required to be written for each site acquired through the county's environmentally sensitive lands program. The approval of this stewardship plan by the county commission will meet this policy.

Within Objective 77.10: Wood Stork, there are two policies, Policy 77.10.1 and Policy 77.10.2, which state the county will "maintain an inventory of documented feeding, roosting, and rookery areas for the wood stork . . ." and "The county will continue to require management plans for existing wood stork feeding, roosting, and rookery areas to utilize 'Habitat Management Guidelines for the Wood Stork in the Southeast Region' (USFWS, 1990)", respectively. Land stewardship staff will advise the appropriate department that wood storks do feed at the Estero Marsh Preserve and will consult the U.S. Fish and Wildlife Service's guidelines for the management of feeding areas for wood storks.

The future land use designation of EMP has already been changed to "conservation lands" through the amendment change process of Lee County Environmental Sciences Division (Figures 17 and 18).

Figure 17

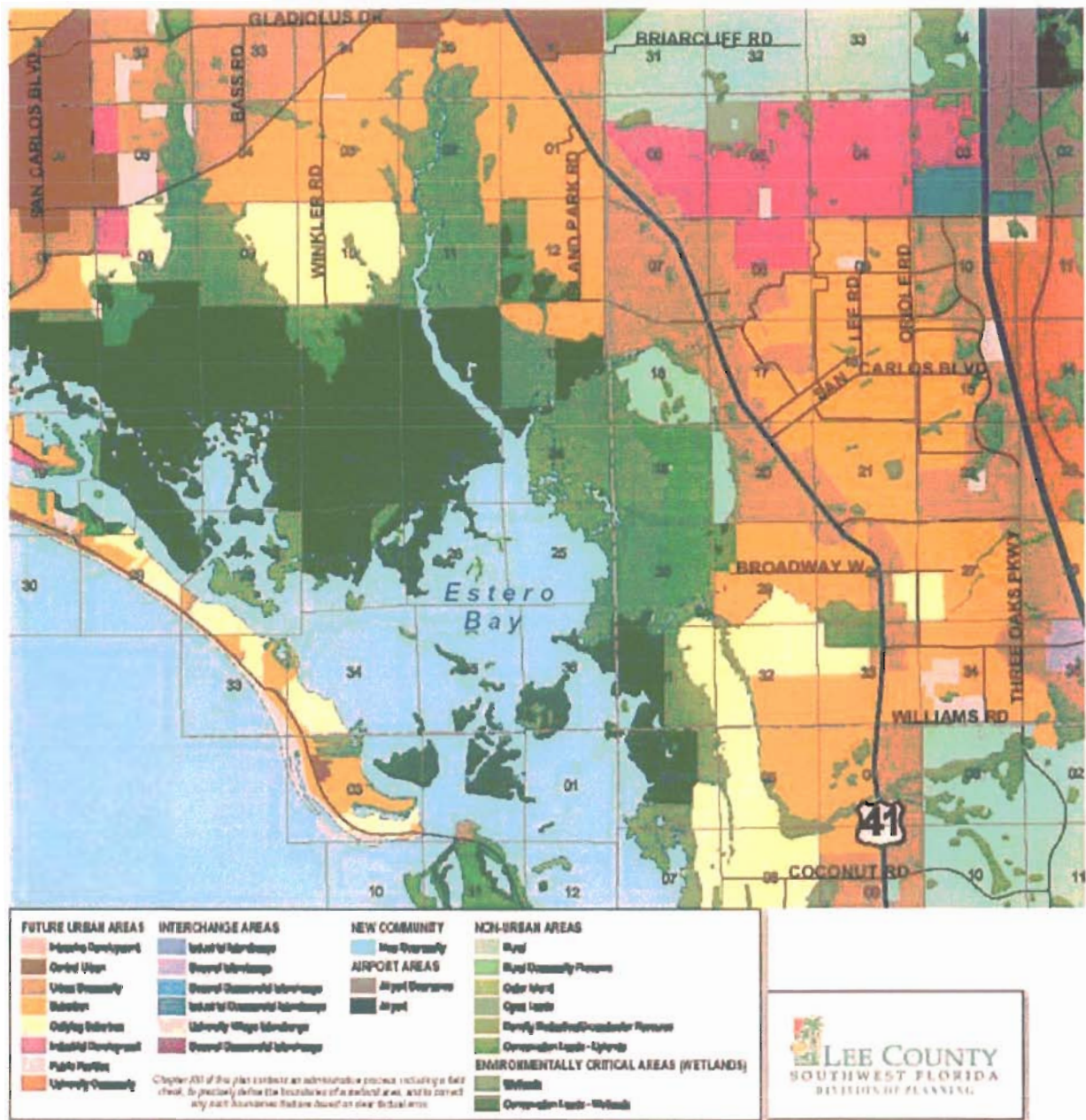
Lee County Future Land Use Map # 1



FUTURE LAND USE MAP

(Lee Plan Map 1 Page 1 of 5)

LEE COUNTY
SOUTHWEST FLORIDA
DIVISION OF PLANNING



Lee County Future Land Use Map (Modified from Lee Plan Map 1 Page 1 of 5)

Figure 18

Lee County Future Land Use Map # 2

D. Management Constraints

Fire management is a vital tool used to keep fuel loads at a minimum, to ensure biological diversity, and to maintain functional habitat value for wildlife. However, fire management may prove to be an unreasonable risk in some areas of the Estero Marsh Preserve where the preserve borders residential communities. Mechanical management of fuel loads in these areas may be the best option for public safety and welfare. Other constraints to management include the annual wet season, and management of exotics through manual means once initial restoration efforts have been performed. Following the initial treatment of exotic vegetation and the installation of native plants, heavy equipment and off-road vehicles will no longer be an option for maintenance of exotics. Hand crews with machetes and backpack herbicide sprayers will be required for regular maintenance.

E. Public Access and Resource-Based Recreation

Public access to the Preserve will be limited due to the sensitive nature of the onsite preserve habitats. Vehicular access into the Preserve will not be provided. Public usage such as hiking, wildlife and bird-watching opportunities will be available. No parking or restroom facilities will be constructed at this preserve. Boardwalks will be considered in the future if there is a demand. No vehicles or ORVs will be allowed to enter the preserve with the exception of County staff vehicles and those of land stewardship contractors and/or emergency personnel.

F. Future Acquisition

The Estero Marsh Preserve is bordered on the northeast side by a parcel of land currently under agency review for residential development. Currently, the proposed development plan includes a preserve contiguous with the Estero Marsh Preserve boundary. There are no undeveloped lands adjacent to EMP that are in need of preservation.

VI. MANAGEMENT ACTION PLAN

A. Goals and Strategies

The Estero Marsh Preserve is part of a countywide quarterly site inspection program for all Conservation 20/20 preserves. A copy of the site inspection form is available in the Land Stewardship Operations Manual (http://www.leeparks.org/pdf/land_stewardship_operations_manual.pdf). The inspection allows staff to monitor for any impacts and/or changes to each preserve and includes listing all animal sightings and new plants found. As part of the restoration activities, reports on the habitat restoration and wildlife usage will be completed. County inspection reports will complement those monitoring reports. If during the inspections at

Estero Marsh Preserve staff finds FNAI listed species, staff will report those findings to FNAI using the appropriate form located in Appendix D.

The Florida Exotic Pest Plant Council's List of Invasive Species (Appendix E) will be consulted in determining the invasive exotic plants to be controlled in each management unit. Concentrated efforts to control exotics will be undertaken as part of the Regional Mitigation Project mitigation permit requirements. Supplemental efforts will be undertaken as part of the long-term maintenance and management program for the Preserve. The invasive exotic plant control will be conducted with the least amount of impact to the preserve possible and with aquatic labeled herbicides where necessary (as per the Land Stewardship Operations Manual). Prescribed burning may be an option for the pine flatwoods to keep the vegetation in an early successional stage, maintaining a healthy diversity of flora and fauna and an accessible vegetative structure.

Perpetual management was established for all Conservation 20/20 preserves. Monies from this fund will be available for planned restoration projects at the Estero Marsh Preserve. Monies will be supplemented through pursuing appropriate grants or other sources of funding, such as but not limited to; grants from the Florida Department of Environmental Protection, Bureau of Invasive Plant Management for the exotic control projects. Projected costs and funding sources are listed in Appendix F.

The following tables outline the long term management goals, strategies for the completion of those goals, and projected timetables for the completion of the management activities. Land Management Units for the Estero Marsh Preserve are delineated on Figure 19.

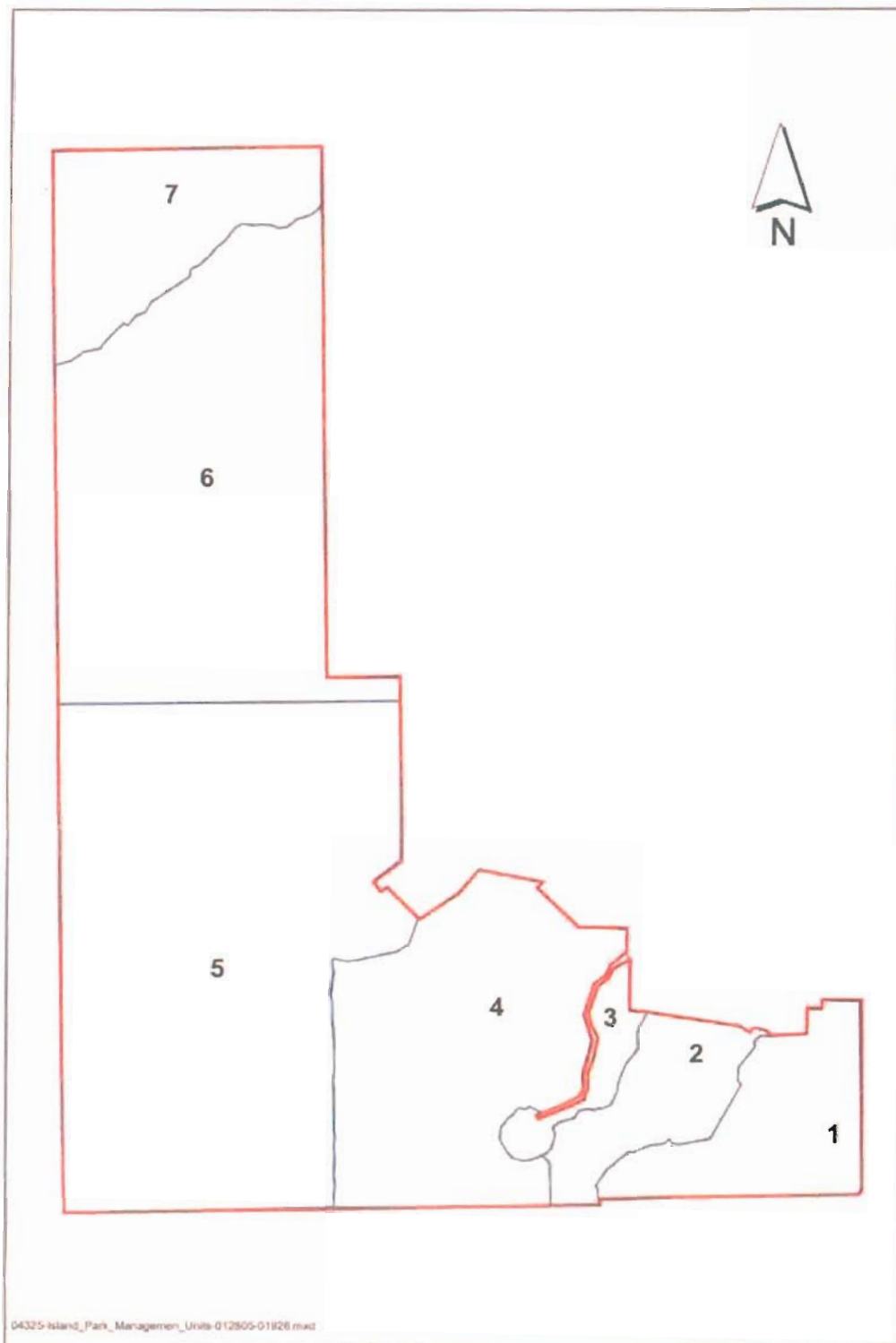


Figure 19
Estero Marsh Preserve Management Units

Legend

- boundary
- Unit_bnd



Wilson Miller

New Directions In Planning, Design & Engineering

B. Management Action Plan

Table 4: Management Plan

Management Action Plan

Unit	Goals	Strategies	Projected Timetable for Implementation	Standards Judging Achievement for Goal
1	Reduce invasive exotic plants to a maintenance level.	<ul style="list-style-type: none"> • Within the Pine Flatwoods community (FLUCCS Code #411) treat individual melaleuca trees by removing them and chipping the material, treating stumps with appropriate herbicide; treat individual Brazilian pepper shrubs with appropriate herbicide. • Within the Mangrove Swamp (#612) and the Saltwater Marsh (#642) communities remove individuals or treat in situ with appropriate herbicide as is easiest. • Within the constructed Filter Marsh all exotics will be removed prior to construction. • Within the Exotic Wetland Hardwoods (#619) exotics will be treated with herbicide or removed and the cut stumps will be treated with the appropriate herbicide. • Entire Unit will be surveyed annually to prioritize treatment areas and to look for new infestations utilizing the EPPC plant list to identify any potential new problems. Cooperation with IFAS/UF and other institutions for possible biological control will be ongoing. 	<ul style="list-style-type: none"> • Unit will have all exotics initially treated by January 1, 2009. 	<ul style="list-style-type: none"> • All invasive exotic vegetation will be treated. • Only immature individuals will be found within two years of initial treatment. • Seed sprouts and re-sprouts will be treated annually.

Management Action Plan

Unit	Goals	Strategies	Projected Timetable for Implementation	Standards Judging Achievement for Goal
	Maintain the fire-dependent natural plant communities with prescribed fire.	<ul style="list-style-type: none"> • Within the Pine Flatwoods community conduct prescribed burns as often as the fuels will permit during the restoration phase and then once every 3-7 yrs to maintain community character. • Within the Exotic Wetland Hardwoods community conduct a prescribed burn after initial herbicide and removal treatment. Allow fires from adjacent pine flatwoods to move into community. • Once Filter Marsh is established conduct prescribed burns in shorter hydroperiod portions of marsh often enough to maintain open characteristics and remove encroaching shrubs and trees. 	<ul style="list-style-type: none"> • Initial burns will be conducted on any community following initial treatment of exotic vegetation. 	<ul style="list-style-type: none"> • Post-burn monitoring will take place following form found in Appendix G. We will be 95% confident that we are reaching individual burn plan objectives within 20% of the mean coverage for any objective.
	Protect perimeter boundaries from encroachment and unauthorized access.	<ul style="list-style-type: none"> • Post fence every 300 feet with boundary signs. • Inspect boundary signs quarterly and maintain to prevent problems. • Meet with neighbors and neighborhood associations to introduce the preserve and needs for maintaining preserve integrity. • Work with local law enforcement to educate them to needs of property. 	<ul style="list-style-type: none"> • Boundary signs posted by January 31, 2006. 	<ul style="list-style-type: none"> • No unauthorized access or encroachment will occur and fences will be maintained with no breaks.
	Restore historic hydrologic regime within unit.	<ul style="list-style-type: none"> • Fill ditch/swale at northeast corner of unit. • Construct Filter Marsh C in the northeast portion of the unit. 	<ul style="list-style-type: none"> • Construction and establishment of Filter Marsh C will be finished by July 1, 2007. 	<ul style="list-style-type: none"> • Within two years of construction there will be 50% coverage of the filter marsh by planted species and there will be no invasive exotic plants (see above).

Management Action Plan

Unit	Goals	Strategies	Projected Timetable for Implementation	Standards Judging Achievement for Goal
2	Reduce invasive exotic plants to a maintenance level.	<ul style="list-style-type: none"> • Within the Pine Flatwoods community (#411) treat individual melaleuca trees by removing them and chipping the material, treating stumps with appropriate herbicide; treat individual Brazilian pepper shrubs with appropriate herbicide. • Within the Mangrove Swamp (#612) community remove individuals or treat in situ with appropriate herbicide as is easiest. • Within the Exotic Wetland Hardwoods (#619) exotics will be treated with herbicide or removed and the cut stumps will be treated with the appropriate herbicide. • Entire Unit will be surveyed annually to prioritize treatment areas and to look for new infestations utilizing the EPPC plant list to identify any potential new problems. Cooperation with IFAS/UF and other institutions for possible biological control will be ongoing. 	<ul style="list-style-type: none"> • Unit will have all exotics initially treated by January 1, 2009. 	<ul style="list-style-type: none"> • All invasive exotic vegetation will be treated. • Only immature individuals will be found within two years of initial treatment. • Seed sprouts and re-sprouts will be treated annually.
	Maintain the fire-dependent natural plant communities with prescribed fire.	<ul style="list-style-type: none"> • Within the Pine Flatwoods community conduct prescribed burns as often as the fuels will permit during the restoration phase and then once every 3-7 yrs to maintain community character. • Within the Exotic Wetland Hardwoods community conduct a prescribed burn after initial herbicide and removal treatment. Allow fires from adjacent pine flatwoods to move into community. 	<ul style="list-style-type: none"> • Initial burns will be conducted on any community following initial treatment of exotic vegetation 	<ul style="list-style-type: none"> • Post-burn monitoring will take place following form found in Appendix G. We will be 95% confident that we are reaching individual burn plan objectives within 20% of the mean coverage for any objective.

Management Action Plan

Unit	Goals	Strategies	Projected Timetable for Implementation	Standards Judging Achievement for Goal
2	Protect perimeter boundaries from encroachment and unauthorized access.	<ul style="list-style-type: none"> • Post fence every 500 feet with boundary signs. • Inspect boundary signs quarterly and maintain to prevent problems. • Meet with neighbors and neighborhood associations to introduce the preserve and needs for maintaining preserve integrity. • Work with local law enforcement to educate them to needs of property. 		<ul style="list-style-type: none"> • No unauthorized access or encroachment will occur and fences will be maintained with no breaks.
3	Reduce invasive exotic plants to a maintenance level.	<ul style="list-style-type: none"> • Within the Pine Flatwoods/Graminid Understory (#416) and the Hydric Pine Flatwoods (#625) communities treat individual melaleuca trees by removing them and chipping the material, treating stumps with appropriate herbicide; treat individual Brazilian pepper shrubs with appropriate herbicide. • Within the Mangrove Swamp (#612) community remove individuals or treat in situ with appropriate herbicide as is easiest. • Within the Previously Cleared Land (#748) remove all exotic vegetation and treat remaining stumps and seedlings with appropriate herbicide. • Entire Unit will be surveyed annually to prioritize treatment areas and to look for new infestations utilizing the EPPC plant list to identify any potential new problems. Cooperation with IFAS/UF and other institutions for possible biological control will be ongoing. 	<ul style="list-style-type: none"> • Unit will have all exotics initially treated by January 1, 2009. 	<ul style="list-style-type: none"> • All invasive exotic vegetation will be treated. • Only immature individuals will be found within two years of initial treatment. • Seed sprouts and re-sprouts will be treated annually.

Management Action Plan

Unit	Goals	Strategies	Projected Timetable for Implementation	Standards Judging Achievement for Goal
3	Maintain the fire-dependent natural plant communities with prescribed fire.	<ul style="list-style-type: none"> • Within the Pine Flatwoods and Hydric Pine Flatwoods communities conduct prescribed burns as often as the fuels will permit during the restoration phase and then once every 3-7 yrs to maintain community character. • Within the Live Oak/Cabbage Palm Hammock community (#427/428) allow fires from adjacent communities to enter the edges of the community but only allow fire to move through the entire community once every 12-20 years with a low intensity fire. 	<ul style="list-style-type: none"> • Initial burns will be conducted on any community following initial treatment of exotic vegetation. 	<ul style="list-style-type: none"> • Post-burn monitoring will take place following form found in Appendix G. We will be 95% confident that we are reaching individual burn plan objectives within 20% of the mean coverage for any objective.
	Protect perimeter boundaries from encroachment and unauthorized access.	<ul style="list-style-type: none"> • Post boundary signs every 500 feet. • Inspect signs quarterly and maintain to prevent problems. • Meet with neighbors and neighborhood associations to introduce preserve and needs for maintaining preserve integrity. • Work with local law enforcement to educate them to needs of property. 		<ul style="list-style-type: none"> • No unauthorized access or encroachment will occur and fences will be maintained with no breaks.
	Restoration of disturbed lands	<ul style="list-style-type: none"> • Following treatment of invasive exotics the northern third of the Previously disturbed land (#748) will be planted with species indicative of a Pine Flatwoods/ Graminid Understory community (#416) and the southern third will be planted with species indicative of a Hydric Pine Flatwoods community (#625). 	<ul style="list-style-type: none"> • Planting will take place within six months of initial exotic treatment. 	<ul style="list-style-type: none"> • There will be an increase in coverage of native species by 30% at the end of one year post-planting and an overall 70% increase in coverage of native species at three years post-planting prior to the first burn.

Management Action Plan

Unit	Goals	Strategies	Projected Timetable for Implementation	Standards Judging Achievement for Goal
4	Reduce invasive exotic plants to a maintenance level.	<ul style="list-style-type: none"> • Within the Mangrove Swamp (#612) and the Saltwater Marsh (#642) communities remove individuals or treat <i>in situ</i> with appropriate herbicide. • Within the Exotic Wetland Hardwoods (#619) exotics will be treated with herbicide or removed and the cut stumps will be treated with the appropriate herbicide. • Entire Unit will be surveyed annually to prioritize treatment areas and to look for new infestations utilizing the EPPC plant list to identify any potential new problems. Cooperation with IFAS/UF and other institutions for possible biological control will be ongoing. 	<ul style="list-style-type: none"> • Unit will have all exotics initially treated by January 1, 2009. 	<ul style="list-style-type: none"> • All invasive exotic vegetation will be treated. • Only immature individuals will be found within two years of initial treatment. • Seed sprouts and re-sprouts will be treated annually.
	Protect perimeter boundaries from encroachment and unauthorized access.	<ul style="list-style-type: none"> • Post boundary signs every 500 feet. • Inspect fence quarterly and maintain to prevent problems. • Meet with neighbors and neighborhood associations to introduce preserve and needs for maintaining preserve integrity. • Work with local law enforcement to educate them to needs of property. 	<ul style="list-style-type: none"> • Signs will be posted by January 31, 2006. 	<ul style="list-style-type: none"> • No unauthorized access or encroachment will occur and fences will be maintained with no breaks.

Management Action Plan

Unit	Goals	Strategies	Projected Timetable for Implementation	Standards Judging Achievement for Goal
5	Reduce invasive exotic plants to a maintenance level.	<ul style="list-style-type: none"> • Within the Mangrove Swamp (#612) and the Saltwater Marsh (#642) communities remove individuals or treat in situ with appropriate herbicide as is easiest. • Within the Exotic Wetland Hardwoods (#619) exotics will be removed or mulched in place and the cut stumps treated with the appropriate herbicide. • Entire Unit will be surveyed annually to prioritize treatment areas and to look for new infestations utilizing the EPPC plant list to identify any potential new problems. Cooperation with IFAS/UF and other institutions for possible biological control will be ongoing. 	<ul style="list-style-type: none"> • Unit will have all exotics initially treated by January 1, 2010. 	<ul style="list-style-type: none"> • All invasive exotic vegetation will be treated. • Only immature individuals will be found within two years of initial treatment. • Seed sprouts and re-sprouts will be treated annually.
	Maintain the fire-dependent natural plant communities with prescribed fire.	<ul style="list-style-type: none"> • Once Filter Marsh is established conduct prescribed burns in shorter hydroperiod portions of marsh often enough to maintain open characteristics and remove encroaching shrubs and trees. 	<ul style="list-style-type: none"> • Initial burns will be conducted on the filter marsh when and if shrubs and woody species begin to encroach on the areas with a shorter hydroperiod. 	<ul style="list-style-type: none"> • Post-burn monitoring will take place following form found in Appendix G. We will be 95% confident that we are reaching individual burn plan objectives within 20% of the mean coverage for any objective.

Management Action Plan

Unit	Goals	Strategies	Projected Timetable for Implementation	Standards Judging Achievement for Goal
5	Protect perimeter boundaries from encroachment and unauthorized access.	<ul style="list-style-type: none"> • Post boundary signs every 500 feet. • Cooperate with FPL to gate powerline at eastern edge of unit. • Inspect signs quarterly and maintain to prevent problems. • Meet with neighbors and neighborhood associations to introduce the preserve and needs for maintaining preserve integrity. • Work with local law enforcement to educate them to needs of property. 	<ul style="list-style-type: none"> • Boundary signs will be installed within six months of construction of filter marsh. • Gate limiting access to powerline constructed by March 31, 2006. 	<ul style="list-style-type: none"> • No unauthorized access or encroachment will occur and fences will be maintained with no breaks.
	Restore historic hydrologic regime within unit.	<ul style="list-style-type: none"> • Install culverts under powerline to move water from southern end of Unit 6 to northern end of Unit 5. • Construct Filter Marsh B in the northeast portion of the unit. 	<ul style="list-style-type: none"> • Construction and establishment of Filter Marsh B will be finished by July 1, 2007. 	<ul style="list-style-type: none"> • Within two years of construction there will be 50% coverage of the filter marsh by planted species and there will be no invasive exotic plants (see above).

Management Action Plan

Unit	Goals	Strategies	Projected Timetable for Implementation	Standards Judging Achievement for Goal
6	Reduce invasive exotic plants to a maintenance level.	<ul style="list-style-type: none"> • Within the Pine Flatwoods community (#411) treat individual melaleuca trees by removing them and chipping the material, treating stumps with appropriate herbicide; treat individual Brazilian pepper shrubs with appropriate herbicide. • Within the Mangrove Swamp (#612) and the Saltwater Marsh (#642) communities remove individuals or treat in situ with appropriate herbicide. • Along the dike/levee (#747) mow and treat with appropriate herbicide all exotics. Allow Power Company to continue mowing and treating exotics along powerline ROW. • Within the Exotic Wetland Hardwoods (#619) exotics will be treated with herbicide or removed and the cut stumps will be treated with the appropriate herbicide. • Entire Unit will be surveyed annually to prioritize treatment areas and to look for new infestations utilizing the EPPC plant list to identify any potential new problems. Cooperation with IFAS/UF and other institutions for possible biological control will be ongoing. 	<ul style="list-style-type: none"> • Unit will have all exotics initially treated by January 1, 2010. 	<ul style="list-style-type: none"> • All invasive exotic vegetation will be treated. • Only immature individuals will be found within two years of initial treatment. • Seed sprouts and re-sprouts will be treated annually.

Management Action Plan

Unit	Goals	Strategies	Projected Timetable for Implementation	Standards Judging Achievement for Goal
6	Maintain the fire-dependent natural plant communities with prescribed fire.	<ul style="list-style-type: none"> • Within the Pine Flatwoods community conduct prescribed burns as often as the fuels will permit during the restoration phase and then once every 3-7 yrs to maintain community character. • Within the Exotic Wetland Hardwoods community conduct a prescribed burn after initial herbicide and removal treatment. Allow fires from adjacent pine flatwoods to move into community. 	<ul style="list-style-type: none"> • Initial burns will be conducted on any community following initial treatment of exotic vegetation. 	<ul style="list-style-type: none"> • Post-burn monitoring will take place following form found in Appendix G. We will be 95% confident that we are reaching individual burn plan objectives within 20% of the mean coverage for any objective.
	Protect perimeter boundaries from encroachment and unauthorized access.	<ul style="list-style-type: none"> • Post boundary signs every 500 feet. • Inspect fence quarterly and maintain to prevent problems. • Meet with neighbors and neighborhood associations to introduce preserve and needs for maintaining preserve integrity. • Work with local law enforcement to educate them to needs of property. 	<ul style="list-style-type: none"> • Post boundary signs by January 31, 2006. 	<ul style="list-style-type: none"> • No unauthorized access or encroachment will occur and fences will be maintained with no breaks.

Management Action Plan

Unit	Goals	Strategies	Projected Timetable for Implementation	Standards Judging Achievement for Goal
7	Reduce invasive exotic plants to a maintenance level.	<ul style="list-style-type: none"> • Within the Pine Flatwoods (#411) and Hydric Pine Flatwoods (#625) communities treat individual melaleuca trees by removing them and chipping the material, treating stumps with appropriate herbicide; treat individual Brazilian pepper shrubs with appropriate herbicide. • Within the Mangrove Swamp (#612) and the Saltwater Marsh (#642) communities remove individuals or treat in situ with appropriate herbicide as is easiest. • Within the Exotic Wetland Hardwoods (#619) exotics will be treated with herbicide or removed and the cut stumps will be treated with the appropriate herbicide. • Entire Unit will be surveyed annually to prioritize treatment areas and to look for new infestations utilizing the EPPC plant list to identify any potential new problems. Cooperation with IFAS/UF and other institutions for possible biological control will be ongoing. 	<ul style="list-style-type: none"> • Unit will have all exotics initially treated by January 1, 2006. 	<ul style="list-style-type: none"> • All invasive exotic vegetation will be treated. • Only immature individuals will be found within two years of initial treatment. • Seed sprouts and re-sprouts will be treated annually.

Management Action Plan

Unit	Goals	Strategies	Projected Timetable for Implementation	Standards Judging Achievement for Goal
7	Maintain the fire-dependent natural plant communities with prescribed fire.	<ul style="list-style-type: none"> • Within the Pine Flatwoods community conduct prescribed burns as often as the fuels will permit during the restoration phase and then once every 3-7 yrs to maintain community character. • Within the Exotic Wetland Hardwoods community conduct a prescribed burn after initial herbicide and removal treatment. Allow fires from adjacent pine flatwoods to move into community. • Once Filter Marsh is established conduct prescribed burns in shorter hydroperiod portions of marsh often enough to maintain open characteristics and remove encroaching shrubs and trees. 	<ul style="list-style-type: none"> • Initial burns will be conducted on any community following initial treatment of exotic vegetation. 	<ul style="list-style-type: none"> • Post-burn monitoring will take place following form found in Appendix G. We will be 95% confident that we are reaching individual burn plan objectives within 20% of the mean coverage for any objective.
	Protect perimeter boundaries from encroachment and unauthorized access.	<ul style="list-style-type: none"> • Post boundary signs every 500 feet. • Inspect fence quarterly and maintain to prevent problems. • Meet with neighbors and neighborhood associations to introduce preserve and needs for maintaining preserve integrity. • Work with local law enforcement to educate them to needs of property. 	<ul style="list-style-type: none"> • Boundary signs will be installed within six months of construction of filter marsh. 	<ul style="list-style-type: none"> • No unauthorized access or encroachment will occur and fences will be maintained with no breaks.
	Restore historic hydrologic regime within unit.	<ul style="list-style-type: none"> • Block ditch/swale at northeast corner of unit to divert water into filter marsh. • Construct Filter Marsh A in the northeast portion of the unit. 	<ul style="list-style-type: none"> • Construction and establishment of Filter Marsh A will be finished by July 1, 2007. 	<ul style="list-style-type: none"> • Within two years of construction there will be 50% coverage of the filter marsh by planted species and there will be no invasive exotic plants (see above).

Table 5: Potential List of Native Plant Species to be Planted in Filter Marsh Areas

Common Name	Scientific Name
saltmarsh cordgrass	<i>(Spartina alterniflora)</i>
needlerush	<i>(Juncus roemerianus)</i>
saltwort	<i>(Batis maritima)</i>
sea purslane	<i>(Sesuvium portulacastrum)</i>
sea oxeye daisy	<i>(Borrchia frutescens)</i>
leather fern	<i>(Acrostichum aureum)</i>
buttonwood	<i>(Conocarpus erecta)</i>
white mangrove	<i>(Laguncularia racemosa)</i>
black mangrove	<i>(Avicennia germinans)</i>
red mangrove	<i>(Rhizophora mangle)</i>

COMMON NAME	SCIENTIFIC NAME	Upland Forest	Brackish Marsh	Freshwater Marsh
Gulf bluestem	<i>Schizachyrium maritimum</i>		X	X
Water hyssop	<i>Bacopa monnieri</i>		X	X
Salt marsh umbrella sedge	<i>Fuirena breviseta</i>		X	
Leather fern	<i>Acrostichum aureum</i>		X	X

Since shrubs typically aren't found in salt marsh habitat and in brackish water conditions, no shrub plantings have been proposed in these areas.

VI. PROJECTED TIMETABLE FOR IMPLEMENTATION

Table 7: Projected Timetable for Implementation of Management Action Plan

Management Activity	7-05	9-05	11-05	1-06	3-06	5-06	7-06	9-06	11-06	1-07	3-07	5-07	7-07	9-07	11-07
Post Boundaries				All											
Begin Exotic Control				6,7		All									
Construct Filter Marsh													1,5,7		
Clear Disturbed Land of Exotics						3									
Replant Disturbed Land									3						
Set-up Photo Points			All												
Take Photos					All										
Initial Burn										2,4,6					
Meet with Neighbors				All						All					

Management Activity	1-08	3-08	5-08	7-08	9-08	11-08	1-09	3-09	5-09	7-09	9-09	11-09	1-10	3-10	5-10
Initial Exotic Control							1-4						5		
Monitor Filter Marsh Estab.										1,5,7					
Take Photos	1,5,7						1,5,7						1,5,7		
Clear Disturbed Land of exotics															
Initial Burn							3	1,5,7							
Meet with Neighbors	All						All						All		

Management Activity	7-10	9-10	11-10	1-11	3-11	5-11	7-11	9-11	11-11	1-12
Take Photos				1,5,7						1,5,7
Meet with Neighbors				All						All

VIII. FINANCIAL CONSIDERATIONS

A. Staffing

The land stewardship section of the Department of Parks and Recreation is responsible for the stewardship of all Conservation 20/20 preserves, including the Estero Marsh Preserve. It consists of a supervisor, 5+ biologists, 2 park rangers, Conservation 20/20 staff, a Land Stewardship Manager and a field technician. Other land stewardship staff from Parks and Recreation is also available to assist with stewardship from time to time. At this time, no staff has been specifically assigned to the Estero Marsh Preserve.

Parks and Recreation Rangers provide considerable additional assistance in patrolling Parks and Recreation managed preserves, investigating unauthorized uses, securing property boundaries and helping educate the public on allowable uses of County preserves.

B. Maintenance and Security

Maintenance of the Preserve will include land stewardship activities. All land stewardship activities for the Preserve are outlined in the Management Action Plan.

Protection of the Preserve's natural resources will be achieved with appropriate boundary signage, fencing and gates where necessary, educating visitors, and patrolling by the Rangers.

IX. LITERATURE CITED

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APPENDICES

Appendix A - Plant Sightings at EMP

SCIENTIFIC NAME	COMMON NAME	NATIVE/EXOTIC
Family: Pteridaceae (brake fern)		
<i>Acrostichum danaeifolium</i>	Giant leather fern	Native
<i>Achrostichum aureum</i>	Golden leather fern	Native
Family Vittariaceae (shoestring fern)		
<i>Vittaria lineata</i>	Shoestring fern	Native
Family polypodiaceae (polypody)		
<i>Phlebodium aureum</i>	Golden polypody	Native
Family Dennstaedtiaceae (cuplet fern)		
<i>Pteridium aquilinum</i>	Bracken fern	Native
Family Thelypteridaceae (marsh fern)		
<i>Thelypteris kunthii</i>	Southern shield fern	Native
Family Blechnaceae (midsorus fern)		
<i>Blechnum serrulatum</i>	Swamp fern	Native
<i>Woodwardia virginica</i>	Virginia chain fern	Native
Family Pinaceae (pine)		
<i>Pinus elliotii</i> var. <i>densa</i>	South Florida slash pine	Native
Family Typhaceae (cattail)		
<i>Typha domingensis</i>	Southern cattail	Native
Family Poaceae (grass)		
<i>Amphicarpum muhlenbergianum</i>	Blue maidencane	Native
<i>Andropogon glomeratus</i>	Bushy broomsedge	Native
<i>Andropogon virginicus</i>	Broom grass	Native
<i>Aristida stricta</i>	Wire grass	Native
<i>Dichanthelium</i> sp.	Witch grass	Native
<i>Distichlis spicata</i>	Salt grass	Native
<i>Eragrostis elliotii</i>	Elliot's love grass	Native
<i>Eustachys glauca</i>	Saltmarsh fingergrass	Native
<i>Eustachys petraea</i>	Pinewoods fingergrass	Native
<i>Muhlenbergia capillaris</i>	Muhly grass	Exotic
<i>Panicum hemitomon</i>	Maidencane	Native
<i>Panicum repens</i>	Torpedo grass	Exotic
<i>Paspalum distichum</i>	Knot grass	Native
<i>Paspalum monostachyum</i>	Gulf dune paspalum	Native
<i>Paspalum notatum</i>	Bahiagrass	Exotic
<i>Setaria geniculata</i>	Foxtail grass	Native
<i>Spartina bakeri</i>	Sand cordgrass	Native
Family: Cyperaceae (sedge)		
<i>Cyperus odoratus</i>	Flat sedge	Native
<i>Cyperus haspan</i>	Flat sedge	Native
<i>Cyperus polystachyos</i>	Manyspike flatsedge	Native
<i>Eleocharis baldwinii</i>	Baldwin's spikerush, roadgrass	Native
<i>Eleocharis interstincta</i>	Jointed spikerush	Native
<i>Fimbristylis spathacea</i>	hurricanegrass	Native
<i>Fuirena scirpoidea</i>	Southern umbrellasedge	Native
<i>Rhynchospora odorata</i>	Fragrant beaksedge	Native
<i>Rhynchospora tracyi</i>	Tracy's beaksedge	Native
Family Arecaceae (palm)		
<i>Sabal palmetto</i>	Cabbage palm	Native
<i>Serenoa repens</i>	Saw palmetto	Native
Family Xyridaceae (yelloweyed grass)		
<i>Xyris elliotii</i>	Elliot's yelloweyed grass	Native
Family Eriocaulaceae (pipewort)		

<i>Eriocaulon</i> sp.	Pipewort	Native
<i>Lachnocaulon</i> sp.	Bogbutton	Native
Family Bromeliaceae (pineapple)		
<i>Tillandsia balbisiana</i>	Reflexed wild pine	Native
<i>Tillandsia fasciculata</i>	Common airplant	Native
<i>Tillandsia recurvata</i>	Ball-moss	Native
<i>Tillandsia setacea</i>	Southern needleleaf	Native
<i>Tillandsia usneoides</i>	Spanish moss	Native
<i>Tillandsia utriculata</i>	Giant airplant	Native
Family: Juncaceae (rush)		
<i>Juncus megacephalus</i>	Bighead rush	Native
<i>Juncus polycephalus</i>	Manyhead rush	Native
<i>Juncus roemerianus</i>	Black needle rush	Native
Family: Amaryllidaceae (amaryllis)		
<i>Crinum americanus</i>	Southern swamp-lily	Native
Family: Casuarinaceae		
<i>Casuarina equisetifolia</i>	Australian pine	Exotic
Family: Myrtaceae		
<i>Myrica cerifera</i>	Wax myrtle	Native
Family: Fagaceae (beech)		
<i>Quercus laurifolia</i>	Laurel oak	Native
<i>Quercus pumila</i>	Running Oak	Native
<i>Quercus virginiana</i>	Live oak	Native
Family: Olacaceae (olax)		
<i>Ximenia americana</i>	Hog plum	Native
Family Droseraceae (sundew)		
<i>Drosera brevifolia</i>	Dwarf sundew	Native
Family: Chrysobalanaceae (coco plum)		
<i>Licania michauxii</i>	Gopher apple	Native
Family: Fabaceae (pea)		
<i>Acacia auriculiformis</i>	Earleaf acacia	Exotic
<i>Albizia lebbek</i>	Woman's tongue	Exotic
<i>Desmodium incanum</i>	Beggar's-ticks	Native
<i>Vigna luteola</i>	Hairy cowpea	Native
Family: Polygalaceae (milkwort)		
<i>Polygala lutea</i>	Orange milkwort	Native
<i>Polygala rugelii</i>	Yellow milkwort	Native
Family: Euphorbiaceae (spurge)		
<i>Chamaesyce</i> sp.	Sandmat	Native
Family: Anacardiaceae (cashew)		
<i>Rhus copallinum</i>	Winged sumac	Native
<i>Schinus terebinthifolius</i>	Brazilian pepper	Exotic
<i>Toxicodendron radicans</i>	Eastern poison-ivy	Native
Family: Aquifoliaceae (holly)		
<i>Ilex cassine</i>	Dahoon holly	Native
<i>Ilex glabra</i>	Gallberry	Native
Family: Sapindaceae (soapberry)		
<i>Cupaniopsis anacardioides</i>	Carrotwood	Exotic
Family: Vitaceae (grape)		
<i>Parthenocissus quinquefolia</i>	Virginia creeper	Native
<i>Vitis cinerea</i> var. <i>floridana</i>	Florida grape	Native
<i>Vitis rotundifolia</i>	Muscadine grape	Native
Family: Malvaceae (mallow)		

<i>Urena lobata</i>	Caesarweed	Exotic
Family: Clusiaceae (St. John's wort)		
<i>Hypericum tetrapetalum</i>	Fourpetal St. John's-wort	Native
Family: Myrtaceae (myrtle)		
<i>Melaleuca quinquenervia</i>	Punktree	Exotic
Family: Melastomataceae (meadow beauty)		
<i>Rhexia sp.</i>	Meadowbeauty	Native
Family: Onagraceae (eveningprimrose)		
<i>Ludwigia peruviana</i>	Peruvian primrosewillow	Exotic
Family: Apiaceae (carrot)		
<i>Hydrocotyle umbellata</i>	Manyflower marsh pennywort	Native
Family: Apocynaceae (dogbane)		
<i>Asclepias tuberosa</i>	Butterflyweed, butterfly milkweed	Native
Family: Ericaceae (heath)		
<i>Lyonia ferruginia</i>	Fetterbush	Native
<i>Vaccinium myrsinites</i>	Shiny blueberry	Native
Family: Myrsinaceae (myrsine)		
<i>Rapanea punctata</i>	Myrsine	Native
Family: Verbenaceae (vervain)		
<i>Callicarpa americana</i>	American beautyberry	Native
Family: Lamiaceae (mint)		
<i>Piloblephis rigida</i>	Pennyroyal	Native
<i>Hyptis alata</i>	Musky mint	Native
Family: Scrophulariaceae (figwort)		
<i>Bacopa caroliniana</i>	Lemon bacopa	Native
Family: Asteraceae (aster)		
<i>Ambrosia artemisiifolia</i>	Common ragweed	Native
<i>Baccharis glomeruliflora</i>	Saltbush	Native
<i>Baccharis halimifolia</i>	Groundsel tree	Native
<i>Bidens pilosa</i>	Beggarticks	Native
<i>Coreopsis floridana</i>	Florida tickseed	Native
<i>Erigeron quercifolius</i>	Oakleaf fleabane	Native
<i>Eupatorium capillifolium</i>	Dog fennel	Native
<i>Eupatorium mikanoides</i>	Semaphore thoroughwort	Native
<i>Euthamia caroliniana</i>	Slender goldenrod	Native
<i>Heterotheca subaxillaris</i>	camphorweed	Native
<i>Mikania scandens</i>	Climbing hempvine	Native
<i>Pluchea odorata</i>	sweetscent	Native
<i>Pluchea rosea</i>	Rosy camphorweed	Native
<i>Rudbeckia hirta</i>	Blackeyed susan	Native
<i>Solidago sp.</i>	goldenrod	Native
<i>Solidago stricta</i>	Narrow-leaved goldenrod	Native
<i>Sonchus asper</i>	Spiny sowthistle	Exotic
Family: Combretaceae		
<i>Conocarpus erectus</i>	Buttonwood	Native
<i>Laguncularia racemosa</i>	White mangrove	Native
Family: Rhizophoraceae		
<i>Rhizophora mangle</i>	Red mangrove	Native
Family: Avicenniaceae		
<i>Avicennia germinans</i>	Black mangrove	Native
Family: Aizoaceae		
<i>Sesuvium spp.</i>	Sea purslane	Native
Family: Rubiaceae		

<i>Chiococca alba</i>	Snowberry	Native
Family: <i>Bataceae</i>		
<i>Batis maritima</i>	Saltwort	Native

Appendix B - Wildlife Sightings at EMP

Wildlife Observations at EMP		FWC	FWS
		Designated Status	
AMPHIBIANS			
Family: Bufonidae (toads)			
<i>Bufo terrestris</i>	Southern toad	NL	NL
Family: Hylidae (tree frogs)			
<i>Osteopilus septentrionalis</i>	Cuban Tree Frog	***Exotic	***Exotic
<i>Hyla cinerea</i>	Green tree frog	NL	NL
Family: Ranidae (true frogs)			
<i>Rana sphenoccephala</i>	Leopard frog	NL	NL
REPTILES			
Family Testudinidae (gopher tortoises)			
<i>Gopherus polyphemus</i>	Gopher tortoise	SSC	NL
Family: Colubridae (colubrids)			
<i>Nerodia fasciata</i>	Southern water snake	NL	NL
<i>Diadophis punctatus edwardsii</i>	Southern ringneck snake	NL	NL
<i>Coluber constrictor priapus</i>	Southern black racer	NL	NL
Family: Emydidae (box and water turtles)			
<i>Terrapene carolina bauri</i>	Florida box turtle	NL	NL
Family: Polychridae (anoles)			
<i>Anolis carolinensis</i>	Green anole	NL	NL
<i>Anolis sagrei</i>	Brown anole	NL	NL
BIRDS			
Family Ardeidae (herons, egrets, bitterns)			
<i>Ardea herodias</i>	Great blue heron	NL	
<i>Butorides virescens</i>	Green heron	NL	NL
<i>Casmerodius albus</i>	Great egret	NL	NL
<i>Egretta caerulea</i>	Little blue heron	SSC	NL
<i>Egretta thula</i>	Snowy egret	SSC	NL
<i>Egretta tricolor</i>	Tricolor heron	SSC	NL
<i>Nycticorax nycticorax</i>	Black-crowned night heron	NL	
Family Threskiornithidae (ibises and spoonbills)			
<i>Eudocimus albus</i>	White ibis	SSC	NL
<i>Plegadis falcinellus</i>	Glossy ibis	NL	NL
Family: Ciconiidae (storks)			
<i>Mycteria americana</i>	Wood stork	E	E
Family: Gruidae (cranes)			
<i>Grus canadensis pratensis</i>	Florida sandhill crane	T	NL
Family: Accipitridae (kites, eagles, hawks)			
<i>Buteo lineatus</i>	Red-shouldered hawk	NL	NL
<i>*Falco sparverius paulus</i>	Southeastern American Kestrel	T	NL
<i>*Falco sparverius</i>	American Kestrel	NL	NL
<i>Pandion haliaetus</i>	Osprey	NL	
Family Alcedinidae (kingfishers)			
<i>Ceryle alcyon</i>	Belted kingfisher	NL	NL
Family: Picidae (woodpeckers)			
<i>Melanerpes carolinus</i>	Red-bellied woodpecker	NL	NL
<i>Dryocopus pileatus</i>	Pileated woodpecker	NL	
<i>Picoides pubescens</i>	Downy woodpecker	NL	NL
<i>Picoides villosus</i>	Hairy Woodpecker		
Family: Columbidae (pigeons and doves)			
<i>Columba livia</i>	Rock dove	NL	
<i>Zenaida macroura</i>	Mourning dove	NL	NL
Family Mimidae (mockingbirds and thrashers)			
<i>Mimus polyglottos</i>	Northern mockingbird	NL	NL
<i>Dumetella carolinensis</i>	Gray catbird		
Family Turdidae (thrushes)			
<i>Turdus migratorius</i>	American robin	NL	NL
Family: Corvidae (crows, jays, etc.)			

<i>Cyanocitta cristata</i>	Bluejay	NL	
<i>Corvus ossifragus</i>	Fish crow	NL	NL
Family: Charadriidae (plovers)			
<i>Charadrius vociferus</i>	Killdeer	NL	NL
Family: Cardinalidae (cardinals)			
<i>Cardinalis cardinalis</i>	Northern cardinal	NL	
Family Icteridae (blackbirds, orioles, etc.)			
<i>Quiscalus quiscula</i>	Boat-tailed grackle	NL	NL
Family: Cathartidae (vultures)			
<i>Cathartes aura</i>		NL	NL
<i>Coragyps atratus</i>	Black vulture	NL	
Family Vireonidae (vireos)			
<i>Vireo altiloquus</i>	Black-whiskered vireo	NL	
MAMMALS			
Family: Dasypodidae (armadillos)			
<i>Dasypus novemcinctus</i>	Nine-banded armadillo	NL	
Family: Tayassuidae (peccaries)			
<i>Sus scrofa</i>	Wild pig	NL	
Family: Sciuridae (squirrels)			
<i>Sciurus carolinensis</i>	Eastern gray squirrel	NL	
Family: Ursidae (bears)			
** <i>Ursus americanus floridanus</i>	Florida black bear	T	NL

*A kestrel was observed on site on 12/12/03. During this time of year, both the listed species, Southeastern American kestrel (*Falco sparverius paulus*), and the non-listed species, American kestrel (*Falco sparverius*), may be found in southwest Florida. They are not easily distinguished from each other, therefore it was not determined which species was observed.

**Signs of Florida Black Bear were observed, such as tracks scat and cabbage palms with their tops ripped open.

***Exotic species are not listed by FWC or FWS. "Exotic" is in reference to a species classified as non-native.

Appendix C - Island Park Regional Mitigation Project Supplement

Island Park Regional Mitigation Project

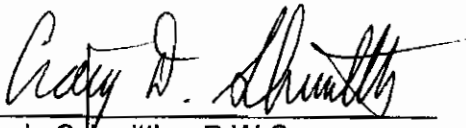
Prepared for:

LEE COUNTY DEPARTMENT OF TRANSPORTATION
1500 MONROE STREET
FORT MYERS, FLORIDA 33901

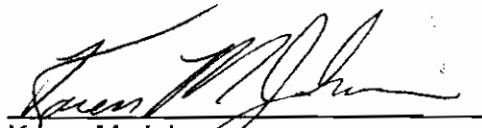
Prepared by:

WilsonMiller, Inc.
4571 Colonial Blvd.
Ft. Myers, FL 33912

September 2004



Craig Schmittler, P.W.S.
Environmental Consultant III



Karen M. Johnson
Project Manager

Naples Fort Myers Sarasota Bradenton Tampa Tallahassee

4571 Colonial Boulevard, Suite 100 Fort Myers, Florida 33912-1062 941-939-1020 ☎ 941-939-7479 📠

www.wilsonmiller.com

3.0 Soils and Topography

Figure 2 provides a map showing the Natural Resources Conservation Service (NRCS) soils mapped on the project site. Soils on the site include: #6 – Hallandale Fine Sand, #8 – Hallandale Fine Sand, Tidal, #10 Pompano Fine Sand, # 13 – Boca Fine Sand, #34 – Malabar Fine Sand, #39 – Isles Fine Sand, Depressional, #44 – Malabar Fine Sand, Depressional, and #56 Isles Muck. All the soils found on the site, except Hallandale Fine Sand (#6) and Boca Fine Sand (#13), are considered hydric by the NRCS.

The NRCS maps are based on vegetation and landscapes as interpreted from aerial photos, along with fieldwork. Major fieldwork conducted for the Lee County soil survey was completed in 1981. Accuracy of soil mapping is often around 70 to 80%, with a typical 3-acre mapping limit.

The following provides an overview of the characteristics of each soil type.

06 - Hallandale Fine Sand

This is a nearly level, poorly drained soil on low, broad flatwoods areas. Slopes are smooth and range from 0 to 2 percent.

The surface layer is gray fine sand about 2 inches thick. The subsurface layer is light gray fine sand about 5 inches thick. The substratum is very pale brown fine sand about 5 inches thick. At a depth of 12 inches is fractured limestone bedrock that has solution holes extending to a depth of 25 inches. These solution holes contain mildly alkaline, loamy material.

Under natural conditions, the water table is less than 10 inches below the surface for 1 to 3 months. It recedes below the limestone for about 7 months.

The available water capacity is low. Natural fertility is low. Permeability is moderate to moderately rapid.

08 - Hallandale Fine Sand, tidal

This is a nearly level, poorly drained soil on the outer edges of tidal flats. Slopes are smooth to concave and range from 0 to 2 percent.

The surface layer is dark gray fine sand about 2 inches thick. The underlying layers are gray fine sand to a depth of 19 inches. Below is hard, fractured limestone bedrock with solution holes up to 26 inches deep that contain moderately alkaline loamy material.

The water table fluctuates with the tide. This soil is subject to tidal flooding.

The available water capacity is low. Permeability is moderately rapid.

10 - Pompano Fine Sand

This is a nearly level, poorly drained soil on sloughs. Slopes are smooth to concave and range from 0 to 1 percent.

The surface layer is dark gray fine sand about 4 inches thick. The underlying layers are light gray, very pale brown, or white fine sand and extend to a depth of 80 inches or more.

Under natural conditions, the water table is above the surface for 3 to 6 months. It is within a depth of 10 to 40 inches for 2 to 4 months. The water table recedes to a depth of more than 40 inches during extended dry periods.

The available water capacity is low. Permeability is rapid in the surface and subsurface layers and moderate in the subsoil. Natural fertility is low.

44 - Malabar Fine Sand, depressional

This is a nearly level, poorly drained soil in depressions. Slopes are concave and are less than 1 percent.

The surface layer is 4 inches thick. The upper 1 inch is black fine sand that is high in organic matter content. The lower 3 inches is dark gray fine sand. The subsurface layer is sand to a depth of 44 inches. The upper 3 inches is very pale brown. The next 11 inches is yellow, iron-coated sand grains. The next 10 inches is very pale brown with common coatings of iron on the sand grains. The lower 16 inches is light gray. The subsoil is 23 inches of live gray sandy loam with dark bluish gray mottles. Sandy loam with marl and shell fragments underlies the subsoil.

Under natural conditions, the soil is ponded for about 4 to 6 months or more. The water table is 10 to 40 inches below the surface for 4 to 6 months.

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 slow or very slow in the subsoil.

56 - Isles Muck

This is a nearly level, very poorly drained soil in tidal swamps. Slopes are smooth and range from 0 to 1 percent.

The upper part of the surface layer is dark reddish brown muck about 5 inches thick. Next is 6 inches of very dark grayish brown mucky fine sand. The subsurface layer is grayish brown fine sand with brownish gray mottles to a depth of 39 inches. The subsoil is 8 inches of grayish brown fine sandy loam with light olive brown mottles. Fractured limestone bedrock is at a depth of 47 inches.

The water table fluctuates with the tide. This soil is subject to tidal flooding.

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.

A review of the United States Geological Survey (USGS) 7.5 minute Estero Quadrangle indicates that the parcels are situated at an elevation of approximately 4 feet above National Geodetic Vertical Datum. The contour lines in the area of the property indicate that the area is sloped gradually to the southwest toward Estero Bay. Site specific topographic information is provided on Sheet 2 of the engineering plans (Attachment 2).

4.1.2 Individual Habitat Descriptions

The following descriptions provide a general summary of each of the FLUCCS/vegetation associations mapped on the project site.

FLUCCS 411 Pine Flatwoods - Saw Palmetto Understory: These areas are dominated by slash pine (*Pinus elliottii*) in the canopy and varying densities of melaleuca (*Melaleuca quinquenervia*) in the subcanopy. Subcanopy plant species also include winged sumac (*Rhus copallinum*), myrsine (*Myrsine guianensis*), wax myrtle (*Myrica cerifera*), rusty lyonia (*Lyonia ferrugenia*) and cabbage palm (*Sabal palmetto*). Running oak (*Quercus minima*), saw palmetto (*Serenoa repens*), wiregrass (*Aristida stricta*), snowberry (*Chiococca spp.*), American beautyberry (*Callicarpa Americana*), penny royal (*Piloblephis rigida*), chocolate weed (*Melochia spp.*), poison ivy (*Toxicodendron radicans*), grapevine (*Vitis spp.*), cat briar (*Smilax auriculata*), caesar weed (*Urena lobata*), love vine (*Cassytha filiformes*), dog fennel (*Eupatorium spp.*) and various grasses are the dominant species in the groundcover stratum. Melaleuca is present at levels ranging from 10 to 49% in pine flatwoods habitats of the site.

FLUCCS 416 Pine Flatwoods - Graminoid Understory: These areas are dominated by a slash pine (*Pinus elliottii*) canopy with dense melaleuca, scattered cabbage palm, wax myrtle, and dahoon holly (*Ilex cassine*) in the subcanopy. Groundcover species often include wiregrass (*Aristida spp.*), broomsedge (*Andropogon virginicus*), yellow-eyed grass (*Xyris spp.*), Caesar weed, love grasses (*Eragrostis spp.*), panic grasses (*Panicum spp.*), and muhly grass (*Muhlenbergia spp.*). Saw palmetto, when present, is widely scattered. Vines include ear-leaf briar (*Smilax auriculata*), and catbriar. Exotic invaders such as melaleuca and Brazilian pepper often occur in varying densities throughout this type of habitat.

FLUCCS 427 Live Oak: These areas have a sparse canopy dominated by live oak. Ground cover in these areas can include saw palmetto, rusty lyonia, myrsine and various other upland shrubs and herbaceous species. Brazilian pepper is present, but not a significant component in the vegetative composition.

FLUCCS 427/428 Live Oak/Cabbage Palm: This area is dominated by a sparse mixture of live oak and cabbage palm in the canopy. Scattered saw palmetto and various incidental upland shrubs and grasses are also present in the midstory and groundcover. Brazilian pepper and melaleuca are present throughout this habitat, but comprise less than 50% of the dominant vegetation.

FLUCCS 500 Open Water: These areas are open water habitats within mangrove dominated wetlands. Water depth is sufficient to prevent vegetation from becoming established. These open water systems vary in size from 0.1 acres to 0.4 acres. The water is usually brackish to saline and supports very little vegetation except for various mangroves around the perimeter.

FLUCCS 513 Ditch/Swale: These areas are highly disturbed and usually contain a high percentage of bare ground. Exotics and nuisance species are very prevalent in these areas as well. There are several ditch features on the project sites. Ditches parallel the FPL easement, extend from culverts beneath Island Park Road, and remain within the northern and southwestern wetlands. Leather fern (*Acrostichum aureum*) is present along the majority of the ditches where standing water is present, with melaleuca and mangroves growing in the larger ditch sections.

FLUCCS 612 Mangrove Swamp: This coastal hardwood community is composed of red (*Rhizophora mangle*), white (*Languncularia racemosa*) and/or black (*Avicennia germinans*) mangroves. Buttonwood (*Conocarpus erectus*) and myrsine are also associated with many of the

FLUCCS 8146 Primitive Trails: A primitive trail occurs along the common boundary of Parcel #66 and #128, and may have originally been cleared by a survey crew to facilitate a boundary survey of the site. Periodic foot and ORV traffic has prevented this area from revegetating.

FLUCCS 832 Electrical Power Transmission Lines: There is an east-west trending FPL power line that bisects the property. Various ruderal grasses inhabit the area that is regularly mowed and maintained.

Table 1. Existing Habitats at Island Park Regional Mitigation Project

FLUCCS CODE	UPLAND ACREAGE	WETLAND ACREAGE	TOTAL ACREAGE
411	5.12		5.12
411E1	6.13		6.13
411E2	23.21		23.21
411E3	.24		.24
416E3	1.15		1.15
427	1.24		1.24
427/428E2	.48		.48
500		.62	.62
513	.91	2.47	3.38
612		10.57	10.57
612E1		14.71	14.71
612E2		3.29	3.29
612E4		1.04	1.04
619		109.56	109.56
625E1		.69	.69
625E2		.72	.72
625E3		9.93	9.93
642		1.91	1.91
6423		.81	.81
642E1		45.15	45.15
743	.01		.01
747E3	.44		.44
748	.26		.26
748H		.48	.48
8146		1.43	1.43
832		.77	.77
TOTALS	39.19	204.15	243.34

5.0 Jurisdictional Wetlands

5.1 General Discussion of Status of Wetland Determinations

Prior to purchase by Lee County, wetland jurisdictional determinations were performed on portions of the project site by the South Florida Water Management District, Florida Department of Environmental Protection, and the U.S. Army Corps of Engineers.

information related to the qualitative factors. Overall, Assessment Areas exhibiting high levels of exotic infestation were scored as having less functional value in their current condition.

Each Assessment Area was scored based on existing conditions and proposed conditions. Since mitigation activities are anticipated to be completed prior to the permitting and completion of wetland impacts, time lag and risk factors of 1 were utilized. As a result, the Relative Functional Gain (RFG) values were identical to the calculated delta values.

Based on the Uniform Mitigation Assessment Method, the Island Park Regional Mitigation Area will generate approximately 126 credits. This total represents an average .46 lift in functional value throughout the project site. Approximately 107.87 credits will be generated as a result of wetland enhancement and restoration activities, combined with filter marsh creation which will provide functional improvements to the wetland system. Minimal functional improvement can be expected from straight preservation of the property.

It is anticipated that 12.6 credits (10% of the total) would be available for "release" at the time a conservation easement is recorded on the project site. The timing of release of the 113.4 remaining credits generated through on-site enhancement/restoration/creation activities will be apportioned according to the timing at which the various levels of success criteria are reached. A draft credit release schedule will be prepared and submitted at the point in time in the agency coordination process when substantial conceptual agreement has been reached regarding the proposed mitigation activities and the associated credit assessment methodology.

At this time, the available mitigation "credits" are proposed to be utilized to offset wetland impacts related to Lee County Department of Transportation roadway projects only. The following list is not all inclusive of future LDOT projects which may request mitigation at the Island Park project site. It should be understood that new projects may be added to this list in the future and projects currently on the list may elect not to utilize Island Park Mitigation. Impact and mitigation acreages for projects listed below are approximate and would be finalized through separate regulatory reviews specifically related to the proposed projects.

Project Name	Estimated Wetland Impacts Forested	Estimated Wetland Impacts Herbaceous
Airport Connector Road	TBD	TBD
Alico Road East	TBD	TBD
Colonial Boulevard Widening	18.00	6.00
Ortiz Widening	20.00	0.00
Palmetto/Plantation Extension	6.00	0.00
Sandy Lane	TBD	TBD
Six Mile Cypress Widening	5.00	0.00

Table 2. Proposed Habitats at Island Park Regional Mitigation Project

Existing FLUCCS Code	Proposed FLUCCS Code	Upland Acreage	Wetland Acreage	Existing Acreage	Proposed Acreage
411	411	5.12		5.12	34.96
411E1	411	6.13		6.13	
411E2	411	23.21		23.21	
411E3	411	.24		.24	
416E3	416	1.15		1.15	1.15
427	427	1.24		1.24	1.24
427/428E2	427/428	.48		.48	.48
500	500		.62	.62	.62
513	513	.91	2.47	3.38	3.38
612	612		10.57	10.57	29.61
612E1	612		14.71	14.71	
612E2	612		3.29	3.29	
612E4	612		1.04	1.04	
619	642		109.56	109.56	
625E1	625		.69	.69	11.34
625E2	625		.72	.72	
625E3	625		9.93	9.93	
642	642		1.91	1.91	158.53
642E1	642		45.15	45.15	
6423	6423		.81	.81	0.81
743	743	.01		.01	.01
747E3	747	.44		.44	.44
748	411	.26		.26	
748H	642		.48	.48	
8146	642		1.43	1.43	
832	832		.77	.77	.77
TOTALS		39.19	204.15	243.34	243.34

8.5 Water Quality Mitigation Credits

The proposed project includes the creation of approximately 45.92 acres of filter marsh habitat within the project. Historic aerials indicate that many of the melaleuca infested areas were once classified as hydric pine flatwoods. These historical freshwater habitats have been stressed by saltwater intrusion to the point that the cypress and many slash pines are dead or dying. The location of the project site immediately adjacent to tidal wetlands severely limits the opportunity to create sizeable freshwater marshes to provide water quality treatment. However, the project site does receive freshwater inflows from upstream areas during the rainy season and herbaceous marsh wetlands, tolerant of these adverse conditions, will be located at these locations to maximize the water quality treatment potential.



New Directions In Planning, Design & Engineering

racemosa), Black mangrove (*avicennia germinans*) and Red mangrove (*Rhizophora mangle*). Since shrubs typically aren't found in this type of marsh habitat, no shrub plantings have been proposed in these areas. Other species to be used in restorative plantings are listed in Attachment D2 of the Island Park Mitigation Plan.

Wetland areas surrounding the filter marsh areas will be supplementally planted following exotic removal. Since these wetland systems have been subjected to increased salinity levels and the historic hydric pine flatwoods and cypress wetlands are being replaced naturally by mangrove wetlands and other salt tolerant wetland systems, the areas to be replanted will utilize salt tolerant vegetation similar to the existing species in each area.

Detailed filter marsh design information is provided on Sheet 2 of the engineering plans (Attachment 2).

The complete Uniform Mitigation Method analysis, including Assessment Area maps and score sheets, is enclosed in Appendix E.

Appendix D – FNAI Forms

FLORIDA NATURAL AREAS INVENTORY
FIELD REPORT FORM FOR RARE PLANTS

Thank you for taking the time to complete and mail this form. Information from knowledgeable individuals such as yourself makes an important contribution to the FNAI Biological Conservation Database. If you need help with this form, or would like additional information, please call the FNAI Botanist at 850-224-8207.

Scientific name: _____ Common name: _____

Basis for identification or manual used: _____ Date(s) seen: _____

Photograph taken? _____ Specimen deposited at a herbarium? _____ Name of herbarium: _____

Quad name: _____ County: _____ Site or managed area name: _____

Directions (mark site on copy of USGS 7.5 minute quad map or aerial photo and attach to this form, or draw a detailed map on back of this page that shows boundary of population, and/or give GPS location (latitude/longitude): _____

Describe the site: habitat/plant community; topography; hydrology; dominant species in tree, shrub, and ground layers: _____

Estimated Size of Population (no. of individuals, size of area occupied, and % of that area occupied by this species): _____

Are you confident this is the full extent of the population? Yes__ No__ Is further survey needed? Yes__ No__

Flowering? Yes__ No__ Fruiting? Yes__ No__ In bud? Yes__ No__ In leaf? Yes__ No__ Dormant? Yes__ No__

Have you seen this species at the same location in the past? Yes__ No__ If yes, give dates: _____ If yes, describe changes, if any, to site and population since last visit _____

Are there disturbances or threats (e.g. vehicle use, trash dumping, fire suppression, exotic species invasion) to the population? If yes, describe: _____

Is there evidence (e.g., fire breaks, scorching) of the use of fire at the site? Yes__No__ If yes, describe and give dates of recent fires, if known _____

Other useful information concerning the population, its ecological conditions, management history, management needs, names of individuals who might be helpful, etc.: _____

Your name: _____ Tel no.: _____ E-mail: _____

Address: _____ Date Submitted: _____

Please include any additional information on the back of this sheet and send this form to: Botanist, Florida Natural Areas Inventory, 1018 Thomasville Rd., Suite 200-C, Tallahassee, FL 32303. **THANK YOU!**

**FLORIDA NATURAL AREAS INVENTORY
FIELD REPORT FORM FOR RARE PLANTS**

Thank you for taking the time to complete and mail this form. Information from knowledgeable individuals such as yourself makes an important contribution to the FNAI Biological Conservation Database. If you need help with this form, or would like additional information, please call the FNAI Botanist at 850-224-8207.

Scientific name: _____ Common name: _____

Basis for identification or manual used: _____ Date(s) seen: _____

Photograph taken? _____ Specimen deposited at a herbarium? _____ Name of herbarium: _____

Quad name: _____ County: _____ Site or managed area name: _____

Directions (mark site on copy of USGS 7.5 minute quad map or aerial photo and attach to this form, or draw a detailed map on back of this page that shows boundary of population, and/or give GPS location (latitude/longitude): _____

Describe the site: habitat/plant community; topography; hydrology; dominant species in tree, shrub, and ground layers: _____

Estimated Size of Population (no. of individuals, size of area occupied, and % of that area occupied by this species): _____

Are you confident this is the full extent of the population? Yes__ No__

Is further survey needed? Yes__ No

Flowering? Yes__ No__ Fruiting? Yes__ No__ In bud? Yes__ No__ In leaf? Yes__ No__ Dormant? Yes__ No

Have you seen this species at the same location in the past? Yes__ No__ If yes, give dates: _____ If yes, describe changes, if any, to site and population since last visit _____

Are there disturbances or threats (e.g. vehicle use, trash dumping, fire suppression, exotic species invasion) to the population? If yes, describe: _____

Is there evidence (e.g., fire breaks, scorching) of the use of fire at the site? Yes__ No__ If yes, describe and give dates of recent fires, if known _____

Other useful information concerning the population, its ecological conditions, management history, management needs, names of individuals who might be helpful, etc.: _____

Your name: _____ Tel no.: _____ E-mail: _____

Address: _____ Date Submitted: _____

Please include any additional information on the back of this sheet and send this form to: Botanist, Florida Natural Areas Inventory, 1018 Thomasville Rd., Suite 200-C, Tallahassee, FL 32303. THANK YOU!

K:\sci_info\botany\field form-rare plants\101305 October 13, 2005

Appendix E - Florida Exotic Plant List of Invasive Species

Florida Exotic Pest Plant Council's 2005

List of Invasive Species

Purpose of the List: *To focus attention on --*

- the adverse effects exotic pest plants have on Florida's biodiversity and plant communities,
- the habitat losses from exotic pest plant infestations,
- the impacts on endangered species via habitat loss and alteration,
- the need to prevent habitat losses through pest-plant management,
- the socio-economic impacts of these plants (e.g., increased wildfires in certain areas),
- changes in the seriousness of different pest plants over time,
- the need to provide information that helps managers set priorities for control programs.

DEFINITIONS: *Exotic*—a species introduced to Florida, purposefully or accidentally, from a natural range outside of Florida. *Native*—a species whose natural range included Florida at the time of European contact (1500 AD). *Naturalized exotic*—an exotic that sustains itself outside cultivation (it is still exotic; it has not "become" native). *Invasive exotic*—an exotic that not only has naturalized but is expanding on its own in Florida plant communities.

Abbreviations used:

for "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.

for "Reg. Dis.": N = north, C = central, S = south, referring to each species' current distribution in general



regions of Florida (not its potential range in the state). See following map.

For additional information on distributions of particular species by county, visit the University of South Florida's Atlas of Florida Vascular Plants web site, www.plantatlas.usf.edu. Many of those species entries also have habit and close-up pictures of the species.

Additional images for some species may be found at the "Introduced Species" page on the [Univ. of Florida Herbarium website](#), at Fairchild Tropical Garden's [Virtual Herbarium](#), and the [Godfrey Herbarium database](#), Florida State University.

For other additional information on plants included in this list, see related links and pages at this web site on the [home page menu](#).

Category I - Invasive exotics that are altering 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.*

Scientific Name	Common Name	EPPC Cat.	Gov. list	Reg. Dist.
<i>Abrus precatorius</i>	rosary pea	I		C, S
<i>Acacia auriculiformis</i>	earleaf acacia	I		S
<i>Albizia julibrissin</i>	mimosa, silk tree	I		N, C
<i>Albizia lebbek</i>	woman's tongue	I		C, S
<i>Ardisia crenata</i> (= <i>A. crenulata</i>)	coral ardisia	I		N, C
<i>Ardisia elliptica</i> (= <i>A. humilis</i>)	shoebutton ardisia	I		S
<i>Asparagus aethiopicus</i> (= <i>A. sprengeri</i> ; <i>A. densiflorus</i> misapplied)	asparagus-fern	I		C, S
<i>Bauhinia variegata</i>	orchid tree	I		C, S
<i>Bischofia javanica</i>	bischofia	I		C, S
<i>Calophyllum antillanum</i> (= <i>C. calaba</i> ; <i>C. inophyllum</i> misapplied)	santa maria (names "mast wood," "Alexandrian laurel" used in cultivation)	I		S
<i>Casuarina equisetifolia</i>	Australian pine	I	P	N,C,S
<i>Casuarina glauca</i>	suckering Australian pine	I	P	C, S
<i>Cinnamomum camphora</i>	camphor-tree	I		N,C,S
<i>Colocasia esculenta</i>	wild taro	I		N,C,S
<i>Colubrina asiatica</i>	lather leaf	I		S
<i>Cupaniopsis anacardioides</i>	carrotwood	I	N	C, S
<i>Dioscorea alata</i>	winged yam	I	N	N,C,S
<i>Dioscorea bulbifera</i>	air-potato	I	N	N,C,S
<i>Eichhornia crassipes</i>	water-hyacinth	I	P	N,C,S
<i>Eugenia uniflora</i>	Surinam cherry	I		C, S
<i>Ficus microcarpa</i> (<i>F. nitida</i> and <i>F. retusa</i> var. <i>nitida</i> misapplied)	laurel fig	I		C, S
<i>Hydrilla verticillata</i>	hydrilla	I	P, U	N,C,S
<i>Hygrophila polysperma</i>	green hygro	I	P, U	N,C,S
<i>Hymenachne amplexicaulis</i>	West Indian marsh grass	I		C, S
<i>Imperata cylindrica</i> (<i>I. brasiliensis</i> misapplied)	cogon grass	I	N, U	N, C, S
<i>Ipomoea aquatica</i>	waterspinach	I	P, U	C
<i>Jasminum dichotomum</i>	Gold Coast jasmine	I		C, S
<i>Jasminum fluminense</i>	Brazilian jasmine	I		C, S

<i>Lantana camara</i>	lantana, shrub verbena	I		N, C, S
<i>Ligustrum lucidum</i>	glossy privet	I		N, C
<i>Ligustrum sinense</i>	Chinese privet, hedge privet	I		N, C, S
<i>Lonicera japonica</i>	Japanese honeysuckle	I		N, C, S
<i>Lygodium japonicum</i>	Japanese climbing fern	I	N	N, C, S
<i>Lygodium microphyllum</i>	Old World climbing fern	I	N	C, S
<i>Macfadyena unguis-cati</i>	cat's claw vine	I		N, C, S
<i>Manilkara zapota</i>	sapodilla	I		S
<i>Melaleuca quinquenervia</i>	melaleuca, paper bark	I	P, N, U	C, S
<i>Mimosa pigra</i>	catclaw mimosa	I	P, N, U	C, S
<i>Nandina domestica</i>	nandina, heavenly bamboo	I		N, C
<i>Neprolepis cordifolia</i>	sword fern	I		N, C, S
<i>Neprolepis multiflora</i>	Asian sword fern	I		C, S
<i>Neyraudia reynaudiana</i>	Burma reed, cane grass	I	N	S
<i>Paederia cruddasiana</i>	sewer vine, onion vine	I	N	S
<i>Paederia foetida</i>	skunk vine	I	N	N, C
<i>Panicum repens</i>	torpedo grass	I		N, C, S
<i>Pennisetum purpureum</i>	Napier grass	I		C, S
<i>Pistia stratiotes</i>	waterlettuce	I	P	N, C, S
<i>Psidium cattleianum</i> (= <i>P. littorale</i>)	strawberry guava	I		C, S
<i>Psidium guajava</i>	guava	I		C, S
<i>Pueraria montana</i> var. <i>lobata</i> (= <i>P.</i> <i>lobata</i>)	kudzu	I	N, U	N, C, S
<i>Rhodomyrtus tomentosa</i>	downy rose-myrtle	I	N	C, S
<i>Rhoeo spathacea</i> (see <i>Tradescantia spathacea</i>)				
<i>Rhynchosyrum repens</i>	Natal grass	I		N, C, S
<i>Ruellia tweediana</i> (= <i>R. brittoniana</i>)	Mexican petunia	I		N, C, S
<i>Sapium sebiferum</i> (= <i>Triadema sebiferum</i>)	popcorn tree, Chinese tallow tree	I	N	N, C, S
<i>Scaevola taccada</i> (= <i>Scaevola sericea</i> , <i>S. frutescens</i>)	scaevola, half-flower, beach naupaka	I		C, S
<i>Schefflera actinophylla</i> (= <i>Brassaia actinophylla</i>)	schefflera, Queensland umbrella tree	I		C, S
<i>Schinus terebinthifolius</i>	Brazilian pepper	I	P, N	N, C, S
<i>Senna pendula</i> var. <i>glabrata</i> (= <i>Cassia coluteoides</i>)	climbing cassia, Christmas cassia, Christmas senna	I		C, S
<i>Solanum tampicense</i> (= <i>S. houstonii</i>)	wetland night shade, aquatic soda apple	I	N, U	C, S
<i>Solanum viarum</i>	tropical soda apple	I	N, U	N, C, S

<i>Syngonium podophyllum</i>	arrowhead vine	I		C, S
<i>Syzygium cumini</i>	jambolan, Java plum	I		C, S
<i>Tectaria incisa</i>	incised halberd fern	I		S
<i>Thespesia populnea</i>	seaside mahoe	I		C, S
<i>Tradescantia fluminensis</i>	white-flowered wandering jew	I		N, C
<i>Tradescantia spathacea</i> (= <i>Rhoeo spathacea</i> , <i>Rhoeo discolor</i>)	oyster plant	I		S
<i>Urochloa mutica</i> (= <i>Brachiaria mutica</i>)	Pará grass	I		C, S

Category II - Invasive exotics that have increased in abundance or frequency but have not yet altered Florida plant communities to the extent shown by Category I species. *These species may become ranked Category I, if ecological damage is demonstrated.*

Scientific Name	Common Name	EPPC Cat.	Gov. list	Reg. Dist.
<i>Adenanthera pavonina</i>	red sandalwood	II		S
<i>Agave sisalana</i>	sisal hemp	II		C, S
<i>Aleurites fordii</i> (= <i>Vernicia fordii</i>)	tung oil tree	II		N, C
<i>Alstonia macrophylla</i>	devil-tree	II		S
<i>Alternanthera philoxeroides</i>	alligator weed	II	P	N, C, S
<i>Antigonon leptopus</i>	coral vine	II		N, C, S
<i>Aristolochia littoralis</i>	calico flower	II		N, C
<i>Asystasia gangetica</i>	Ganges primrose	II		C, S
<i>Begonia cucullata</i>	wax begonia	II		N, C
<i>Blechum pyramidatum</i>	green shrimp plant, Browne's blechum	II		N, C, S
<i>Broussonetia papyrifera</i>	paper mulberry	II		N, C
<i>Callisia fragrans</i>	inch plant, spironema	II		C, S
<i>Casuarina cunninghamiana</i>	Australian pine	II	P	C, S
<i>Cecropia palmata</i>	trumpet tree	II		S
<i>Cestrum diurnum</i>	day jessamine	II		C, S
<i>Chamaedorea seifrizii</i>	bamboo palm	II		S
<i>Clematis terniflora</i>	Japanese clematis	II		N, C
<i>Cryptostegia madagascariensis</i>	rubber vine	II		C, S
<i>Cyperus involucratus</i> (<i>C. alternifolius</i>)	umbrella plant	II		C, S

misapplied)				
<i>Cyperus proliifer</i>	dwarf papyrus	II		C
<i>Dalbergia sissoo</i>	Indian rosewood, sissoo	II		C, S
<i>Elaeagnus pungens</i>	thorny eleagnus	II		N, C
<i>Epipremnum pinnatum</i> cv. Aureum	pothos	II		C, S
<i>Ficus altissima</i>	false banyan, council tree	II		S
<i>Flacourtia indica</i>	governor's plum	II		S
<i>Hemarthria altissima</i>	limpo grass	II		C, S
<i>Hibiscus tiliaceus</i>	mahoe, sea hibiscus	II		C, S
<i>Ipomoea fistulosa</i> (= <i>I.</i> <i>carnea</i> ssp. <i>fistulosa</i>)	shrub morning-glory	II	P	C, S
<i>Jasminum sambac</i>	Arabian jasmine	II		S
<i>Kalanchoe pinnata</i>	life plant	II		C, S
<i>Koelreuteria elegans</i> ssp. <i>formosana</i> (= <i>K.</i> <i>formosana</i> ; <i>K.</i> <i>paniculata</i> misapplied)	flamegold tree	II		C, S
<i>Leucaena leucocephala</i>	lead tree	II		N, C, S
<i>Limnophila sessiliflora</i>	Asian marshweed	II	P	N, C, S
<i>Livistona chinensis</i>	Chinese fan palm	II		C, S
<i>Melia azedarach</i>	Chinaberry	II		N,C,S
<i>Merremia tuberosa</i>	wood-rose	II		S
<i>Murraya paniculata</i>	orange-jessamine	II		S
<i>Myriophyllum spicatum</i>	Eurasian water-milfoil	II	P	N, C, S
<i>Nymphoides cristata</i>	snowflake	II		C, S
<i>Panicum maximum</i>	Guinea grass	II		C, S
<i>Passiflora biflora</i>	two-flowered passion vine	II		S
<i>Pennisetum setaceum</i>	green fountain grass	II		S
<i>Phoenix reclinata</i>	Senegal date palm	II		C, S
<i>Pittosporum pentandrum</i>	Philippine pittosporum, Taiwanese cheesewood	II		S
<i>Phyllostachys aurea</i>	golden bamboo	II		N, C
<i>Pteris vittata</i>	Chinese brake fern	II		N, C, S
<i>Ptychosperma elegans</i>	solitary palm	II		S
<i>Ricinus communis</i>	castor bean	II		N, C, S
<i>Sansevieria</i> <i>hyacinthoides</i>	bowstring hemp	II		C, S
<i>Scleria lacustris</i>	Wright's nutrush	II		C, S
<i>Sesbania punicea</i>	purple sesban, rattlebox	II		N, C, S
<i>Solanum diphyllum</i>	Two-leaf nightshade	II		N, C, S
<i>Solanum jamaicense</i>	Jamaica nightshade	II		C
<i>Solanum torquatum</i>	susumber, turkey berry	II	N, U	N, C, S
<i>Sphagneticola trilobata</i>	wedelia	II		N, C, S

(= <i>Wedelia trilobata</i>)				
<i>Stachytarpheta urticifolia</i> (= <i>S. cayennensis</i>)	nettle-leaf porterweed	II		S
<i>Syagrus romanzoffiana</i> (= <i>Arecastrum romanzoffianum</i>)	queen palm	II		C, S
<i>Syzygium jambos</i>	rose-apple	II		C, S
<i>Terminalia catappa</i>	tropical almond	II		C, S
<i>Terminalia muelleri</i>	Australian almond	II		C, S
<i>Tribulus cistoides</i>	puncture vine, burr-nut	II		N, C, S
<i>Urena lobata</i>	Caesar's weed	II		N, C, S
<i>Vitex trifolia</i>	simple-leaf chaste tree	II		C, S
<i>Washingtonia robusta</i>	Washington fan palm	II		C, S
<i>Wedelia</i> (see <i>Sphagneticola</i> above)				
<i>Wisteria sinensis</i>	Chinese wisteria	II		N, C
<i>Xanthosoma sagittifolium</i>	malanga, elephant ear	II		N, C, S

Citation example:

FLEPPC. 2005. List of Florida's Invasive Species. Florida Exotic Pest Plant Council. Internet: <http://www.fleppc.org/05list.htm>

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Appendix F - Projected Costs & Funding Sources for Infrastructure

ISLAND PARK PROJECT MITIGATION COST ESTIMATE

Exotic Removal

- 66.47-acres of Level 1 in Wetlands.
- 30-acres of Level 1 in Uplands
- 121.7-acres of Level 2 in Wetlands
- 1.7-acres of Level 2 in Uplands

Level 1 (< 50% exotics) = Hand removal/herbicidal treatment. From edge of preserve in 100' exotic vegetation to be removed/chipped/stockpiled onsite for spreading/burning or transport offsite. Interior of preserves, kill in place >4" DBH or log cabin/tee-pees 100' apart.

Level 2 (>50% exotics) = Mechanized clearing, bulldozers, front-end loaders, feller-bunchers, etc. Exotics will be removed/chipped/stockpiled for spreading/burning or transport offsite. (Give price for removal offsite and separate price for stockpiling onsite).

Estimated Cost to Chip/Stockpile Onsite = \$720,000.00

Estimated Cost to Remove Offsite = \$820,000.00

Exotic Maintenance

- Semi-annual maintenance for first two years.
Estimated Cost = \$240,000.00
- Annual basis for 3 years.
Estimated Cost = \$270,000.00

(Must maintain mitigation areas exotic-free immediately following a maintenance event and exotic and nuisance plants constitute an average of no more than five (5) percent of the ground cover, midstory and canopy strata combined).

Marsh Creation

- Marsh A = 2.8-acres
- Marsh B = 7.6-acres
- Marsh C = 31.3-acres Estimated cubic yards of excavation = 40,000

(Wetland excavation material must be disposed offsite).

Estimated Cost for Excavation/Hauling/Disposal= \$400,000.00

Estimated Cost for Marsh Contouring = \$100,000.00

Note: Does not include any survey costs for stakeout.

Marsh Plantings

- Total of 46-acres of brackish marsh plantings required
- Trees 25' O.C. (Black, red, and white mangroves and buttonwood).
- Ground cover 3' O.C. (Liners/bare-root stock) on staggered rows or 5' O. C. for larger stock size (Cordgrass, needlerush, saltwort, sea purslane, sea-oxeye daisy, and leather fern).

Estimated Cost = \$725,000.000

Appendix G - Post Burn Evaluation

Post Burn Evaluation Form

I SITE DESCRIPTION AND PURPOSE OF BURN

Preserve: _____ Unit: _____ Acres: _____

Date Burned: _____ Date Evaluated: _____ Prepared By: _____

Type of Burn (circle): Ecological Management Fuel Reduction Training Research Other

II TEMPERATURE AND FUEL CONDITIONS ON DAY OF BURN

Temperature: Low _____ High _____ Live Fuel Moisture: _____

Relative Humidity: Low _____ High _____ KBDI: _____

1 hr Fuel Moisture: Low _____ High _____ Days Since Rain/Amount: _____

Comments: _____

III IMMEDIATE POST BURN FIRE EFFECTS

Averages From Transects (From Data Sheet)

Community Type	Fuel Model	Tree Type: P or H	Scorch Height Class	% Canopy Scorch Class	Char Degree

Percent of Unit Burned: _____ Comments on litter consumption, hot spots, unburned islands, etc _____

IV ACCOMPLISHMENT OF OBJECTIVES (State objectives from prescription and comment on each one)

Objectives	Comments
1	
2	
3	
4	
5	

V ATTACHMENTS

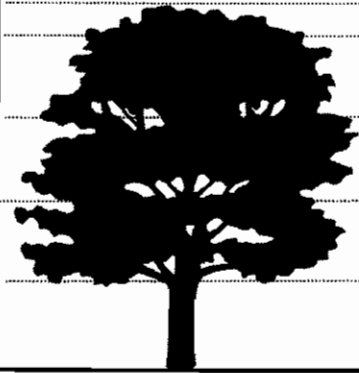
_____ Map – Lighting pattern, area burned, route of eval.
 _____ Fuel, Weather, and Fire Behavior Observation Form
 _____ Detailed Cost Evaluation

_____ Additional Worksheets
 _____ ICS Unit Log
 _____ Other

Tables

Fuel Model	Description [FLUCFCS]
1	Estuarine Tidal Marsh (Saltmarsh) – [642]
2	Mesic Flatwoods (Pine/Graminoid) – [416]
2	Hydric Pine Flatwoods (Pine/Graminoid) – [625]
7	Mesic Flatwoods (Pine/Palmetto) – [411]
8	Mesic Hammock (Live Oak) – [427]
8	Prairie Hammock (Live Oak/Cabbage Palm) – [428]
8	Estuarine Tidal Swamp (Mangrove) – [612]
8	Exotic Wetland Hardwood (Melaleuca/Pepper) – [619]

Scorch Height Class					
0	1	2	3	4	5
No Scorch	0 – 6 Feet	>6 – 15 Feet	>15 – 30 Feet	>30 – 50 Feet	>50 Feet

Percent Canopy Scorch Class				
				
0	1	2	3	4
No Scorch	1% – 30%	31% - 60%	61% - 90%	>90%

Char Degree			
0	1	2	3
No char	Light – spotty char or scorch with scattered pitting of bark	Medium – continuous charring with areas of minor reduction in bark thickness	Heavy – continuous charring, pronounced reduction in bark thickness with underlying wood sometimes exposed

