The Preserves of Northern Pine Island

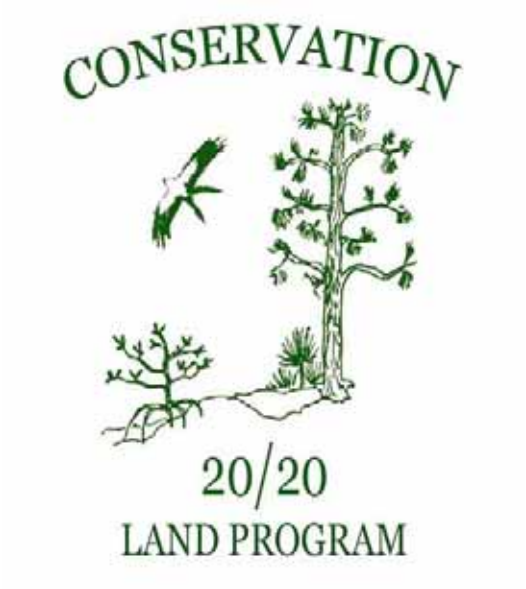
Smokehouse Bay Preserve
Carver Preserve

Land Stewardship Plan 2010

Land Stewardship Plan
for the
Preserves of Northern Pine Island

Smokehouse Bay and Carver Preserves

Lee County, FL



Prepared by the Land Stewardship Section
Lee County Department of Parks and Recreation

Approved by the Lee County Board of County Commissioners: Feb. 9, 2010

Acknowledgements

We would like to thank the following individuals for their assistance in the development of this document: Roger Clark; Cathy Olson; the Lee County Land Stewardship staff for carefully reviewing this Land Stewardship Plan and providing constructive criticism; members of Management Sub-Committee of the Conservation Lands Acquisition and Stewardship Advisory Committee, who were also instrumental in providing valuable suggestions regarding land management issues and the formatting of the plan; Katie Steiner, Robert Clemens, Lynda Thompson, Reneé Armstrong for clarification on several sections; Calusa Land Trust for Plan input; Lee County Parks and Recreation and Lee County Library System for making the plan available for public review.

Lee Waller
Laura Greeno

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List of Exhibits

List of Acronyms

BoCC	Board of County Commissioners
CP	Carver Preserve
C20/20	Conservation 20/20
SBP	Smokehouse Bay Preserve
CLASAC	Conservation Land Acquisition and Stewardship Advisory Committee
DHR	Division of Historical Resources (Florida)
FDACS	Florida Department of Agriculture and Consumer Services
FDEP	Florida Department of Environmental Protection
FDNR	Florida Department of Natural Resouces
FLEPPC	Florida Exotic Pest Plant Council
FLUM	Future Land Use Map
FNAI	Florida Natural Areas Inventory
FWC	Florida Fish and Wildlife Conservation Commission
IRC	Institute for Regional Conservation
LCDCL	Lee County Division of County Lands
LCDP	Lee County Division of Planning
LCTDC	Lee County Tourist Development Council
LSOM	Land Stewardship Operations Manual
LWCR	Lower West Coast Region
NMFS	National Marine Fisheries Service
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
PARI	Piper Archaeological Research, Inc.
SFWMD	South Florida Water Management District
STRAP	Section, Township, Range, Area, Parcel (Block Lot)
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service

VISION STATEMENT

It is the vision of the staff within the Lee County Department of Parks and Recreation and the Conservation 20/20 Program to conserve, protect, restore and maintain both Smokehouse Bay Preserve and Carver Preserve as productive, functional and viable ecosystems. These preserves provide extensive and vital habitat to both marine and terrestrial wildlife. The stewardship of these Preserves will ensure their health and continue to allow opportunity for resource sensitive recreation while providing scenic backdrops for passing boaters and fishermen. The primary stewardship activities for the Preserves of Northern Pine Island will be the control of invasive exotic vegetation and the hydrologic restoration of the abandoned agricultural field on Smokehouse Bay Preserve. These stewardship activities on the Preserves will improve wildlife habitat and enhance water quality reaching Matlacha Pass and Pine Island Sound Aquatic Preserves.

I. EXECUTIVE SUMMARY

Smokehouse Bay Preserve (SBP) is located on the northeastern side of Pine Island; in northwest Lee County, Florida, within Sections 4 and 33, Townships 43 and 44, Range 22. Carver Preserve (CP) is located on the northwestern side of Pine Island in northwest Lee County, Florida, within Sections 1, 2, 35, and 36, Townships 43 and 44, Range 21. Smokehouse Bay Preserve is a 267 acre preserve consisting of two acquisitions. The first (SBP #55) is approximately 158 acres and was purchased in 1999 for $75,000. The second (SBP #315) is approximately 110 acres and was purchased in 2007 for $1,345,000. Carver Preserve is approximately 189 acres and was purchased in 2008 for $321,300. These preserves were acquired through Lee County's Environmentally Sensitive Lands Acquisition Program, Conservation 20/20 (C20/20). The C20/20 Program was established in 1996 after Lee County voters approved a referendum that increased taxes by up to 0.5 mil for the purpose of purchasing and protecting environmentally sensitive lands.

Carver Preserve is the fourth Conservation 20/20 property to be honored in the Legacy Program. The Legacy Program was created as an initiative to attract quality nominations. A seller of exceptional conservation land may petition the County for naming rights of the new preserve. The petition must be approved by the Board of County Commissioners. Through the Legacy Program, Carver Preserve has officially been named in honor of Jack C. Carver, MD, who taught his family the importance of preserving natural environments for future generations.

The Gulf of Mexico and Caribbean Sea affect the climate of Lee County and these factors influence SBP and CP by creating mild, sub-tropical conditions. Average annual rainfall is 61.6 inches, slightly lower than the County's average (64.4 inches). The majority of the rain falls between June and September. Natural trends and disturbances influencing plant communities and stewardship at SBP and CP include hurricanes, flooding, wildfires, occasional freezes and the cycling of wet and dry seasons. The Preserves lie within Lee County's Coastal High Hazard area and are vulnerable to both tropical storms and hurricanes during June-November.

SBP and CP lie in two stratigraphic units, the Tertiary/Quaternary and the Holocene Sediments. All of SBP #315 and CP lie in the Holocene Sediments while SBP #55 is dominated by the Holocene Sediments but has Tertiary/Quaternary along its eastern edge. The principle force in the creation of the geologic formations present in southwest Florida today has been the Ice Age, which occurred between 1.8 million and 10,000 years ago and had four distinct periods of freezing and melting.

Lee County is located within the Gulf Coastal Lowlands of Florida that extend around the coastal periphery of the state where elevations are generally below 100 feet. The natural elevations at SBP and CP range from sea level to approximately 6 feet on the artificial spoil piles. SBP contains three plant communities. Tidal swamp makes up 58.9% of the preserve while 20.3% is abandoned field-agriculture, and 17.2% is disturbed-mosquito ditches. CP contains two plant communities. Tidal swamp makes

up 83.8% of CP and 6.7% is disturbed-mosquito ditches. The remainder of the acreage is open water. A number of designated plant and animal species can be found on both preserves.

SBP #55 has been disturbed by the installation of mosquito ditching in the 1960s along the property's southeastern corner and western property line. Forty-two acres of SBP #315 was converted to a palm tree grove and numerous palm trees remained on the property after Lee County's Conservation 20/20 Program purchased the property. Salt water intrusion into the southwestern grove area played a role in causing the palms to yellow and drop in value. The entire grove area had been ditched and furrowed and a large perimeter ditch was installed along the shared boundary with the property line and the grove area. Much of the rest of the property has significant disturbance due to the installation of mosquito ditches. This allowed exotic species to become established and now much of the natural part of the property is infested with Brazilian pepper (*Schinus terebinthifolius*) and Australian pine (*Casuarina equisetifolia*).

Carver Preserve remained in an untouched state until mosquito ditches were dug in the late 1960s. In 2003, on the eastern edge of the site, an adjacent land owner cleared a small trail for canoe access through the ditches to Big Jim Creek.

SBP and CP are both classified as a Category 4 Resource Protection & Restoration Preserve. As with all designated Category 4 preserves, "if there is a public interest, staff may provide guided field trips when there are no safety concerns and it is compatible with protecting the animals and plant communities found at the specific preserve."

The goal of this land stewardship plan is to identify Preserve resources, develop strategies to protect the resources and implement restoration activities to preserve SBP and CP as productive, functional and viable ecosystems while ensuring that the preserves will be managed in accordance with Lee County Parks and Recreation's Land Stewardship Operations Manual. Restoration and management activities at SBP and CP is on-going and focuses on controlling invasive exotic plant species, debris removal, and removal of berms and furrows on SBP #315. A Management Action Plan outlines restoration and stewardship goals. This plan outlines the goals and strategies, explains how the goals will be accomplished, and provides a projected timetable for completion. This land stewardship plan will be revised in ten years (2019).

II. INTRODUCTION

Smokehouse Bay Preserve (SBP) is a 267 acre preserve consisting of two parcels. These parcels have been grouped to form Smokehouse Bay Preserve due to their similar plant communities, recreational category, and geographic location. The first parcel (SBP #55) is approximately 158 acres and was purchased in 1999 for $75,000. The second parcel (SBP #315) is approximately 110 acres and was purchased in 2007 for $1,345,000. Carver Preserve (CP) is approximately 189 acres and was purchased in 2008 for $321,300. GIS data shows that SBP #55 is currently 113 acres while GIS data and a 2003 Harris – Jorgenson, Inc. survey show that SBP #315 is 95 acres. C20/20 staff spoke with Lee County's Division of County Lands and Property Appraiser staff to attempt to clear up the SBP #315 acreage discrepancy. The Property Appraisers office has SBP #315 on record as being 114.3 acres and cited an 1876 township plat that was showing the government lots being 208.59 acres. Since Pine Island is a bay island, the natural processes of accretion and erosion could have played a small role in the varying acreages listed for this site. GIS data and acreages will be used and referred to throughout this Land Stewardship Plan since surveys are not available for all of the parcels.

SBP and CP were acquired through Lee County's Environmentally Sensitive Lands Acquisition Program, Conservation 20/20 (C20/20). The purchase and perpetual stewardship of these sites will provide protection to the surrounding estuarine communities. The Preserve's natural communities will continue to contribute to the ecosystem functions and help maintain its integrity.

The Preserves are located on the northern portion of Pine Island. CP and SBP parcel #55 have legal access via boat only. SBP parcel #315 is accessible via Harbor Drive (Figure 1).

SBP #55 has been disturbed by the installation of mosquito ditching in the property's southeastern corner and western property line. Forty-two acres of SBP #315 had been used as a palm tree grove and numerous palm trees remained on the property after C20/20 purchased the property. Salt water intrusion into the southwestern grove seems to have played a role in causing the palms to yellow and therefore drop in value. The entire grove area had been ditched and furrowed and a large perimeter ditch was installed along the shared boundary with the property line and the grove area. Much of the rest of the property is disturbed due to the installation of mosquito ditches in the 1960s. This allowed exotic species to become established and now much of the natural part of the property is infested with Brazilian pepper (*Schinus terebinthifolius*), and Australian pine (*Casuarina equisetifolia*).

The main stewardship challenges for the sites will be the initial treatment and continued follow up treatment of invasive exotic plants and hydrologic restoration including filling of mosquito ditches, regrading of the palm grove portion of SBP parcel #315, and planting native vegetation once the regrading is completed. Seven Florida Exotic Pest Plant

Council (FLEPPC, 2009) Category I and three FLEPPC Category II invasive plant species have been identified on the Preserves.

The purpose of this stewardship plan is to define conservation goals for SBP and CP. It will serve as a guide for the Lee County Department of Parks and Recreation (LCPR) to use best management practices to ensure proper stewardship and protection of the Preserves. A number of field surveys were conducted along with review of scientific literature and historical records to understand how the Preserves function in the ecosystem, which wildlife and plants are found within its boundaries and how it has been impacted by humans. This allows the plan to serve the purpose as a reference guide for those interested in learning more about the Preserve and some of the land stewardship efforts in Lee County.

III. LOCATION AND SITE DESCRIPTION

SBP is a 267 acre preserve consisting of parcel numbers 55 and 315. CP is a 189 acre preserve consisting of parcel # 368. SBP is located on the northeastern side of Pine Island; in northwest Lee County, Florida, within Sections 4 and 33, Townships 43 and 44, Range 22. CP is located on the northwestern side of Pine Island in northwest Lee County, Florida, within Sections 1, 2, 35, and 36, Townships 43 and 44, Range 21 (Figure 1).

SBP contains 42.4 acres of abandoned field –agriculture from a palm farm operation, 122.9 acres of tidal swamp, 35.8 acres of disturbed land as a result of mosquito ditching and 7.3 acres of open water. CP contains 28.2 acres of disturbed land as a result of mosquito ditching, 146.4 acres of tidal swamp and 14.4 acres of open water known as Big Jim Creek.

The boundaries of SBP are depicted in Figures 2 and 3 and of CP in Figure 4. Surveys of SBP parcel #315 and of CP are on file with C20/20 staff, but a survey for SBP parcel #55 was not obtained during acquisition.

Figure 1: Location Map

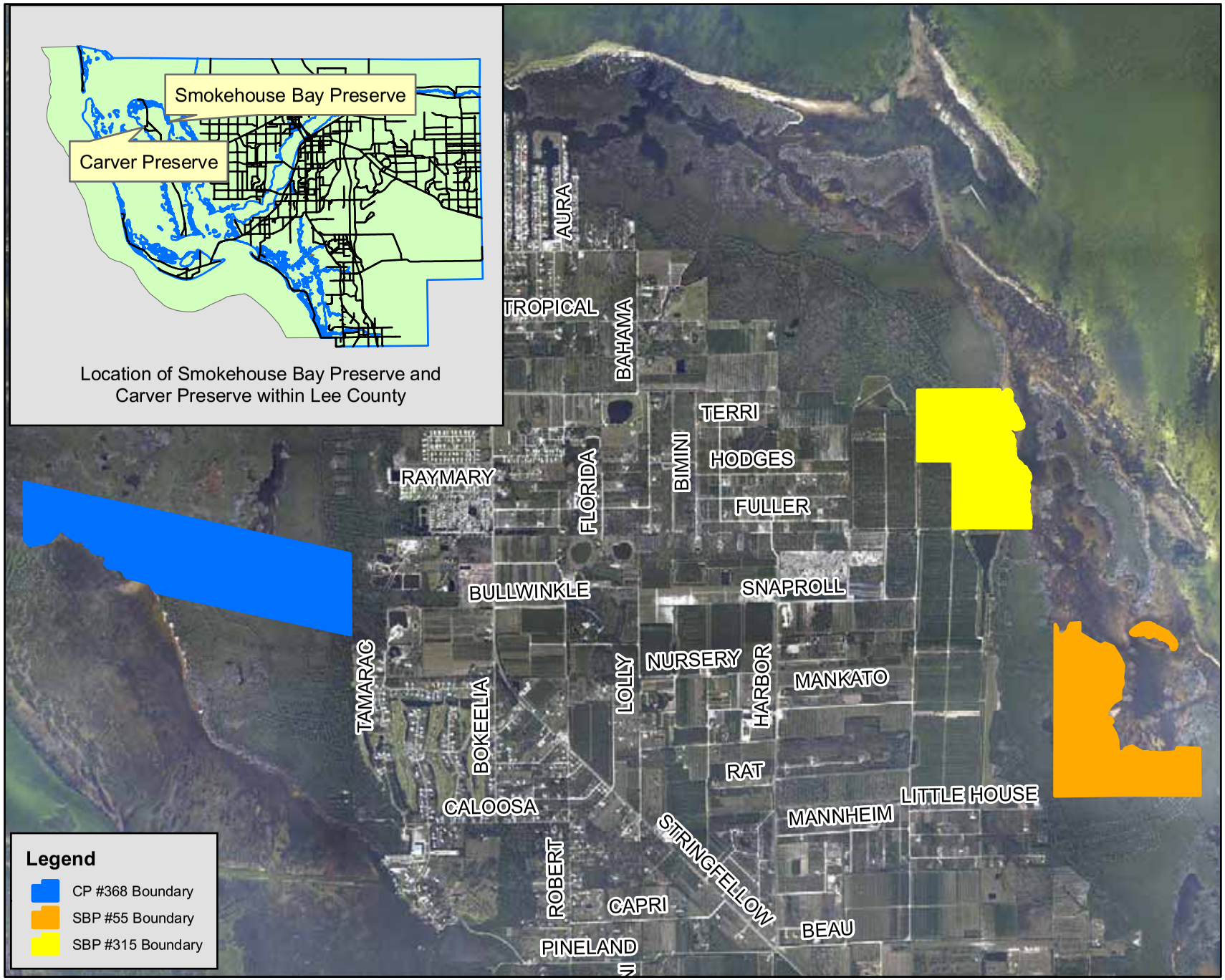
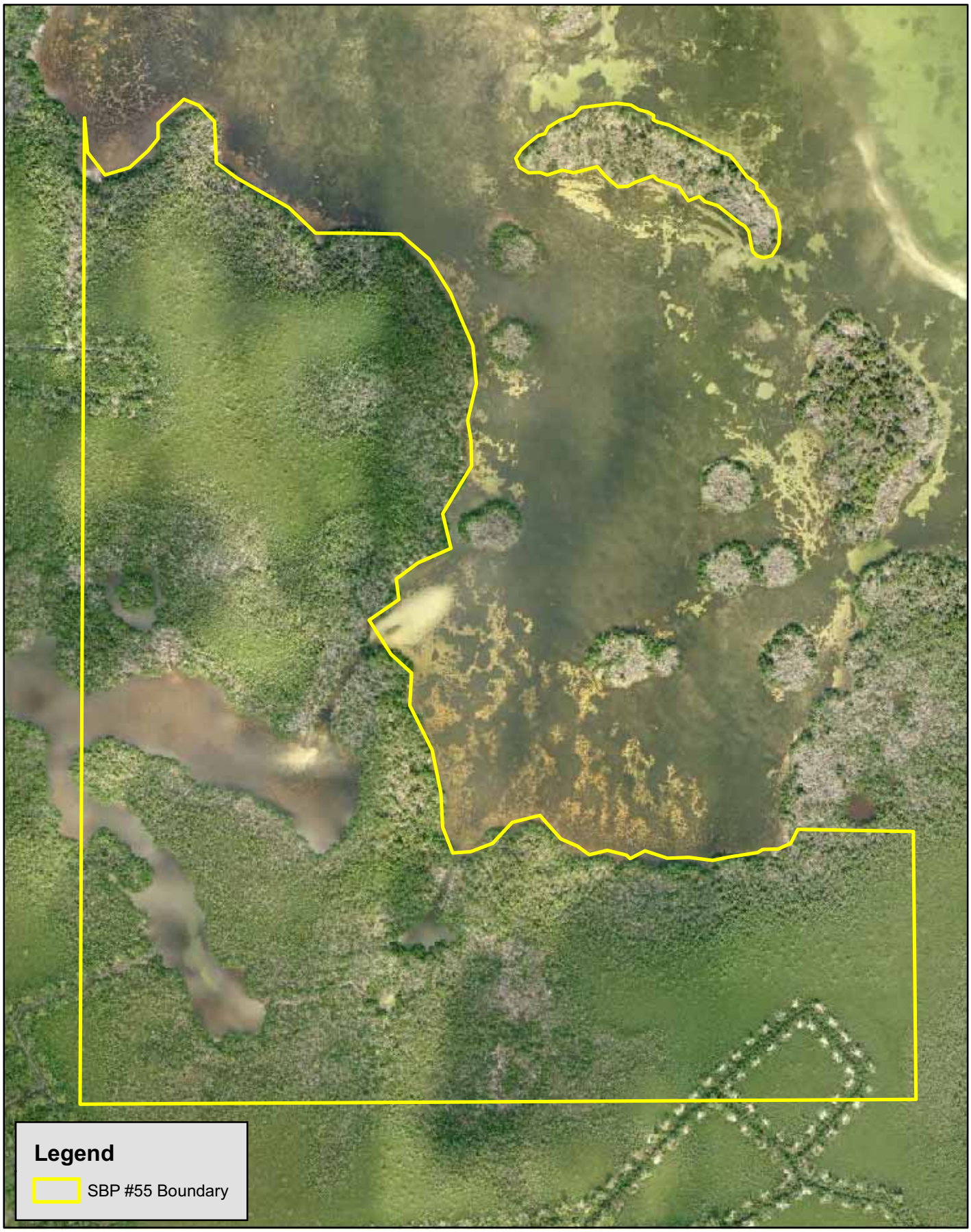


Figure 2: 2009 Aerial Photograph Smokehouse Bay Preserve #55



Smokehouse Bay Preserve #55

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Land Stewardship staff has prepared this document for informational and planning purposes.

Map prepared on 8/20/2009 by jwaller@leegov.com
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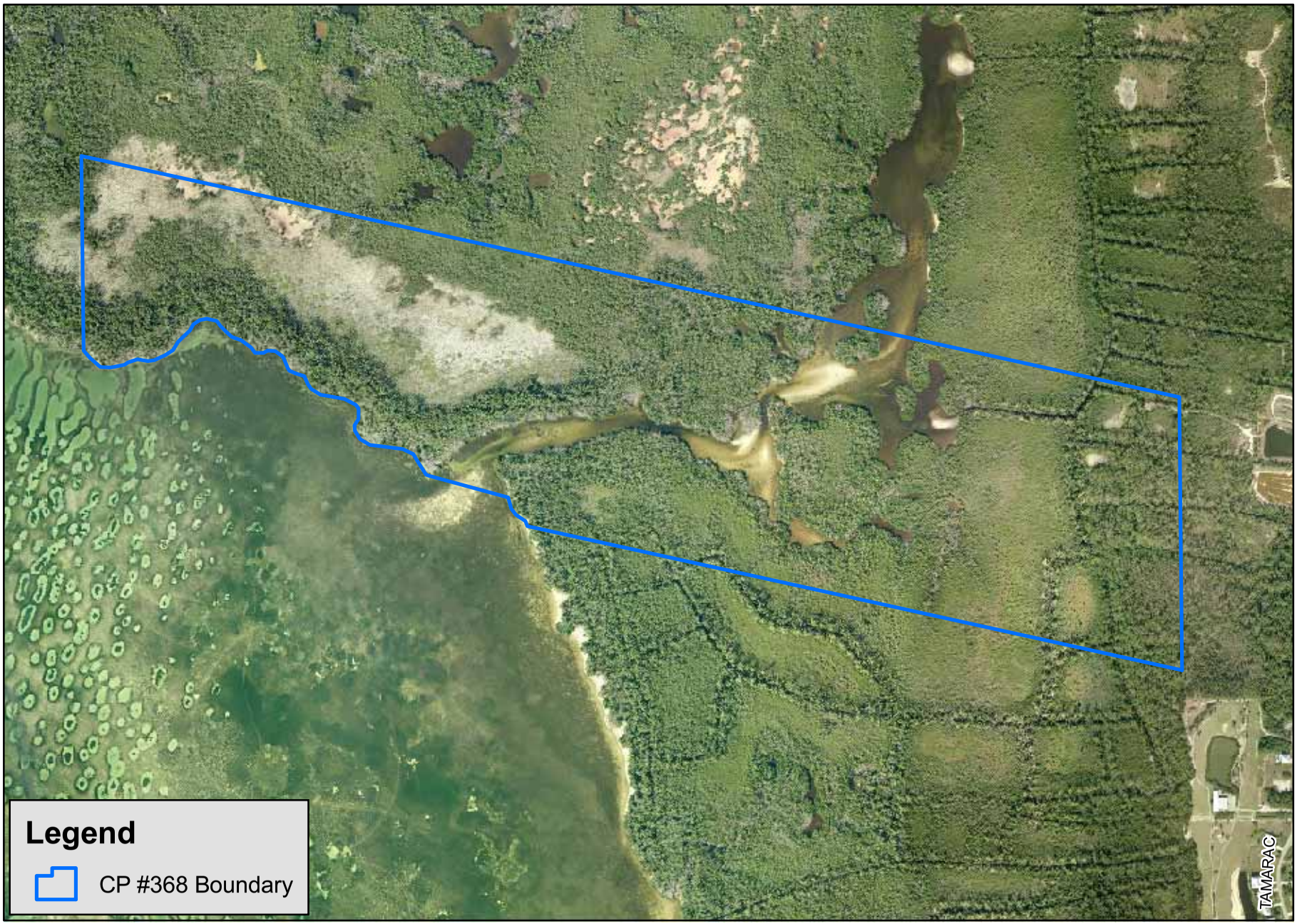
Figure 3: 2009 Aerial Photograph Smokehouse Bay Preserve #315

Figure 4: 2009 Aerial Photograph Carver Preserve



Carver Preserve

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IV. NATURAL RESOURCES DESCRIPTION

A. Physical Resources

i. Climate

Southwest Florida has a humid, sub-tropical climate due to its maritime influence from the Caribbean Sea and the Gulf of Mexico. The mild temperatures encourage winter residents and tourists to visit the area. 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 late fall, winter, and early spring, weather systems (fronts) from the northeastern United States sweep over the area. These fronts can bring significant swings in temperature and humidity, causing the weather to oscillate between maritime tropical and continental winter weather.

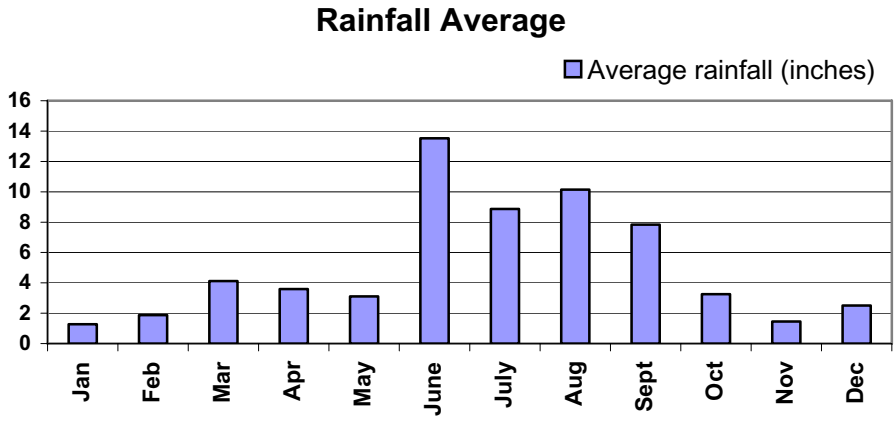
Temperate climate influences are exerted as well, with infrequent but significant freezes occurring in December and January (FCC 2005). These freezes occasionally damage the vegetation and prevent some of the more cold sensitive tropical plants from becoming established. Cold fronts regularly push cool, sometimes moist weather from the southeastern U.S. to southwest Florida during the winter. These cold fronts also encourage migratory birds to utilize the Preserves as either a stop-off point on a longer voyage, or as a winter roosting and feeding area. Table 1 shows the average high and low temperatures for Fort Myers, Florida compiled by the Southeast Regional Climate Center from 1931 to 2007.

Table 1: Average High/Low Temperatures for Ft. Myers, FL (1931-2007)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
High temperature (°F)	74.7	76.1	79.8	84.2	88.6	90.5	91.2	91.4	89.7	85.7	80.2	75.9
Low temperature (°F)	53.5	54.7	58.4	62.4	67.5	72.4	74.2	74.5	73.9	68.3	60.5	55.1

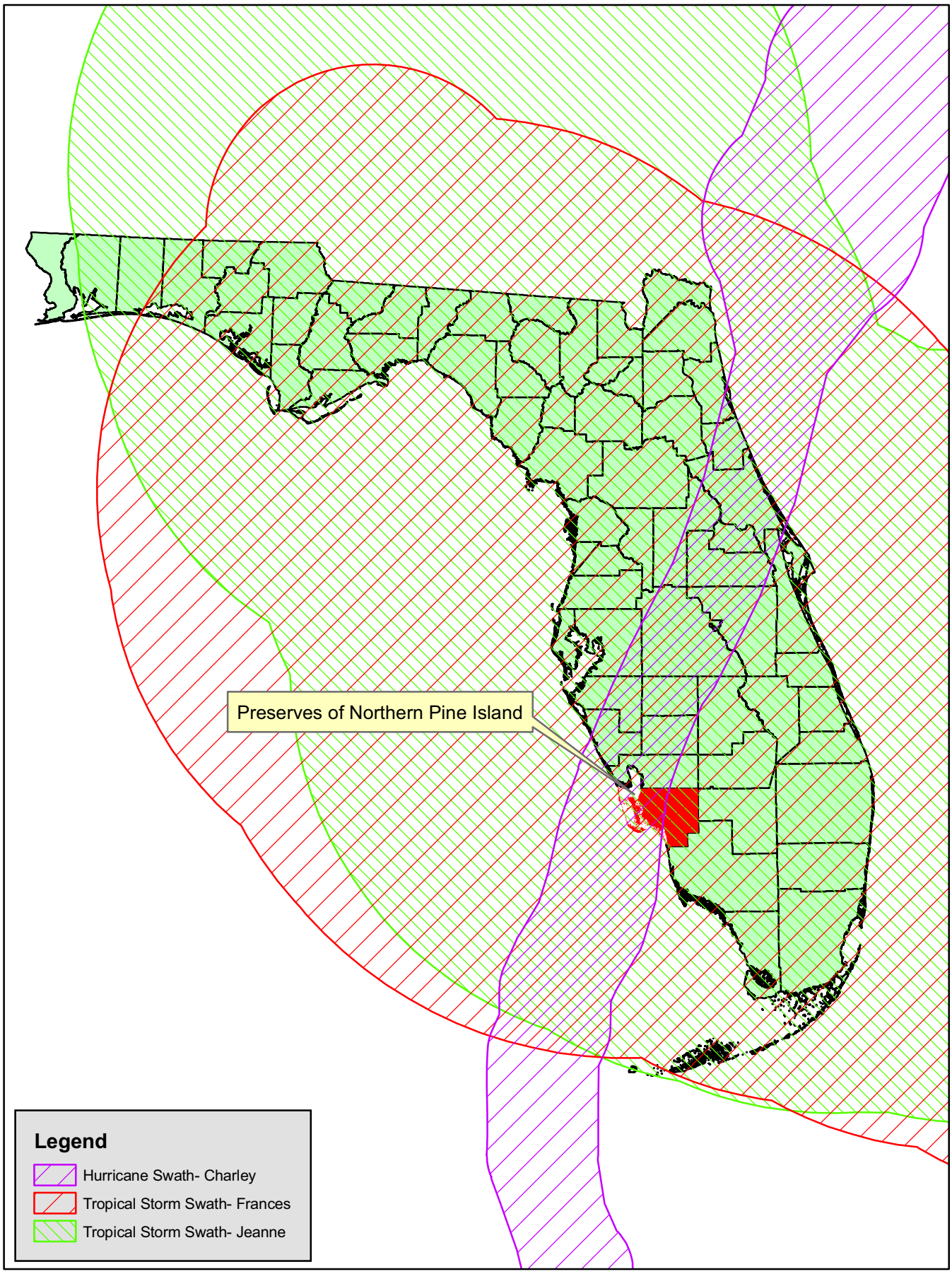
The graph below depicts the rainfall data collected by the Greater Pine Island Water Association on a daily basis from their facility located at 9550 Stringfellow Road, Pine Island. This facility is approximately 2.5 miles south-south east of the Preserves of Northern Pine Island. Average annual rainfall over the four years was 61.6 inches, slightly lower than the average rainfall for the entire county for the last fourteen years (64.76 inches).

Figure 5: Pine Island Average Rainfall 2003-2007



Occasionally, major hurricanes pass through southwest Florida impacting natural ecosystems and man-made infrastructure. Although these effects are believed by many to be short-term, long-term consequences may result in plant canopy restructuring, invasive plant introduction and/or further dispersal, and increased wildfire severity to communities from increased fuel loads (dead vegetation). The effect of hurricanes on natural systems is compounded by the already present anthropogenic impacts. During 2004, three tropical systems (Charley, Frances, and Jeanne) passed over Lee County. SBP and CP experienced hurricane force winds from Hurricane Charley and tropical storm force winds from Hurricanes Frances and Jeanne (Figure 6).

Figure 6: 2004 Tropical Storm Map



ii. Geology

For millions of years, the Florida Platform was submerged by the ocean. Sediments accumulated upon it and hardened into sedimentary rock. Thirty-five (35) million years ago, portions of Florida rose above the ocean's surface and for the next 12 million years it alternated between emersion and submergence. From 23 million years ago to the present, at least a small portion of the Florida Platform has always been above the ocean surface (Wilder 2005).

Ten lithostratigraphic units have been identified in the state of Florida. Lithostratigraphic units are differentiated by the conditions under which they were formed and when during geologic time they were formed. These lithostratigraphic units are further divided by timing of formation into stratigraphic units (Figure 7). The Preserve's entire boundary lies within the Holocene sediments. These were formed in the last 10,000 years with the warming of earth and the beginning of man. These sediments occur near the coastlines with elevations generally less than 5 feet. Sediments here include quartz, sands, carbonate sands and muds, and organics (Missimer & Scott 2001).

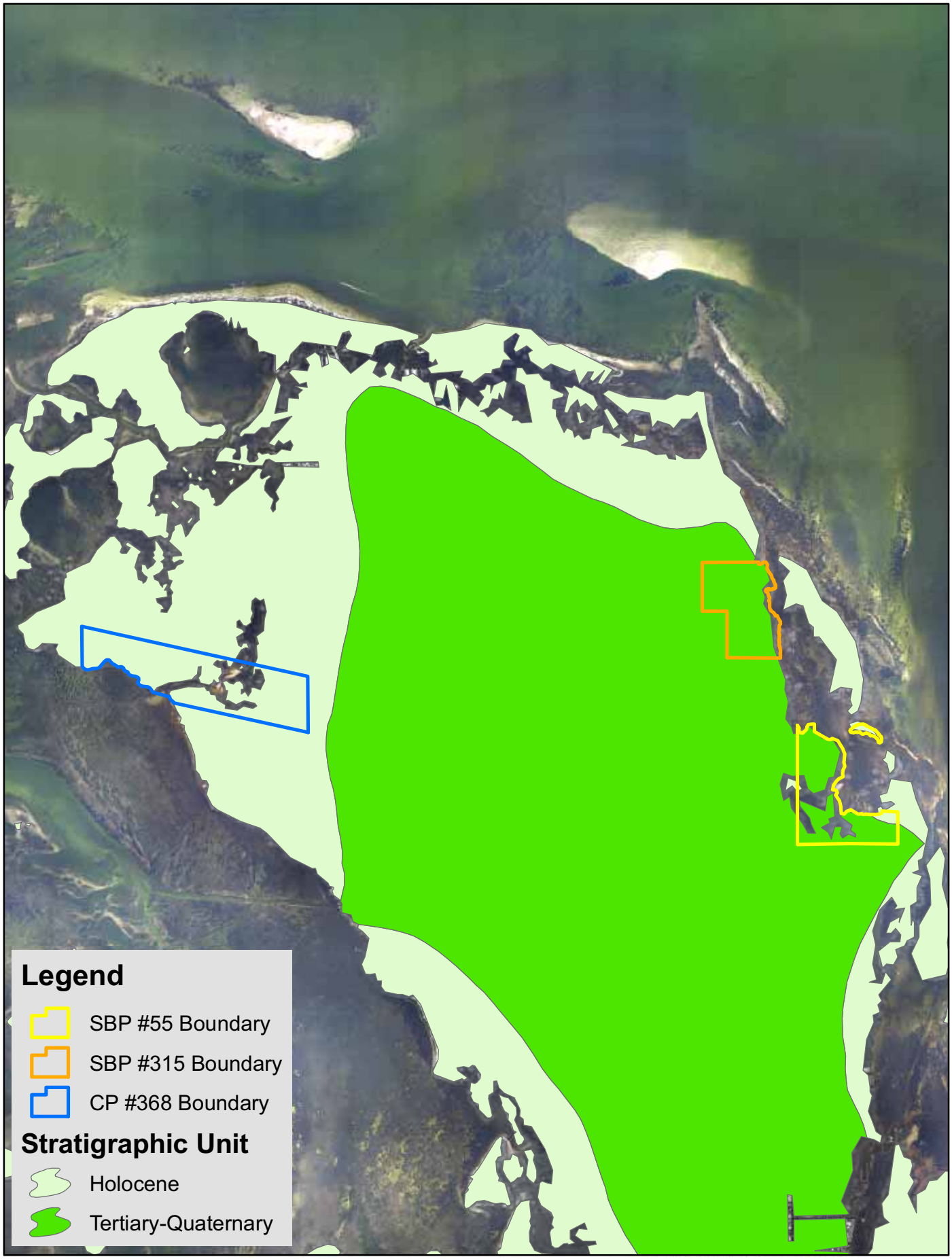
The Tertiary-Quaternary period is also known as the Ice Age, where huge ice sheets formed across Canada and the northern United States. When these ice sheets were formed, they consumed large quantities of seawater, dropping the current sea level 300 or more feet, which greatly increased the land area of Florida. As the glaciers shrank, sea levels rose, and the Florida peninsula was again flooded. During the peak warm periods, sea level reached 150 feet above the current sea level. The waves and currents during these high sea level periods reworked the sediments and formed a series of geological units (Caloosahatchee, Ft. Thompson, Anastasia, Miami Limestone and Key Largo Limestone). Each of these geological units is characterized by their unique compositions. However, throughout much of Lee County the Caloosahatchee and Fort Thompson units are somewhat indistinct and have been lumped together as undifferentiated Tertiary-Quaternary Sediments. This unit consists of a quartz sand blanket covering limestone and clay. Fossils, including mollusks and corals, are very common and usually in excellent condition (Missimer and Scott 2001).

Southwest Florida can also be divided into ten major physiographic provinces. These are broad-scale subdivisions based on physical geography features such as terrain texture, rock type and geologic structure and history. Figure 8 illustrates where SHB and CP lie within the Gulf Coastal Lowlands (Map source: SFWMD 2000).

The Gulf Coastal Lowlands are found in northwest Lee County as well as most of Charlotte and Sarasota Counties to the north. This region is characterized as a gently southwestward sloping plain composed of deposited sediments. These sediments are aligned parallel to the coastline, which indicates they were formed by marine forces (Missimer and Scott 2001).

The Preserves are all located on Pine Island which is a bay island that helps make up the Gulf Barrier Chain. Both barrier islands, including Sanibel and Captiva, and other bay islands together create this chain of islands in the Gulf of Mexico.

Figure 7: Stratigraphic Units



The Preserves of Northern Pine Island

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Map prepared on 8/20/2009 by jwaller@leegov.com
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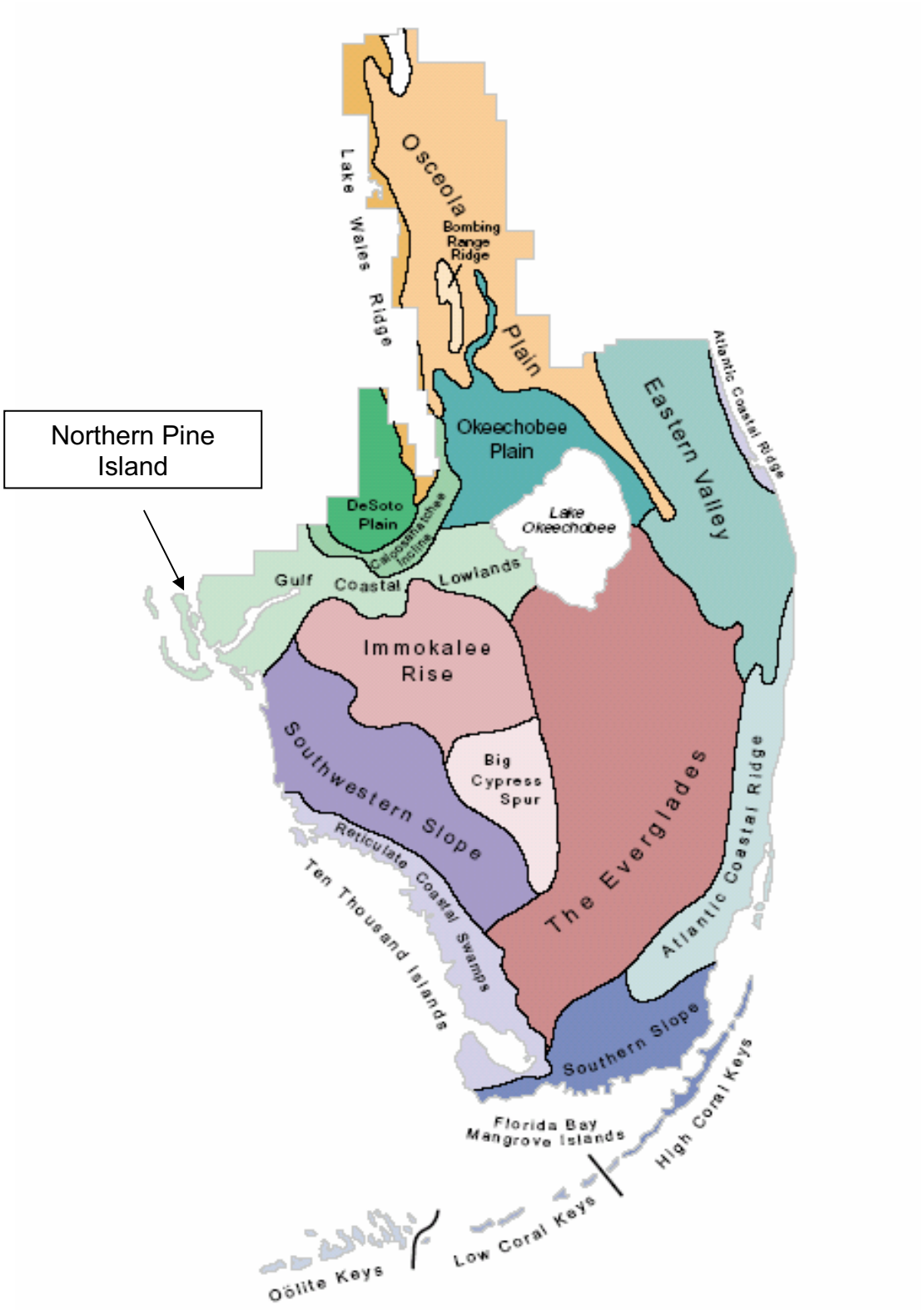
Figure 8: Physiographic Regions

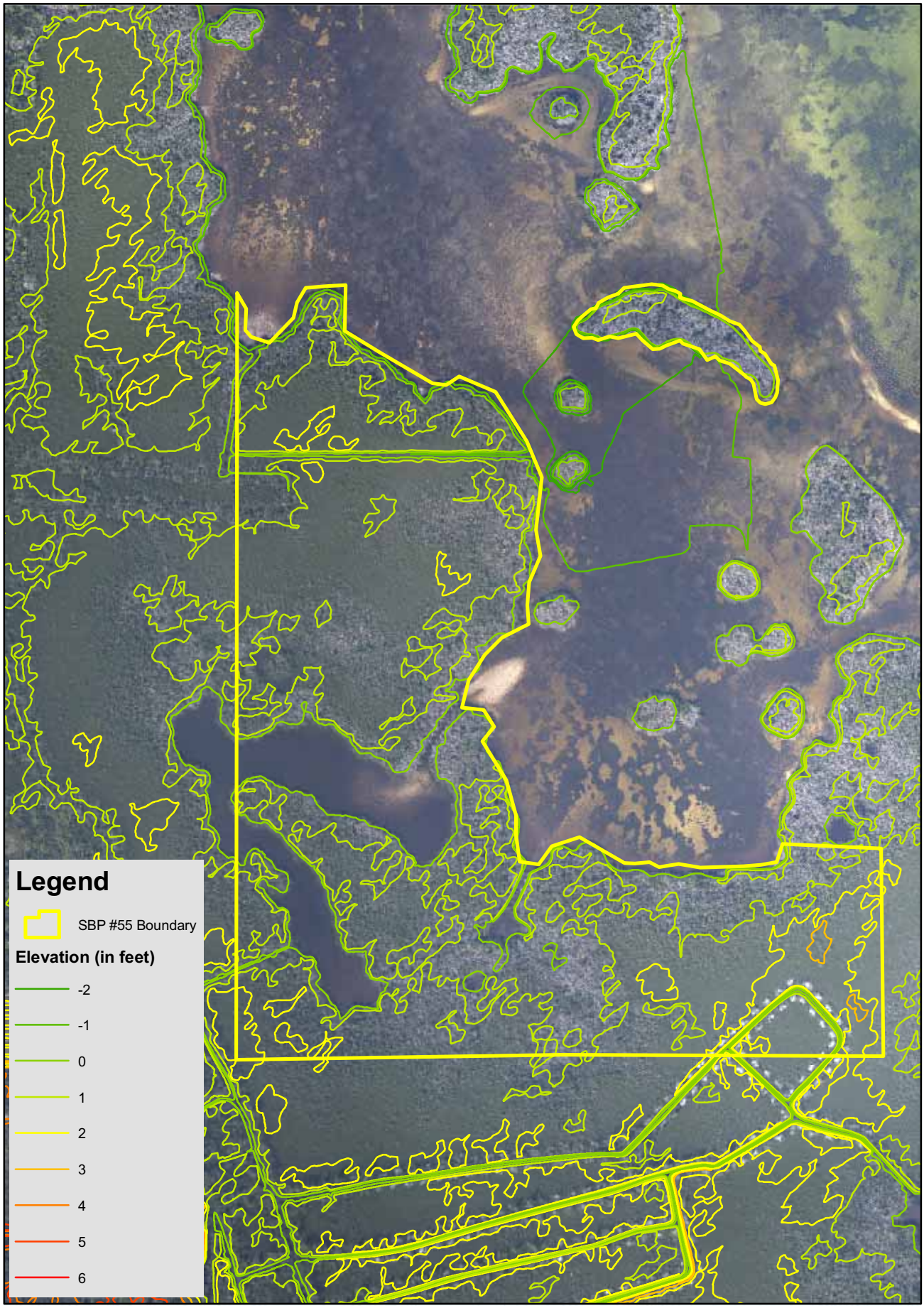


iii. Topography

Most of Lee County is located within the Gulf Coastal Lowlands of Florida that extend around the coastal periphery of the state where elevations are generally less than 100 feet above sea level (Stubbs 1940; Cooke 1945).

Natural elevations at SBP and CP range from sea level to approximately 3 feet above sea level. SBP generally slopes in an easterly direction while CP generally slopes in a westerly direction. Several portions of the preserves have had their natural elevations altered through the deposition of material from the creation of mosquito ditches, where elevations exceed 6 ft in some places. Figures 9-11 show the topography of each of the Preserve sites.

Figure 9: Topography Map Smokehouse Bay Preserve #55



Smokehouse Bay Preserve #55

0 115 230 460 690 920 Feet

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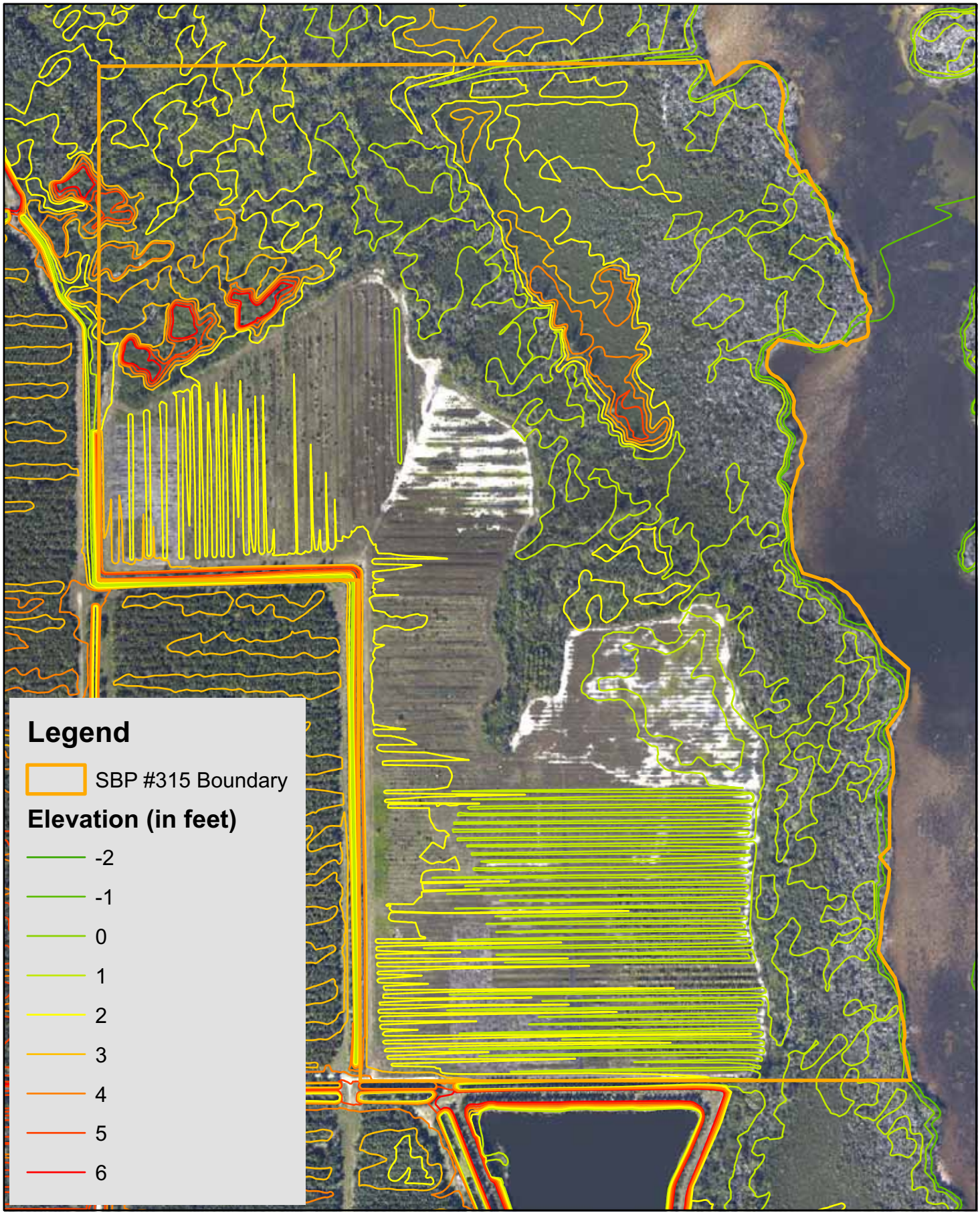
Figure 10: Topography Map Smokehouse Bay Preserve #315



Smokehouse Bay Preserve

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Figure 11: Topography Map Carver Preserve

Carver Preserve

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iv. Soils

The Soil Survey of Lee County, Florida (Henderson 1984) was designed for a diverse group of clients to be able to comprehend soil behavior, physical and chemical properties, land use limitations, potential impacts, and protection of the environment. 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 (WMI 2005).

Several soil types occur on the SBP and CP. SBP #55 has two soil types; Peckish mucky fine sand and Wulfert muck (Figure 12 and Table 2). SBP #315 includes four soil types. Maykka Fine Sand makes up the majority of the palm grove, while Peckish Mucky Fine Sand, Pompano Fine Sand, and Wulfert Muck make up more of the mangrove areas (Figure 13). CP has three types of soils, but is primarily composed of Wulfert Muck. However, Peckish Mucky Fine Sand and Myakka Fine Sand are also present primarily along the eastern property line (Figure 14).

Table 2 and the descriptions below have been organized to quickly provide land stewards with pertinent soils information for understanding restrictions and/or results regarding future restoration and probable recreational plan limitations and expense.

There are eight generalized range site categories in Lee County, three of which are found on the Preserves of Northern Pine Island. A range site has the potential to support a native plant community typified by an association of species different from that of other range sites. Man-made areas are not included in range site categories. Note that these categories are not Florida Natural Areas Inventory (FNAI) natural plant community designations, but rather they are used to group soil types and where they might occur. The ranges identified on these Preserves are:

- Saltwater Marshes – Tidal marsh areas along the Gulf of Mexico with the potential to produce significant amounts of cordgrass (*Spartina spp*.), seashore saltgrass (*Distichlis spicata*), and seashore paspalum (*Paspalum vaginatum*).
- South Florida Flatwoods – Nearly level areas with scattered to numerous pine trees (*Pinus spp.*), saw palmetto (*Serenoa repens*), gallbery (*Ilex glabra*), and other woody plants.
- Slough – Open grassland where nearly level areas act as broad natural drainage courses in the flatwoods. The potential plant community is dominated by blue maidencane (*Amphicarpum muhlenbergianum*), chalky bluestem (*Andropogon virginicus* var. *glaucus*), and blue-joint panicum (*Panicum tenerum*).

Wetland classifications are used to identify locations that may retain water for an indeterminate amount of time.

- F-Flooding: Soil flooded by moving water from stream overflow, runoff or high tides.

- S-Slough (sheet flow): A broad nearly level, poorly defined drainage way that is subject to sheet-flow during the rainy season.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long duration storms. There are two hydrologic soil groups found on the Preserve:

- B – Soils having a moderate infiltration rate (low to moderate runoff potential) when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well-drained soils that have moderately fine texture to moderately coarse texture. Moderate rate of water transmission.
- D - Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist mainly of clays that have a high shrink-well potential, soils that have a permanent high water table, soils that have a clay pan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. Very slow rate of water transmission.

Note that some of the soil types are shown as having dual hydrologic groups, such as B/D. A B/D listing means that under natural condition the soil belongs to D, but by artificial methods the water table can be lowered sufficiently so that the soil fits in B. These preserves have been impacted in several ways, including the installation of berms, furrows, and mosquito ditches. Since there are different degrees of drainage or water table control, an onsite evaluation would be needed to determine the exact hydrologic group of the soil at each particular impacted location.

Soil permeability is defined as “the quality of the soil that enables water to move downward through the profile.” Permeability is measured as the number of inches per hour that water moves downward through the soil. The water table columns indicate the amount of time water may be present at specified depth ranges. Terms describing permeability are below:

Very slow	< 0.06 inch
Slow	0.06 – 0.2 inch
Moderately slow	0.2 – 0.6 inch
Moderate	0.6 – 2.0 inches
Moderately rapid	2.0 – 6.0 inches
Rapid	6.0 – 20 inches
Very rapid	> 20 inches

Soils affect the type, quality and quantity of food and cover for wildlife. Wildlife diversity and abundance are also influenced by distribution of food, cover, and water. Wildlife habitat may be created or improved by planting appropriate vegetation, maintaining existing plant communities and promoting the natural establishment of desired vegetation. The soils of Lee County occur in four different habitat types:

- Openland: Cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. Wildlife attracted includes northern bobwhite quail (*Colinus virginianus*), sandhill cranes (*Grus canadensis*), hawks, various birds, and rabbits.
- Woodland: Deciduous plants, coniferous plants, grasses, legumes, and wild herbaceous plants. Wildlife attracted includes wild turkeys (*Meleagris gallopavo*), thrushes, woodpeckers, squirrels, foxes, raccoons (*Procyon lotor)*, white-tailed deer (*Odocoileus virginianus*), snakes, frogs, and bobcats (*Lynx rufus*).
- Wetland: Open, marshy or swampy shallow water areas. Wildlife attracted includes ducks, ibis, egrets, herons, shorebirds, snakes, frogs, alligators (*Alligator mississippiensis*), and otters (*Lutra canadensis*).
- Rangeland: Shrubs and wild herbaceous plants. Wildlife attracted includes white-tailed deer, quail, Virginia opossums (*Didelphis virginiana*), and various birds.

The potential of the soil for wildlife habitat is rated as:

- Good - Easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected.
- Fair - Established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results.
- Poor - Limitations are severe as habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive.
- Very poor - Restrictions are very severe and unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.
- -- Soil was not rated.

Staff considers soil limitations that affect their suitability for recreational development when developing the Land Stewardship Plan for the site. Although the Soil Survey of Lee County has other categories under recreation, these are not under consideration for the Preserves of Northern Pine Island. The soil types within these Preserves have been identified as having severe limitations for recreational uses due to the flood hazard and high salt content. Severe means “that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.”

Table 2: Summary of Soil Characteristics

						Physical Attributes							*Biological Attributes*				
	Soil Types	Map Symbol	Total Acres	% of Preserve	Habitats (Range Site)	Wetland Class (1)	Hydrologic Group (2)	Surface Permeability	Subsurface Permeability	Water Table within 10" of surface	Water Table below 10-40" of surface	% Organic Matter	Potential as habitat for wildlife in-- Openland	Woodland	Wetland	Rangeland	Limitations for Recreational Paths & Trails
CP	Wulfert Muck	23	118.31	62.6%	salt water marsh	F	D	rapid	rapid	tidal		--	very poor	very poor	fair	--	Severe: wetness, excess humus
	Peckish mucky fine sand		31.09	16.4%	salt water marsh	F	D	rapid		tidal		--	very poor	very poor	fair	--	Severe: wetness, too sandy
	Myakka Fine Sand	11	11.34	6.0%	south Florida flatwoods		B/D	rapid	rapid	1-3 months	2-6 months	<2%	fair	poor	poor	--	Severe: wetness, too sandy
SBP #55	Peckish mucky fine sand		28.30	25.0%	salt water marsh	F	D	rapid		tidal		--	very poor	very poor	fair	--	Severe: wetness, too sandy
	Wulfert Muck	23	65.30	57.8%	salt water marsh	F	D	rapid	rapid	tidal		--	very poor	very poor	fair	--	Severe: wetness, excess humus
SBP #315	Peckish mucky fine sand		9.91	10.2%	salt water marsh	F	D	rapid		tidal		--	very poor	very poor	fair	--	Severe: wetness, too sandy
	Wulfert Muck	23	21.88	22.6%	salt water marsh	F	D	rapid	rapid	tidal		--	very poor	very poor	fair	--	Severe: wetness, excess humus
	Myakka Fine Sand	11	44.85	46.2%	south Florida flatwoods		B/D	rapid	rapid	1-3 months	2-6 months	<2%	fair	poor	poor	--	Severe: wetness, too sandy
	Pompano Fine Sand	10	14.52	15.0%	slough	S	B/D	rapid		2-4 months	6 months	1-5%	poor	poor	fair	--	Severe: wetness, too sandy

Color Key:

Dry
Wet
Wetter
Wettest
Saturated

(1) S - Slough (sheet flow): A broad nearly level, poorly defined drainage way that is subject to sheet-flow during the rainy season.

F - Flooding: The temporary inundation of an area caused by overflowing streams, runoff from adjacent slopes or tides.

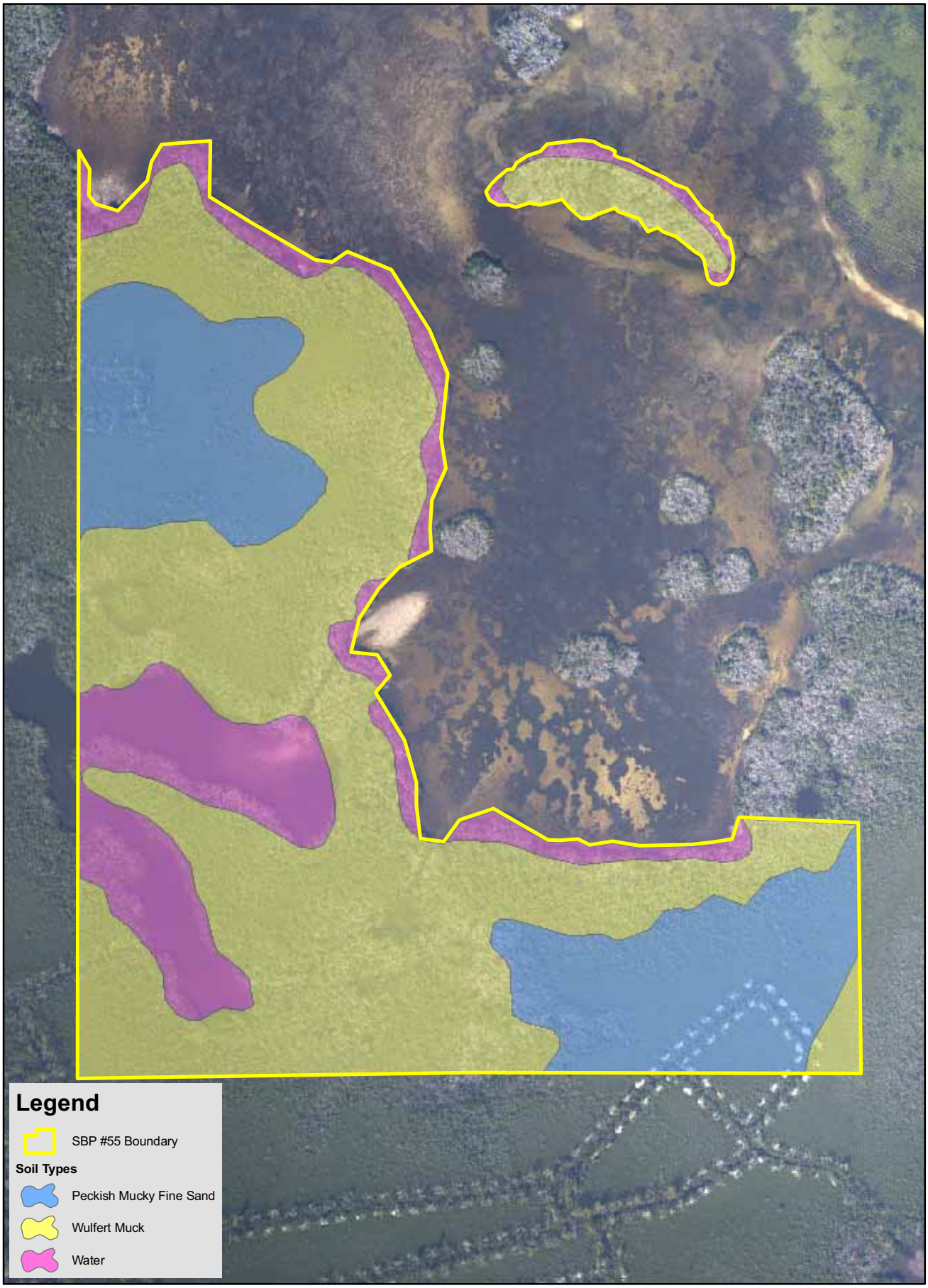
(2) * Water table is above the surface of soil

B - Soils having a moderate infiltration rate (low to moderate runoff potential) when thoroughly wet.

C- Soils having a slow infiltration rate (moderate to high runoff potential) when thoroughly wet.

D - Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet.

Figure 12: Soils Map Smokehouse Bay Preserve #55



Smokehouse Bay Preserve #55

0 125 250 500 750 1,000 Feet

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Map prepared on 8/20/2009 by jwaller@leegov.com
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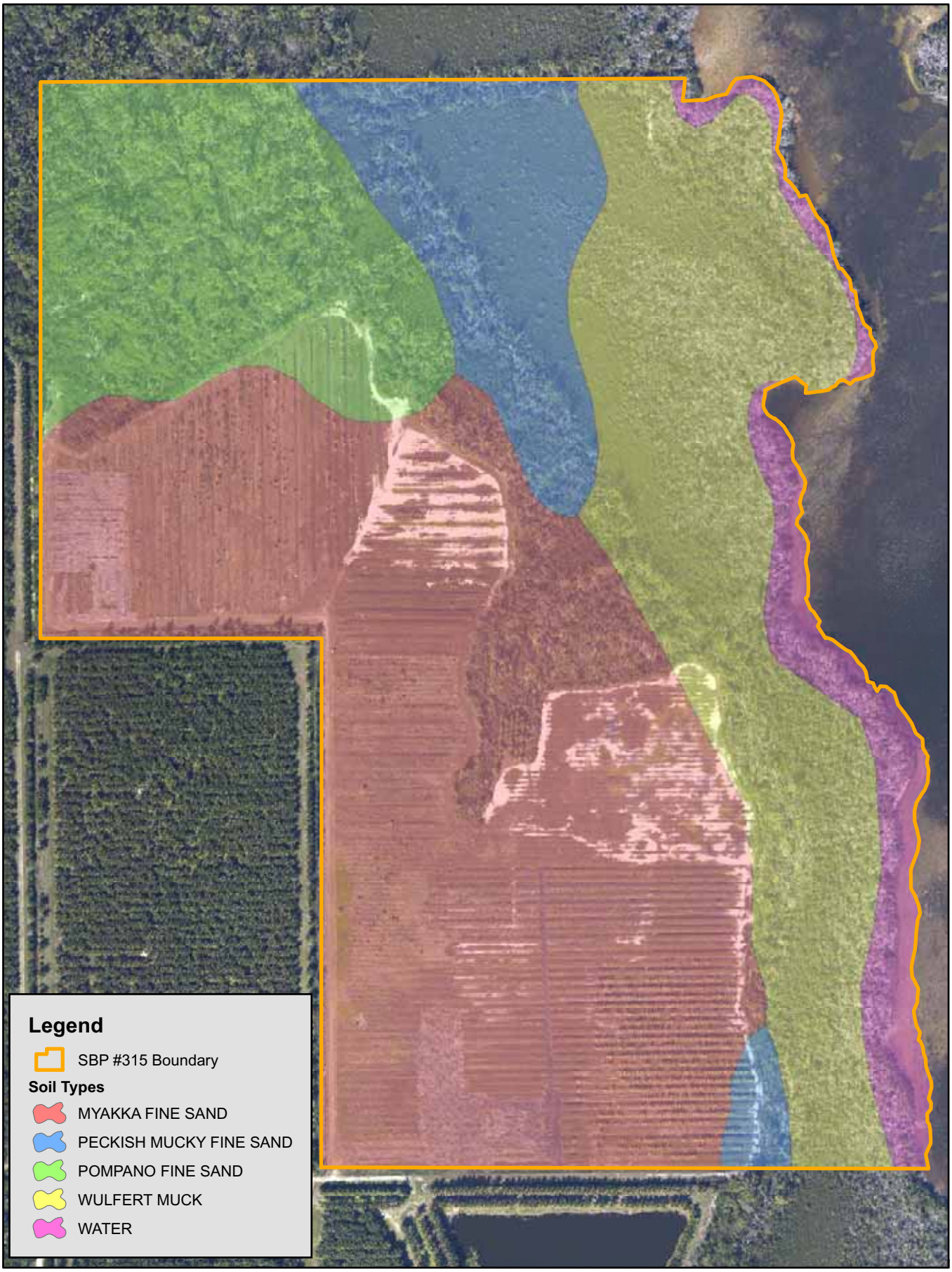
Figure 13: Soils Map Smokehouse Bay Preserve #315



Smokehouse Bay Preserve

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Map created on 8/20/2009 by jwaller@leegov.com
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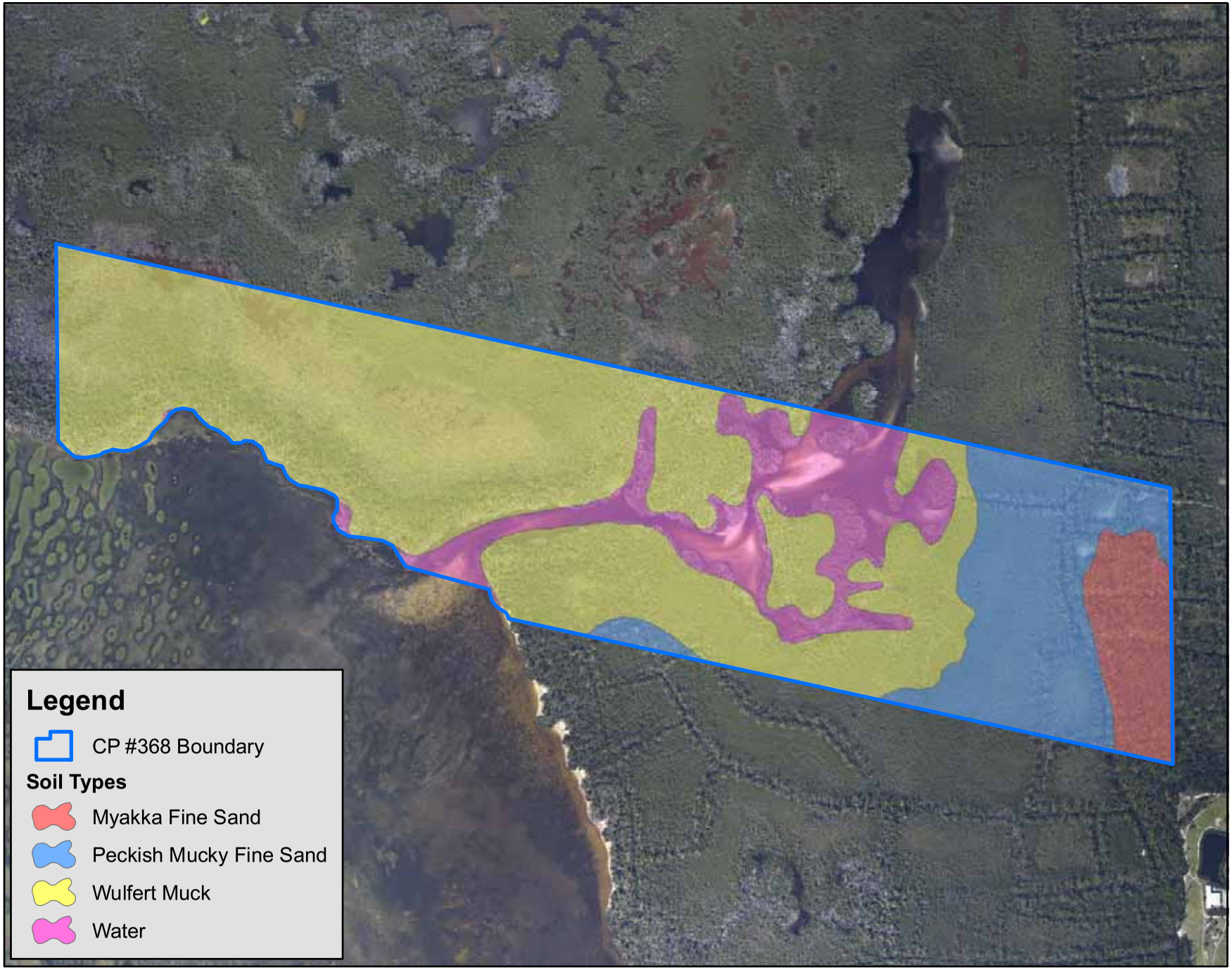
Figure 14: Soils Map Carver Preserve



Carver Preserve

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Map prepared on 8/20/2009 by jwaller@leegov.com
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v. Hydrologic Components and Watershed

SBP and CP are located within the northwestern portion of the South Florida Water Management District's (SFWMD) Lower West Coast Region (LWCR) (SFWMD 2000). Pine Island is approximately 17 miles long and 3 miles wide at its widest point. It is divided into two watersheds, North and South, which include Little Pine Island. The dividing line is the east-west corridor of Pine Island Road. The Preserves lie within the 21 square mile North Pine Island Watershed. This watershed drains the northern half of the island from the center of the island (more or less Stringfellow Road) east into Matlacha Pass and west into Pine Island Sound. The South Pine Island Watershed covers a surface area of approximately 28 square miles (Figure 18).

SBP and CP are almost entirely tidally influenced. During extreme high tides and storm events all of the properties can be inundated with water. As such, there is essentially no surface fresh water on any part of the preserves.

In 1974, the United States Fish and Wildlife Service (USFWS) directed its Office of Biological Services to conduct an inventory of the nation's wetlands. This National Wetlands Inventory (NWI) became operational in 1977. Wetlands were identified on the photography by vegetation, visible hydrologic features, and geography, and subsequently classified in general accordance with the Classification of Wetlands and Deep Water Habitats of the United States (Cowardin et al. 1979). SBP #55 is identified as having 11 acres of Estuarine Aquatic Bed and 90 acres of Estuarine Scrub-Shrub. SBP #315 is identified as having eight acres of Estuarine Aquatic Bed, 28 acres of Estuarine Emergent, and 45 acres of Estuarine Scrub-Shrub. CP is identified as having 26 acres of Estuarine Aquatic Bed, seven acres of Estuarine Emergent, and 155 acres of Estuarine Scrub-Shrub. Estuarine systems are defined as deepwater tidal communities and adjacent tidal wetlands that are usually semi-enclosed by land but have open, partly obstructed, or sporadic access to the open ocean and in which ocean water is at least occasionally diluted by freshwater runoff from the land. Scrub-shrub wetlands are intertidal and are dominated by woody vegetation less than 20 feet tall. Based on the federal NWI evaluation, all of SBP #55 and CP and almost 84% of SBP #315 is classified as wetlands (Figures 15,16, and 17).

Hydrologic alterations have been made on and directly adjacent to the Preserves of Northern Pine Island which affect the natural sheetflow across the lands. The mosquito ditches and spoil piles on all three sites and the berms and furrows associated with the abandoned palm grove on site #315, have altered the natural flow of water. The wetlands on the Preserves, which are directly adjacent to each of the mosquito ditches, drain into the ditches and off to Matlacha Pass for SBP sites and Pine Island Sound for CP.

Figure 15: Hydrologic Features Smokehouse Bay Preserve #55

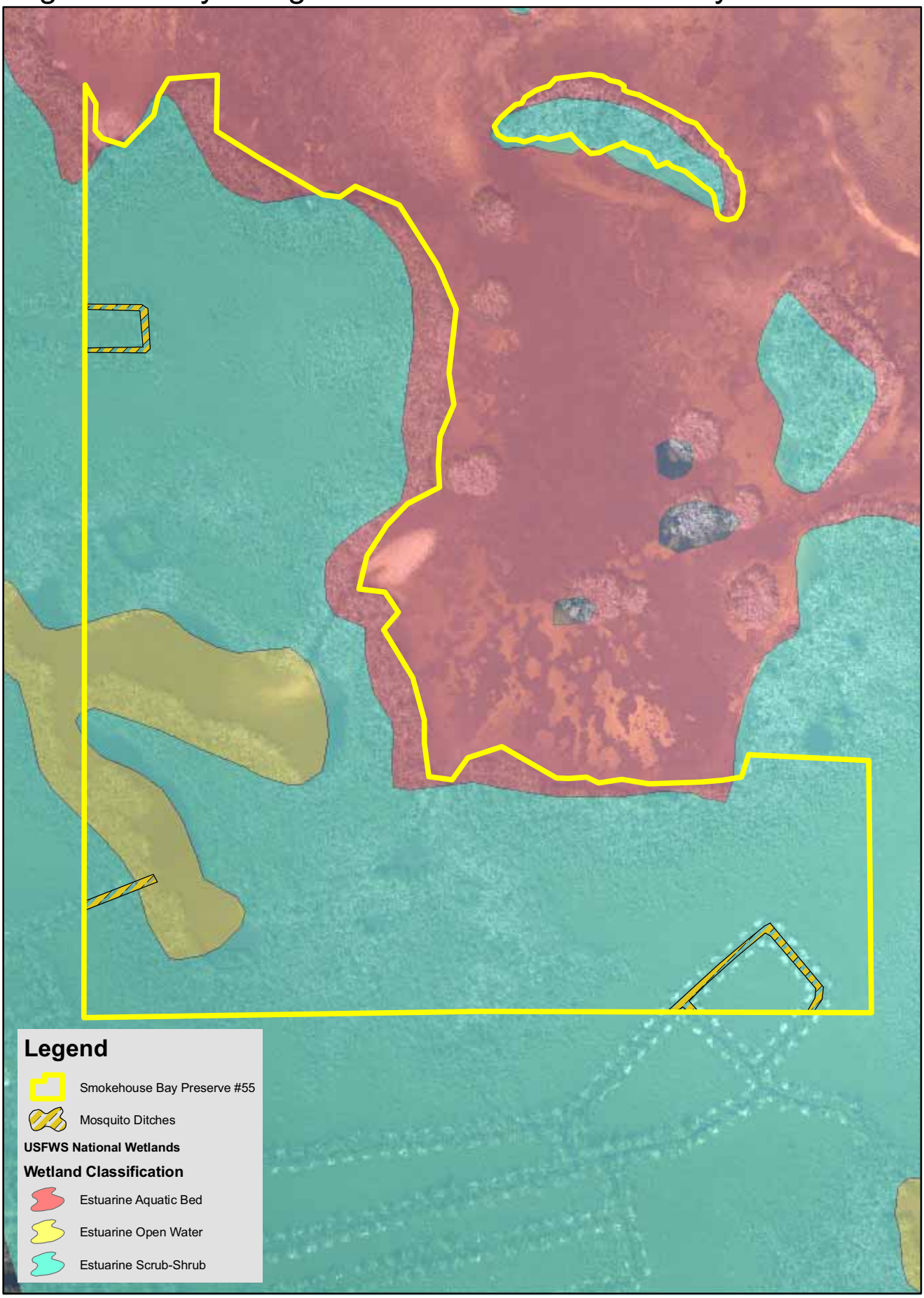
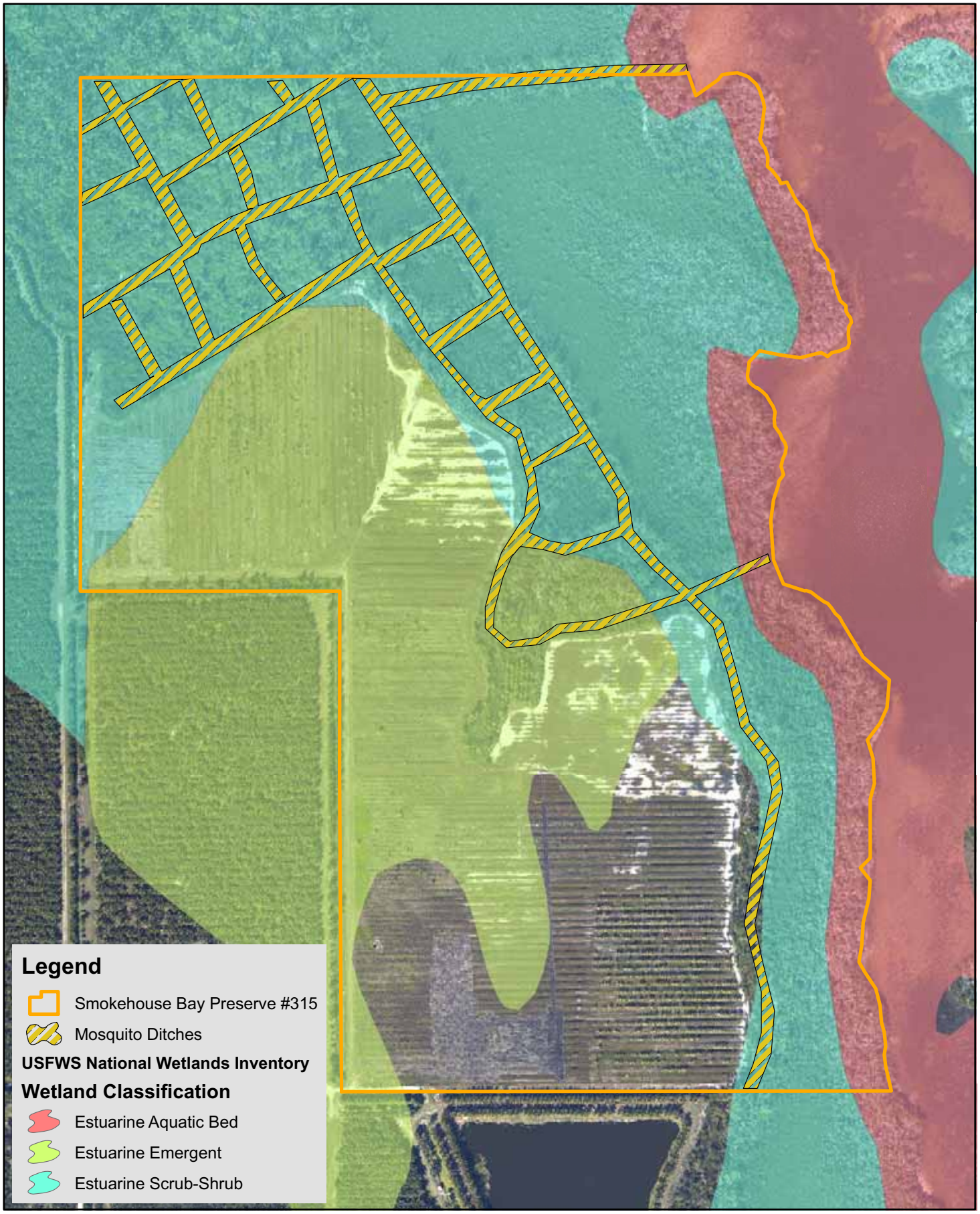


Figure 16: Hydrologic Features Map Smokehouse Bay Preserve #315



Smokehouse Bay Preserve

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Map created on 8/20/2009 by jwaller@leegov.com
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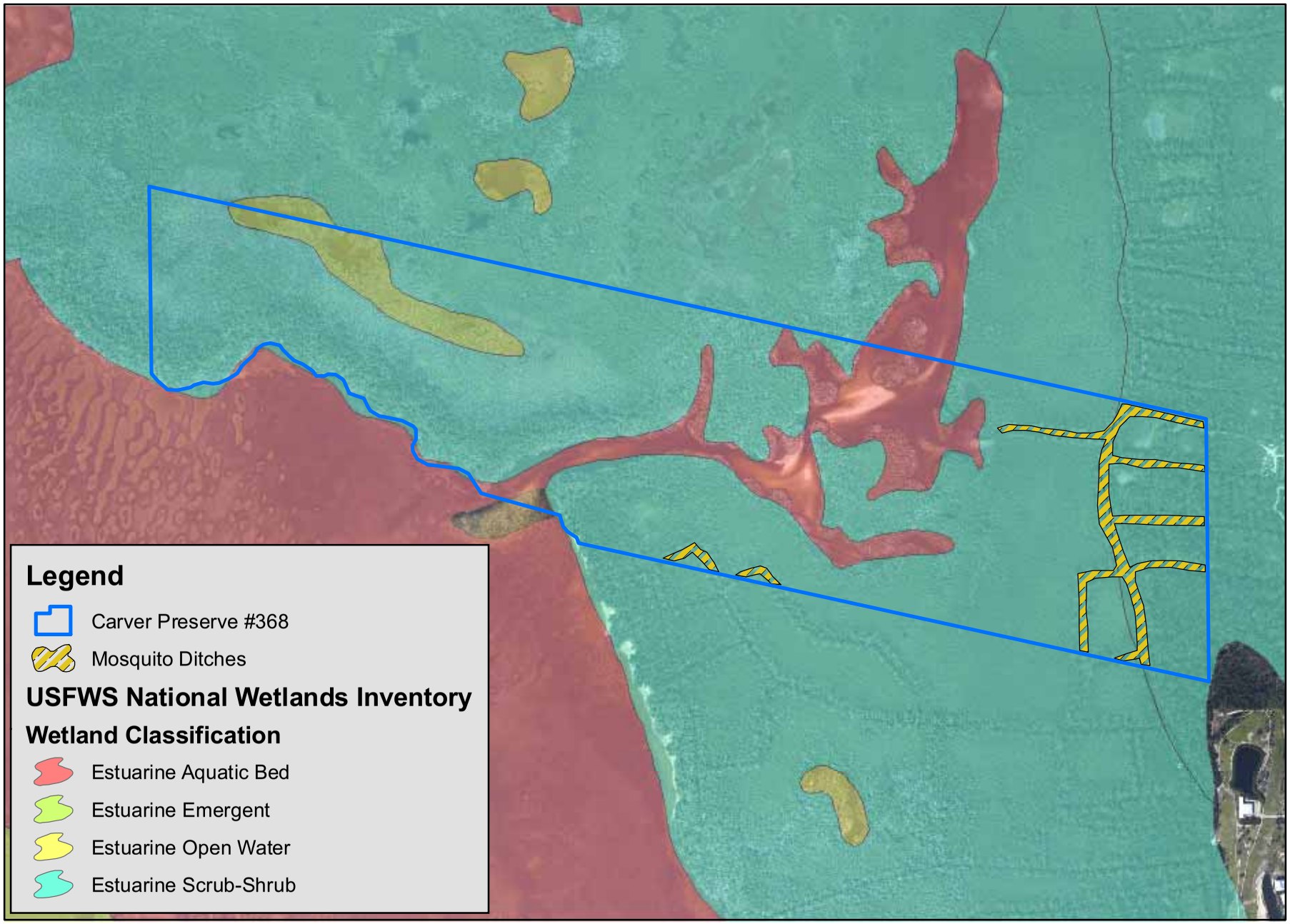
Figure 17: Hydrologic Features Map Carver Preserve



Carver Preserve

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Map created on 8/20/2009 by jwaller@leegov.com
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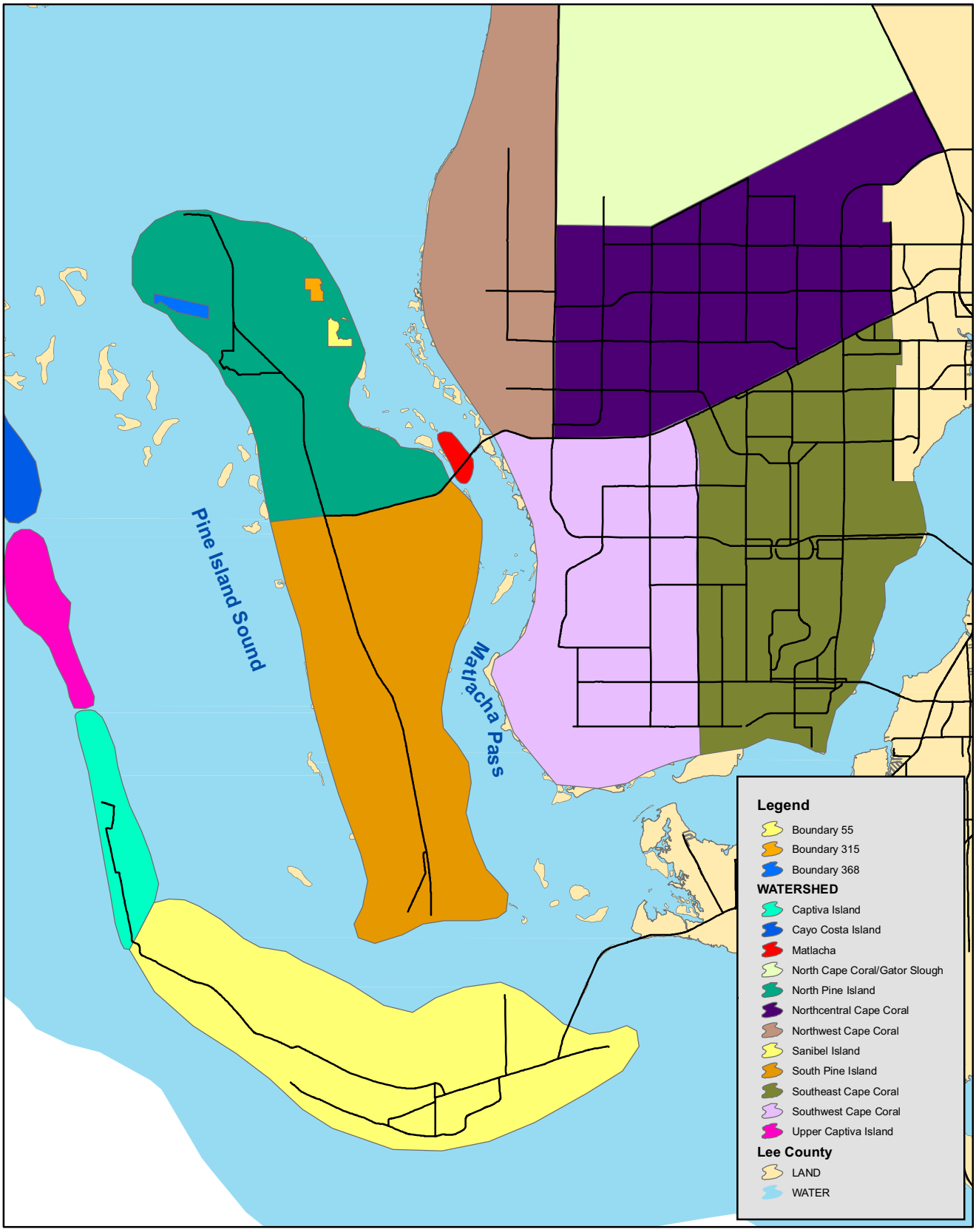
Figure 18: Watershed Map



The Preserves of Northern Pine Island

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Map prepared on 8/26/2009 by jwaller@leegov.com
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B. Biological Resources

i. Ecosystem Function

A tidal swamp, such as those found at SBP and CP, is a significant plant community because it functions as a nursery ground for most of Florida's commercially and recreationally important fish and shellfish. Occurring in flat coastal areas, the soils are generally saturated with brackish water at all times, and at high tides these same soils are usually inundated with standing water. In older areas the sands and muds are usually covered by a layer of peat which has built up from detritus (decaying plant material). Temperature, salinity, tidal fluctuation, substrate and wave energy are five physical factors influencing the size and extent of these communities. Requiring an annual average water temperature above 19°C (66°F) they do not tolerate temperatures below freezing or temperatures which fluctuate widely over the course of a year (FNAI & FDNR 1990).

The prop roots of red mangroves (*Rhizophora mangle)*, the extensive pneumatophores (aerial roots) of black mangroves (*Avicennia germinans)* and the dense root mats of the white mangrove (*Laguncularia racemosa)* serve to entrap sediments and recycle nutrients from upland areas and from tidal import. This process serves in "island formation" and is a part of the successional process involved in land formation in south Florida. These root structures also provide substrate for the attachment of and shelter for numerous marine and estuarine organisms (FNAI & FDNR 1990). In addition to island formation tidal swamps are also important in protecting the coastline from erosion. The roots of the mangroves act to disperse wave energy and stabilize the shoreline. Additionally, tidal swamps help protect other inland communities by absorbing the brunt of tropical storms and hurricanes. Additionally, mangroves can produce up to 80% of the total organic material available in the aquatic food web through the continuous shedding of its leaves and other plant components (FNAI & FDNR 1990).

Tidal swamps provide breeding grounds for substantial populations of wading birds, shorebirds and other animals (FNAI & FDNR 1990). Several bird species including; mangrove cuckoos (*Coccyzus minor*), black-whiskered vireos (*Vireo altiloquus*) and gray kingbirds (*Tyrannus dominicensis*) are dependent on mangroves for nesting and their numbers are jeopardized by the fragmentation of mangrove habitat. Tidal swamps are also important habitat for wading birds such as wood storks (*Mycteria americana*), white ibis (*Eudocimus albus*), and roseate spoonbills (*Platalea ajaja*) all of which are known to use larger mangroves as nesting areas. Although not all have been documented on the Preserves, there are several wildlife species that are found exclusively in tidal swamps including mangrove salt marsh snakes (*Nerodia clarkii compressicauda*) and at least two butterfly species, the mangrove skipper (*Phocides pigmalion*) and the black mangrove buckeye (*Junonia evarete*), that depend on mangroves as a larval food source (Postmus per. comm.).

ii. Natural Plant Communities

SBP and CP consist entirely of coastal communities and disturbed lands. Only two natural plant communities exist on these preserves as defined using the Guide to the Natural

Communities of Florida (FNAI and the Florida Department of Natural Resources 1990). The largest community is tidal swamp which makes up 77.5% of the vegetation on CP and 58.9% on SBP. Another community identified is spoil area created from the digging of mosquito ditches in the late 1960's.

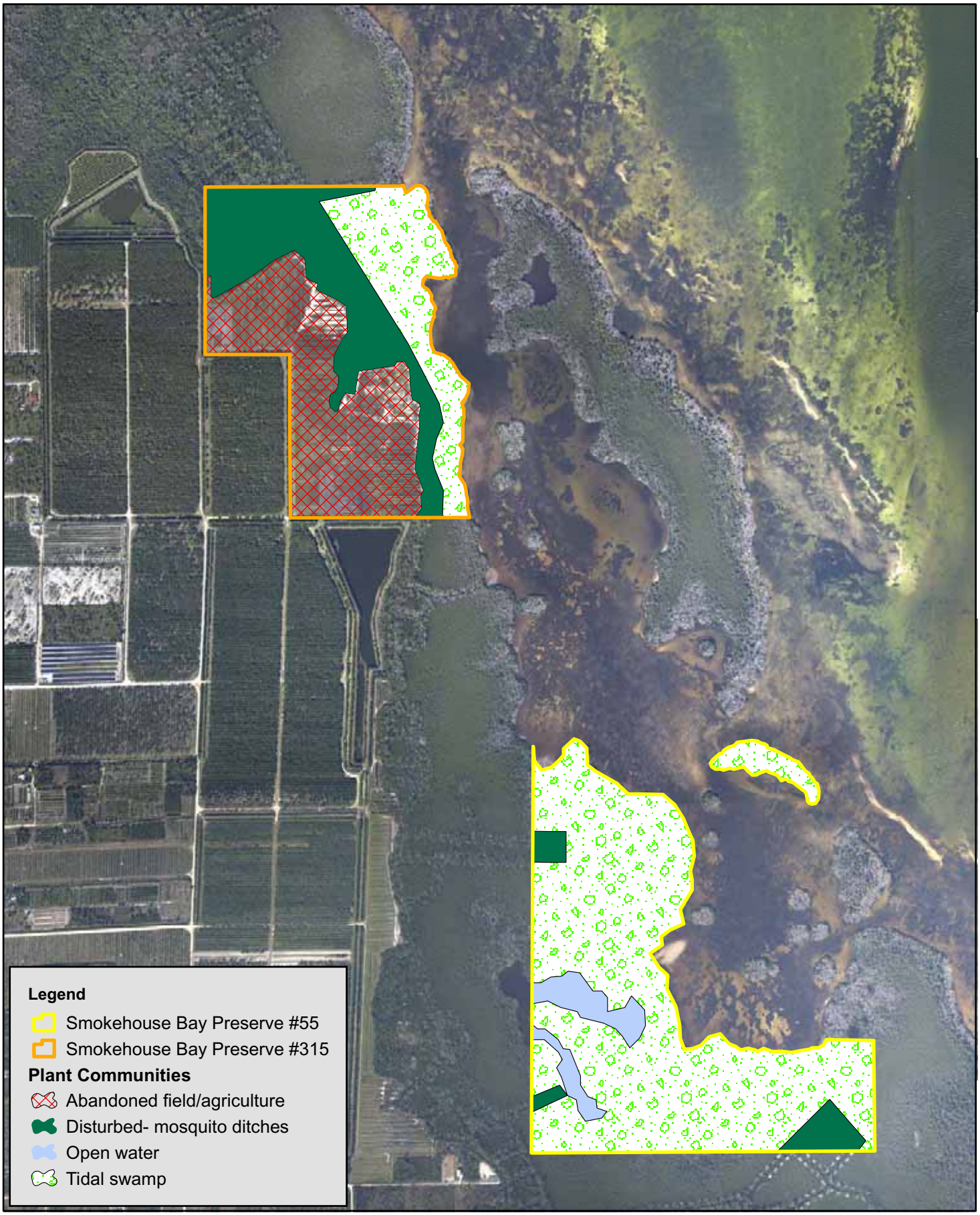
Tidal Swamp Community – SBP 122.9 acres, 58.9% coverage
CP 146.4 acres, 77.5% coverage
Tidal swamps are characterized as dense forests located along the shorelines of southern Florida. The dominant plants in this community are black mangrove, red mangrove, white mangrove and buttonwood (*Conocarpus erectus*). The dominant species of mangrove found in different areas is dependant on abiotic factors such as tidal flushing and salinity.

This community is the largest, making up more than 60% of the natural community's composition. Moving away from the red mangrove dominated shoreline, black mangroves and buttonwood become the dominate species towards the interior of the island. The interior of CP has been heavily impacted by storms and shows signs of reverting to a tidal marsh. However, evidence of the once dense mangrove canopy still exists and young mangroves are repopulating the area.

Abandoned Field/Agriculture- SBP 42.4 acres, 20.3% coverage
After the 2004 hurricanes, the palm tree farming operation was abandoned. Early successional vegetation has recruited and a mix of young invasive exotic vegetation occurs. Ditches and furrows are clearly visible on the 2009 aerial (Figure 2).

Disturbed- mosquito ditches- SBP 35.8 acres, 17.2% coverage
CP 28.2 acres, 14.9% coverage
SBP and CP contain networks of mosquito ditching resulting in berms of dredge spoil which have been re-colonized by invasive exotic vegetation including Australian pine and Brazilian pepper. Figures 19 and 20 show the natural plant communities in these Preserves.

Figure 19: Natural Plant Communities Map Smokehouse Bay Preserve



Smokehouse Bay Preserve

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Map created on 7/30/09/2009 by lgreeno@leegov.com
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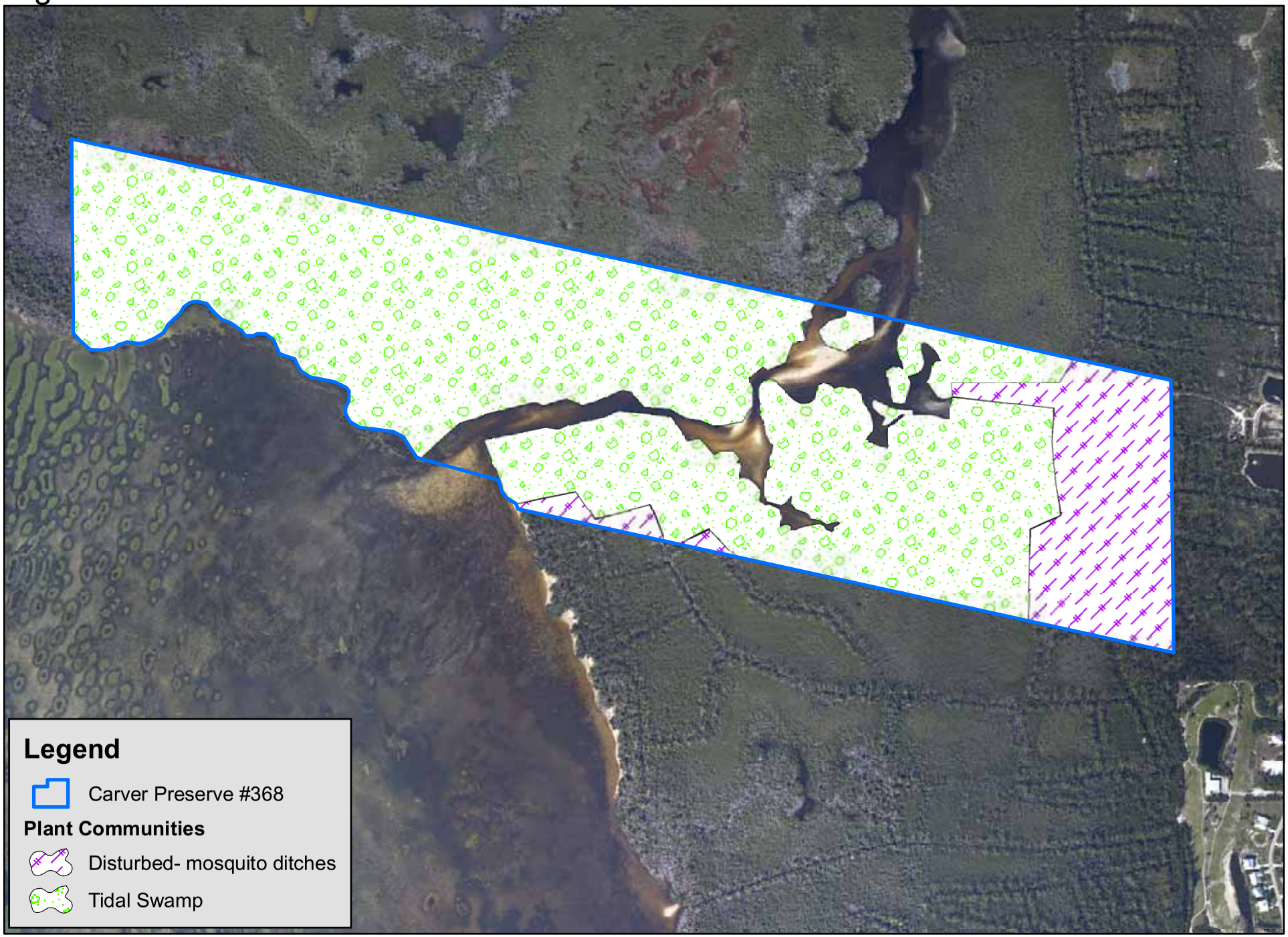
Figure 20: Plant Communities Carver Preserve



iii. Fauna

The Preserves are bordered by agricultural lands (palm and fruit tree farms), limited residences and the waters of Pine Island Sound and Matlacha Pass. Big Jim Creek bisects Carver Preserve. The density of mangroves and relatively small size of the Preserves provides a challenge for large wildlife, excluding birds, to access the Preserve, although bobcat tracks have been noted on site. These reasons likely influence the small number of wildlife species that have been observed when compared to other county preserves (Appendix A). Wildlife species were recorded during field work, quarterly site inspections and visits by the Lee County Bird Patrol volunteers and staff. Future sightings through site inspections and volunteers will continue to be recorded. Four exotic wildlife species have been documented at the Preserves (Table 3).

Table 3: Exotic Wildlife at the Preserves of Northern Pine Island

Scientific Name	**Common Name**
Osteopilus septentrionalis	Cuban treefrog
Dasypus novemcinctus	nine-banded armadillo
Sus scrofa	feral hog
Anolis sagrei	brown anole

Wildlife stewardship at the Preserves will focus on providing optimal habitat for native species. Control of invasive exotic plants will be a critical restoration component to provide improved habitat for wildlife. These Preserves are part of a countywide quarterly site inspection program for all C20/20 Preserves. These inspections allow staff to monitor for any impacts and/or changes to each preserve and include lists of all animal sightings and new plant species that are found. If, during these inspections, staff finds FNAI listed species, they will be reported using the appropriate forms.

iv. Designated Species

There are several designated animal and plant species (Table 4) found at SBP and CP. Although all native plant and animal species found at the Preserves have some protection due to the preservation of this property, certain species need additional attention. For stewardship purposes, all plants and animals listed by the United States Fish and Wildlife Service (USFWS), Florida Fish and Wildlife Conservation Commission (FWC), Florida Department of Agriculture and Consumer Services (FDACS), the Institute for Regional Conservation (IRC) and FNAI will be given special consideration.

Typically, designated species will benefit from proper management of the biological communities in which they occur. However, some species may require additional measures to ensure their protection. Management practices likely to benefit wildlife at the Preserves include exotic plant control, hydrological restoration, trash removal, wildlife monitoring and enforcement of no littering, no hunting and other regulations.

Table 4: Listed Species Found at SBP and CP and Their Designated Status

Scientific Name	Common Name	USFWS	FWC	FNAI	FDACS	IRC	Occurrence
BIRDS							
Pelecanus occidentalis	brown pelican		SSC	G4/S3			confirmed
Mycteria americana	wood stork	E	E	G4/S2			confirmed
Ardea alba	great egret			G5/S4			confirmed
Egretta caerulea	little blue heron		SSC	G5/S4			confirmed
Egretta thula	snowy egret		SSC	G5/S3			confirmed
Egretta tricolor	tricolored heron		SSC	G5/S4			confirmed
Hailaeetus leucocephalus	bald eagle	T		G5/S3			confirmed
Eudocimus albus	white ibis		SSC	G5/S4			confirmed
Egretta rufescens	reddish egret		SSC	G4/S2			confirmed
Nyctanassa violacea	yellow-crowned night heron			G5/S3			confirmed
Pandion haliaetus	osprey			G5/S3S4			confirmed
Sterna maxima	royal tern			G5/S3			confirmed
Sterna sandvicensis	sandwich tern			G5/S2			confirmed
PLANTS							
Andropogon virginicus	broomsedge bluestem					I	confirmed
Asclepius tuberosa	butterflyweed					R	confirmed
Elephantopus elatus	tall elephantsfoot					R	confirmed
Woodwardia virginica	Virginia chain fern					R	confirmed

Wildlife Species

The following is a brief summary of each designated wildlife species explaining why they are in decline. Unless stated otherwise, the reasons for the species decline were obtained from Hipes et al. (2001).

Brown Pelican

The brown pelican (*Pelecanus occidentalis*) population was decimated in the 1950s and 1960s due to the use of the pesticide DDT (dichlorodiphenyltrichloroethane). Populations have risen since then, but they still face other threats such as increased turbidity from dredging, oil and other chemical spills, freezing weather, human disturbance and entanglement in fishing gear.

Wood Stork

Wood storks are very sensitive to water levels in freshwater wetlands, as they require high concentrations of fish in fairly shallow water for foraging. Unnaturally high water levels during nesting seasons and extended droughts are both threats that wood storks face. Wood storks are often seen feeding in the shallow waters around the Preserves but no nesting activity has been documented.

Bald Eagle & Osprey

Bald eagle (*Haliaeetus leucocephalus)* numbers have steadily increased in Florida after a low of 120 active nests in 1973. Still, loss of habitat and human disturbance due to development is a primary concern for this species. For bald eagle and osprey eggshell thinning resulting from DDT was documented in breeding sites in the latter half of the 1900s also contributed to population decline. In south Florida lowered food availability could also be contributing to a decline. Osprey and eagles nests are near the Preserves and both species are regularly seen foraging.

Royal & Sandwich Tern

The decline in tern populations has been attributed to human disturbance and harassment, destruction of habitat and contaminated water and food. Extreme high tides during nesting season are a natural threat. Since terns concentrate their nesting into large colony sites, a natural disaster such as a hurricane or a manmade disaster can significantly impact the population. No tern nesting has been documented on the Preserves, but they have be seen foraging along the shoreline.

Herons, Egrets and Ibis

The tricolored heron's (*Egretta tricolor*) decline is primarily due to loss of freshwater wetlands and alteration of their natural hydroperiod. There is also some indication that pesticides and heavy metal contamination may affect this heron. Like the heron, the snowy egret (*Egretta thula*), reddish egret (*Egretta rufescens)*, great egret (*Ardea alba),* little blue heron *(Egretta caerulea)* and yellow-crowned night heron (*Nyctanassa violacea)* are declining throughout their range, and have been since the 1950s. Scientists believe that the main reason for this decline is the loss and alteration of wetlands where they forage. These are commonly seen perched and foraging at the SBP and CP.

Similar to the heron, the white ibis (*Eudocimus albus*) is declining throughout its range, due to the reduction and degradation of wetlands and human disturbances to their rookeries. Rookeries are not documented on SBP or CP but ibis are commonly seen perched and foraging at the Preserves.

Plant Species

To date no state or federally listed plant species have been documented at either CP or SBP. However, the Preserves provide habitat for several designated plant species that were provided by IRC, which is not a regulatory agency (see Table 4). Scientists working for this Institute have conducted a tremendous amount of field work and research documenting plants occurring in conservation areas in the 10 southernmost counties of Florida. This initial floristic inventory allowed the IRC to rank plant species to indicate how rare/common these plants are in protected areas.

In their book, Rare Plants of South Florida: Their History, Conservation and Restoration (Gann 2002), the authors provide an entire chapter of recommendations to help restore south Florida's rare plant diversity. Several of these recommendations, particularly those that protect plants on the Preserve and relate to stewardship practices, will be followed. More information on the specific techniques used will be discussed in the Management Action Plan. The following list highlights those recommendations by IRC that will be incorporated into the stewardship of the Preserves:

- Ensure that park improvements and management activities do not needlessly threaten or destroy rare plant populations.
- Prevent illegal poaching of rare plants.
- Prosecute poachers to the fullest extent of the law.
- Implement an ongoing exotic pest plant control program.

- Educate exotic plant control crews about the rare plants to ensure they avoid non-target damage.

If additional listed species are documented on the Preserve they will be added to the lists in Appendices A or B. When any of the designed species' nests or burrows are discovered on the Preserve, a map will be created, for staff use only, to assist with planning for restoration activities.

v. Biological Diversity

Biodiversity at SBP and CP varies depending on the community, from the shoreline to the abandoned agricultural fields which are taking on upland characteristics resultant from historical use of the island. Currently there are 45 identified plant species on the Preserves. Eleven of these are listed on the Florida Exotic Pest Plant Council's 2007 List of Invasive Species (FLEPPC 2005) and considered exotic invasive. There are 79 species of wildlife on the Preserves although it's known that many more exist in the inter-tidal zone around the island. Protection of native plants across the landscape will enhance the overall biodiversity of the Preserves.

The integrity and diversity of SBP and CP must be protected when and where possible. Land Stewardship staff will perform the following actions in this regard:

- Control of invasive exotic vegetation followed by annual maintenance to provide more suitable habitat for native aquatic and terrestrial species.
- Remove any debris and prevent future dumping on site.
- Control invasive exotic animal populations to reduce their impacts on the herbaceous plants, native animals and soils.
- Conduct on-going species surveys utilizing volunteers and staff to catalog and monitor the diversity that is present.
- Post signs to inform that any plant and/or animal collection (or harassment) will be prosecuted, along with any search and/or collection of cultural resources.

C. Cultural Resources

i. Archaeological Features

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. All of CP and SBP parcel #55 and the majority of SBP parcel #55 are located within an area designated as archaeological sensitivity level 2 (Figure 21). 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 determine the presence of any archaeological sites in the impact area and/or assess the significance of these sites" (Austin 1987).

A professional archaeologist will be hired to conduct a survey of the area to be impacted if restoration projects require any major soil disturbance. If evidence of shell middens or other artifacts are found in the area during restoration activities, staff will follow the Division of Historical Resources (DHR) "Best Management Practices: An Owner's Guide to Protecting Archeological Sites" (http://www.flheritage.com/archeology/education/culturalmgmt/) and immediately DHR will be contacted. Staff will also work with DHR to designate the Preserve as a State Archeological Landmark Zone under Section 267.11. This would extend protection of the site and allow for protection procedures under 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.

Figure 21: Archaeological Sensitivity Map

Smokehouse Bay Preserve and Carver Preserve

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Map prepared on 8/20/2009 by jwaller@leegov.com
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ii. Land Use History

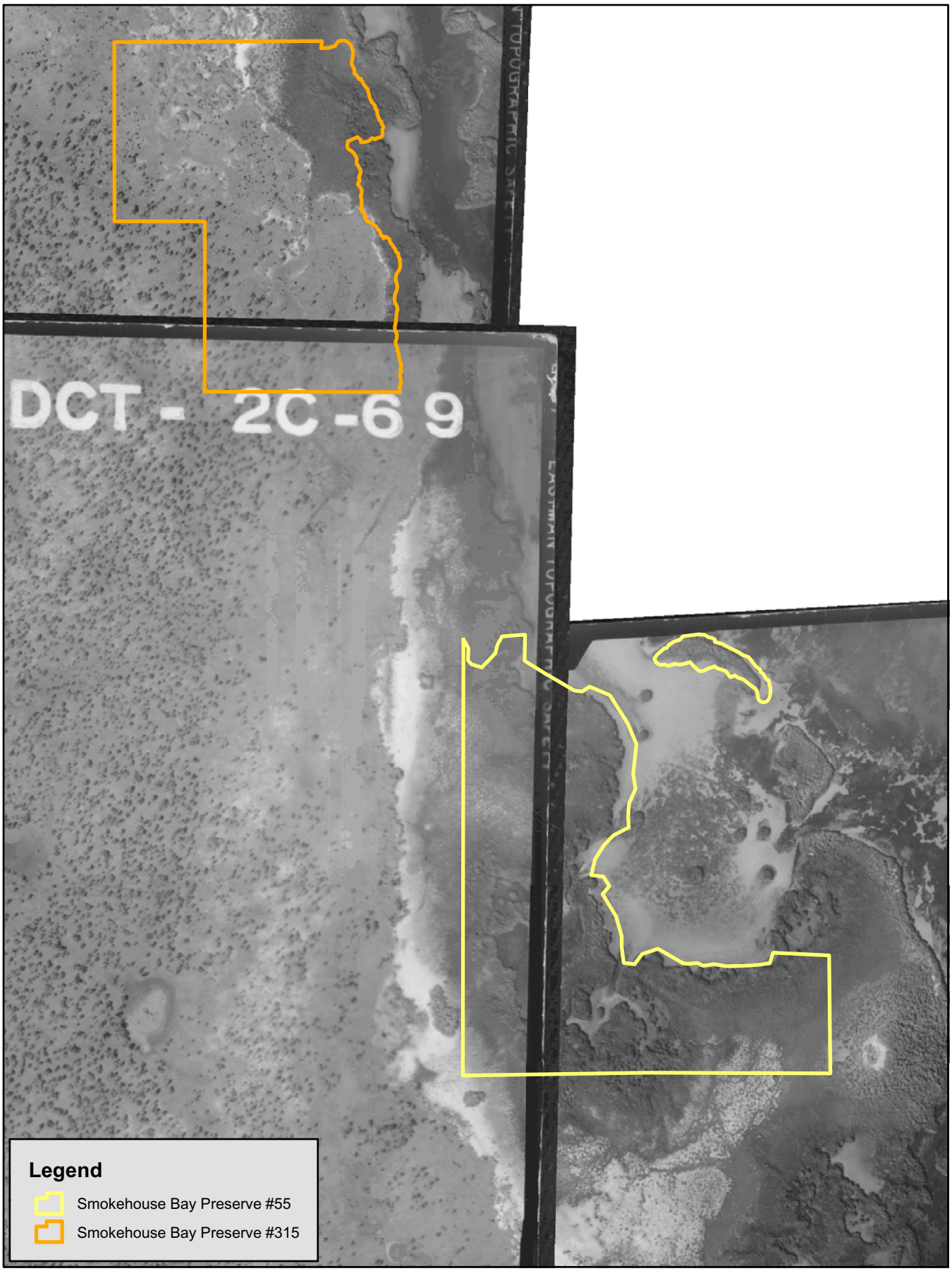
SBP #55 has only been disturbed by the installation of a mosquito ditch in the property's southeastern corner and western property line in the late 1960s. Invasive exotic vegetation became established on the spoil berms and has altered the natural system.

In reviewing aerial photographs of SBP #315, no clearing or signs of development were present in 1966, except canals had been cut and soil piled along them. It is also evident that mangroves did not reach the extent of coverage that exists today. The 1981 aerial showed the canals in the northwest portion of this parcel had either been filled in or had become overgrown with vegetation. The 1990 aerials show partial clearing for cultivation purposes and mangroves extending westward from the coastline along the northern boundary. The 1993 aerials show agricultural activities and the presence of ditches and retention areas related to the cultivation. The mangroves cover the same percentage of land today as in 1993 aerials. An aerial from 1996 shows palm tree farming. Several palm trees remained on the property after C20/20 Program purchased the property. The entire grove area had been ditched and furrowed and had a large ditch installed along the shared boundary with the property line and the grove area.

CP remained in an untouched state until mosquito ditches were dug in the late 1960s. In 2003, on the eastern edge of the site, an adjacent land owner cleared a small trail for canoe access through the ditches to Big Jim Creek.

The 1944, 1970 and 2004 Post-hurricane Charley aerial photos (Figures 22-27) were chosen to represent the history of the sites in this plan. The 1944 aerial is the baseline for historical maps in LSPs, 1970 shows the mosquito ditching begun in the late 1960s, and 2004 shows the extent of vegetative damage done to the Preserves after the 2004 hurricane season.

Figure 22: 1944 Aerial Photograph Smokehouse Bay Preserve



Smokehouse Bay Preserve

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Map created on 5/12/2009 by lgreeno@leegov.com
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Figure 23: 1970 Aerial Photograph Smokehouse Bay Preserve

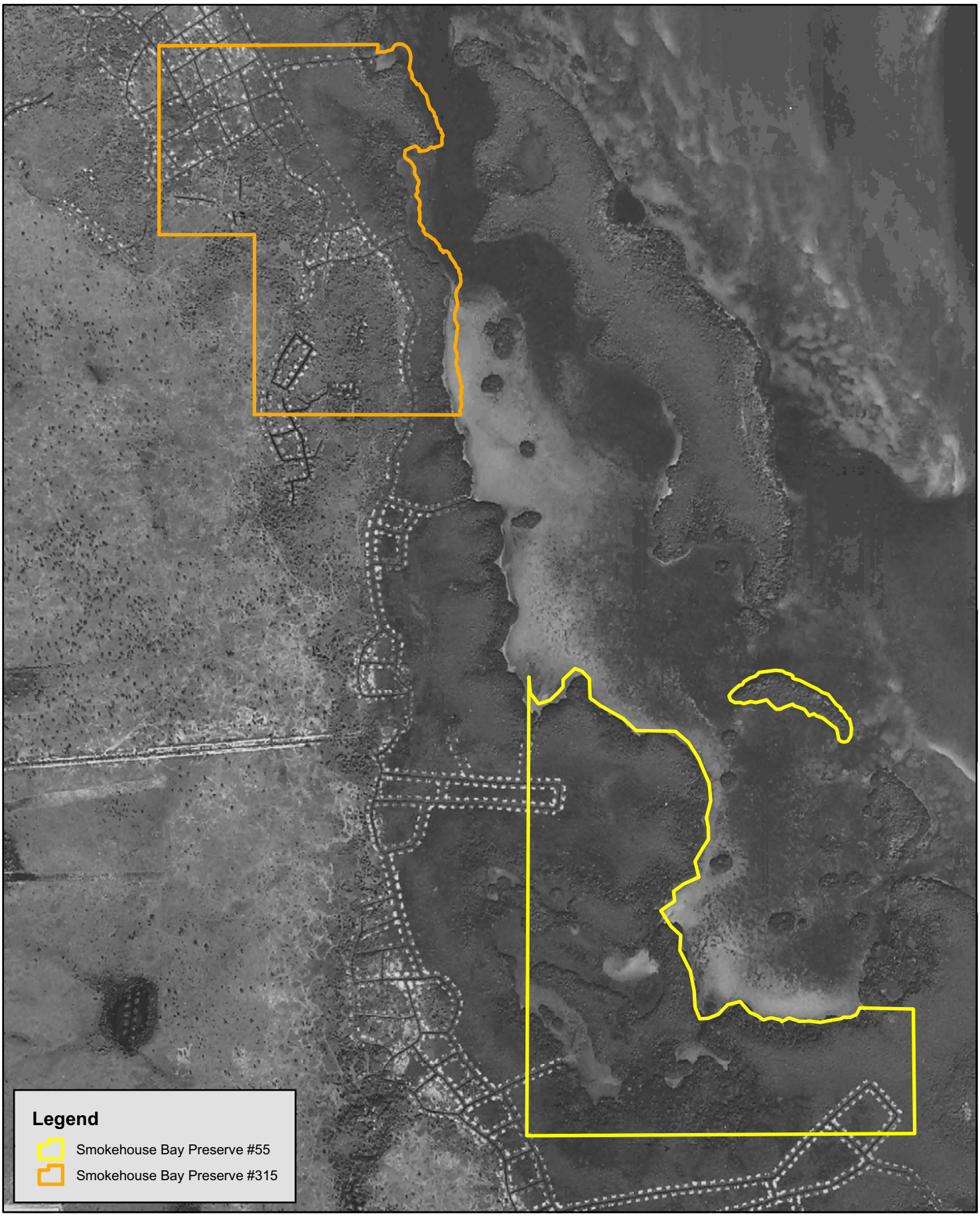

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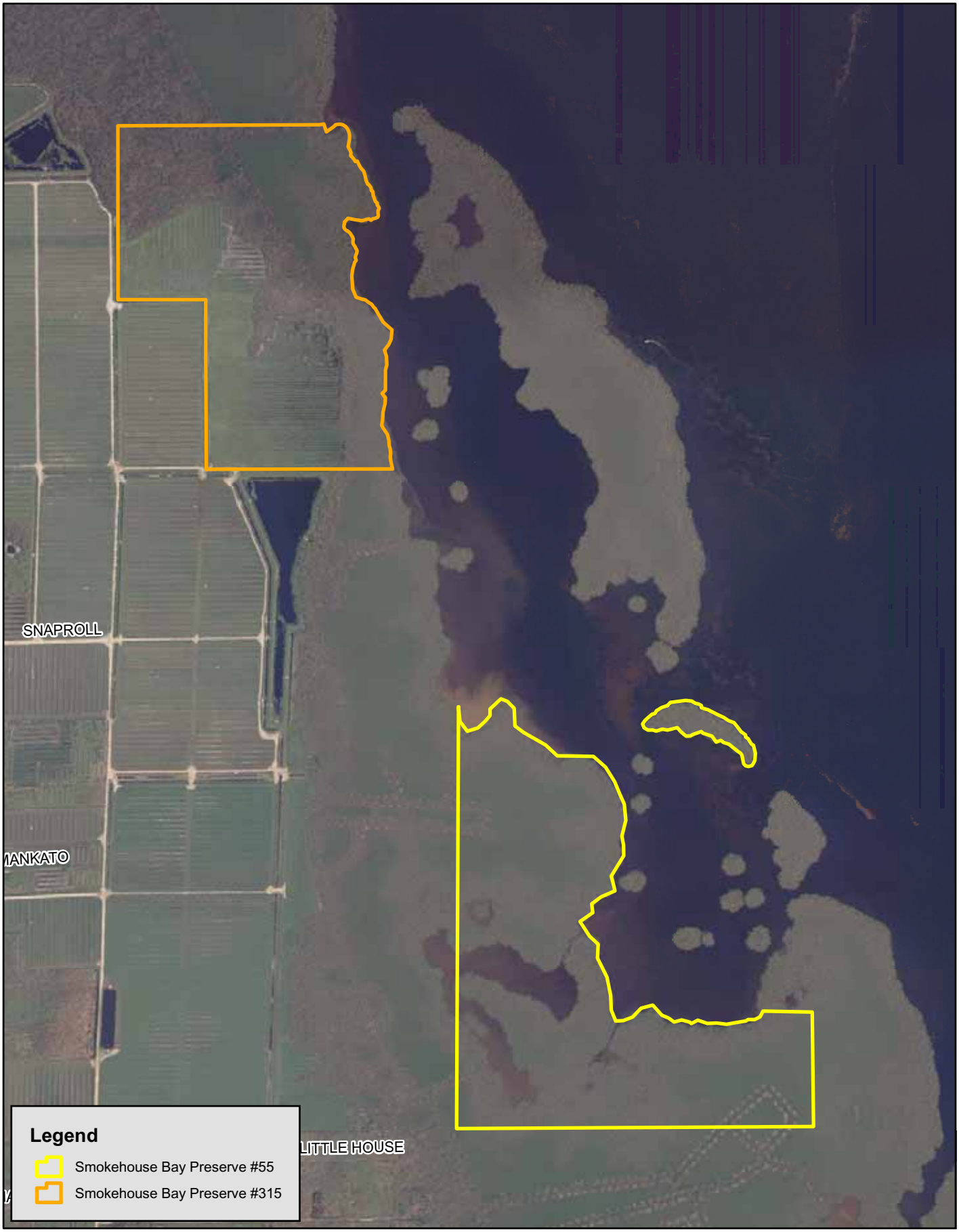
Figure 24: 2004 Post Charley Aerial Photograph Smokehouse Bay Preserve



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Map created on 6/8/2009 by lgreeno@leegov.com
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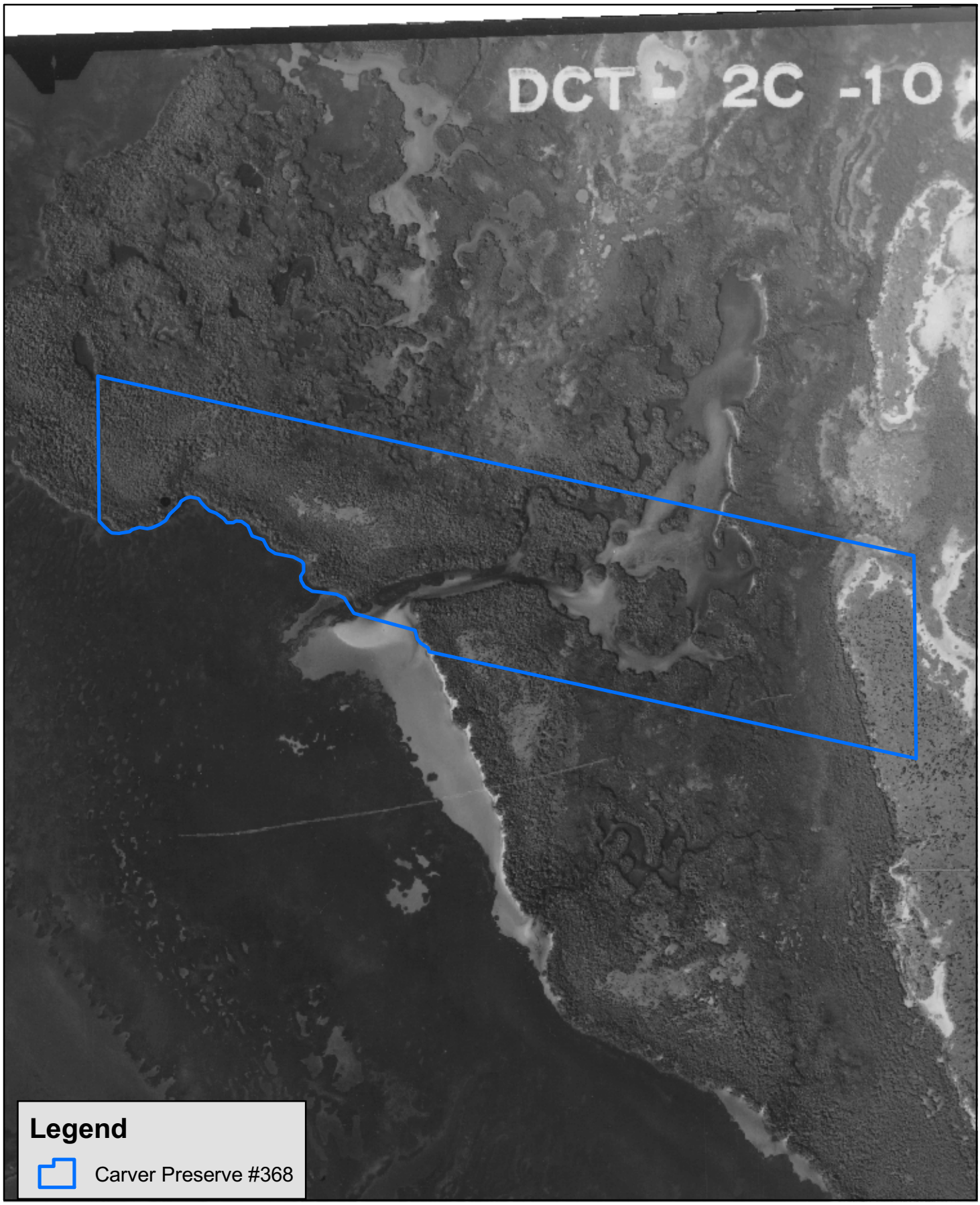
Figure 25: 1944 Aerial Photograph Carver Preserve



Carver Preserve

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for informational and planning purposes.

Map created on 5/27/2009 by lgreeno@leegov.com
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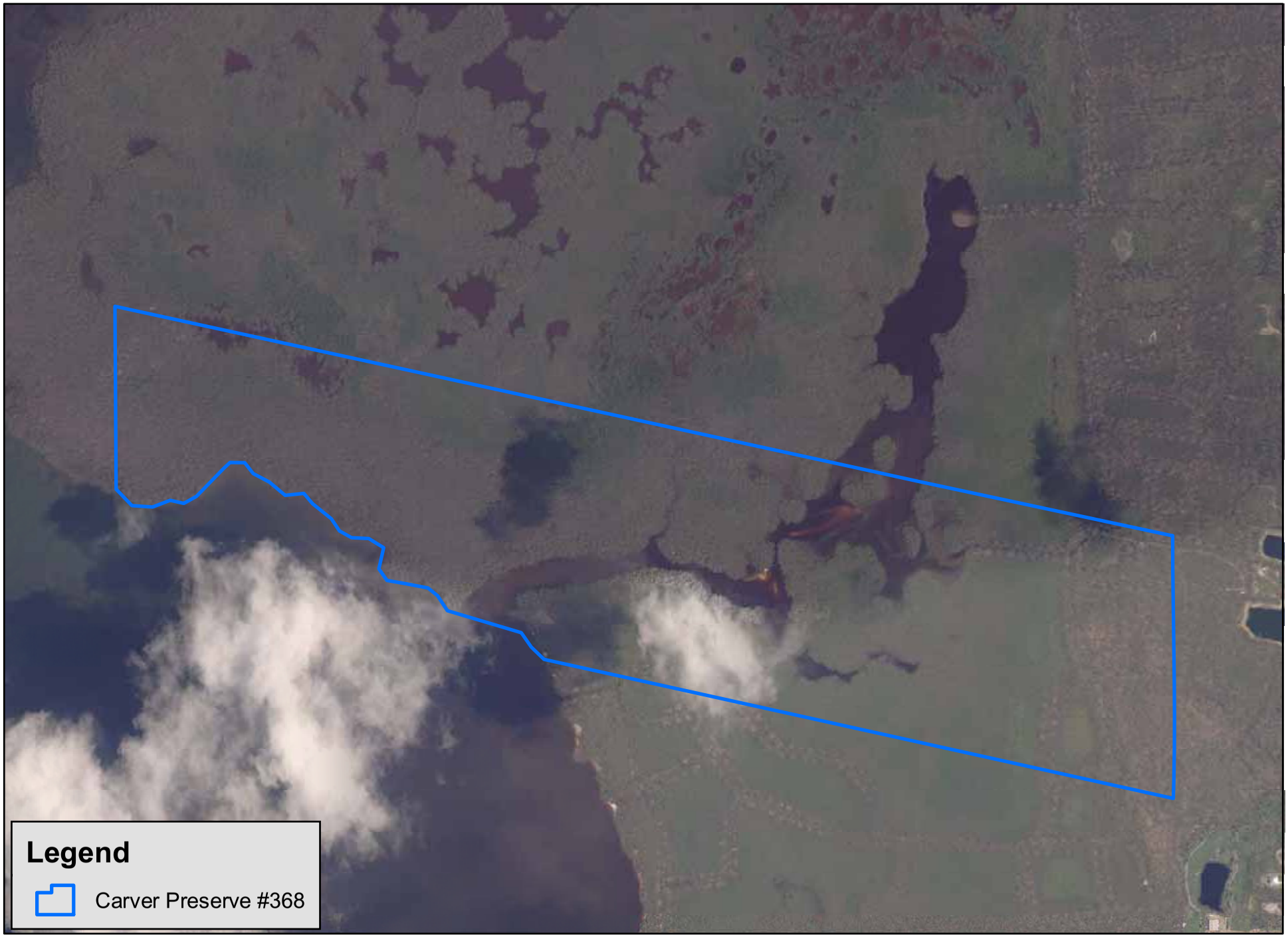
Figure 26: 1970 Aerial Photograph Carver Preserve

Figure 27: 2004 Post Hurricane Charley Aerial Photograph Carver Preserve



Carver Preserve

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Land Stewardship staff has prepared this document for informational and planning purposes.

Map created on 6/8/2009 by lgreeno@leegov.com
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iii. Public Interest

SBP and CP were purchased for the preservation of environmentally sensitive lands, high probability for state listed species, proximity to known archaeological resources, and overall benefits to the surrounding aquatic preserve.

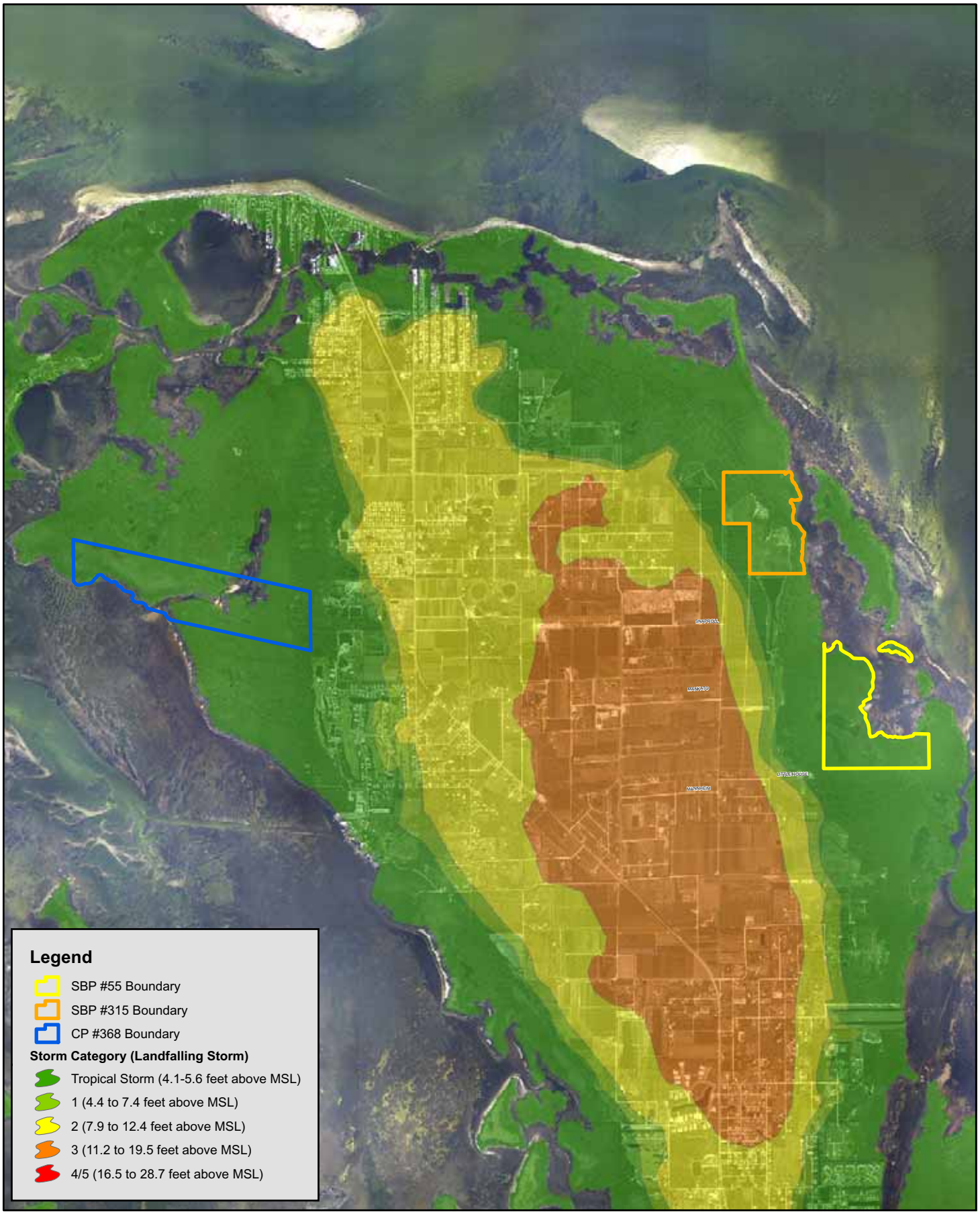
The Calusa Land Trust has actively shown an interest in the protection and preservation of CP and donated monies to the acquisition fund in order for C20/20 to purchase the Preserve (see acquisition section for more information).

C20/20 staff has not received any public visitation requests concerning the Preserves and limited requests for information. Publicly available information concerning this and all C20/20 preserves can be found on the web site along with copies of their associated management plans when available (www.conservation2020.org).

CP receives casual recreational use from boaters and fishermen utilizing Big Jim Creek. There is also a canoe/kayak paddling trail that uses a series of mosquito ditches to connect Fritts Park (a Caloosa Land Trust property) out to Big Jim Creek through CP on a high tide. This trail was created by and continues to be maintained by the CLT.

The Coastal High Hazard Map (Figure 28) has been included to show the impact of a tropical storm system on the Preserves. Due to the likelihood of flooding during a storm event, along with access issues and mangrove communities, staff does not recommend construction of amenities on either of the Preserves.

Figure 28: Coastal High Hazard and Storm Surge Map



V. FACTORS INFLUENCING MANAGEMENT

A. Natural Trends and Disturbances

Natural trends and disturbances influencing native communities and stewardship at SBP and CP include hurricanes, fluctuating tides, occasional freezes and the cycling wet and dry seasons. Implementation of the Management Action Plan will take all of these factors and their influence on projects at the preserves into consideration. For example, a tropical storm or hurricane could cause extensive damage to vegetation. In the event that SBP or CP is impacted by a hurricane the site will be left to recover on its own, as was the case with the active hurricane season in 2004. The Preserves received hurricane force winds from hurricanes Charley and tropical storm force winds from Frances and Jeanne (see Figure 6). Significant damage occurred to the tidal swamp plant community after the 2004 hurricane season but it is slowly recovering.

Another natural trend important for the stewardship of the Preserves is an understanding of the dynamic nature of an island and how storms and continuous natural process can erode and deposit sediments that essentially change the boundaries of the Preserve.

Invasive exotic plant control is influenced by hydroperiods and tides. The LSOM's exotic plant prescription form will be used to define the conditions for control activities. Care shall be taken to prevent herbicide from running off during a typical summer thunderstorm so as not to affect non-target plants. Only herbicides approved for aquatic application will be used for treatment of vegetation in standing water or where flooding may occur.

B. Internal Influences

Internal Influences at SBP and CP are limited to those areas utilized for historic activities and the few areas not easily accessible for recreational use.

Mosquito ditching on CP and the resulting berms provide areas for the establishment of invasive exotic species, most notably Brazilian pepper and Australian pine. The ditching also allows litter to wash into the interior of the Preserve. These sites would benefit from restoration to eliminate the growth of invasive species and to restore hydrological integrity to the plant communities.

The abandoned palm grove including the many berms and furrows throughout are now allowing for the establishment of Brazilian pepper and several other invasive exotic plant species. The berms and furrows, which run east and west in the field, channel water that would otherwise move in a thin flat sheet of water as it drained off the property and toward the bay.

C. External Influences

The external influences on SBP and CP are many and varied. As with all islands broad scale climate fluctuations and natural processes of erosion, long-shore drift and disposition affect the size and form of the shorelines and in turn the boundaries of the Preserve.

More localized external influences include water quality within Pine Island Sound and the Matlacha Pass. This includes both water quality which is greatly affected by a number of natural processes and impacted by runoff from both the mainland and the populated barrier islands, and pollution.

Boat usage in the waters surrounding the Preserves can also influence the overall health of the Preserve. These impacts include pollution from engines/exhausts, trash dropped from passing boats and noise pollution which can disturb wildlife. Also, the wake from powerboats can cause shore erosion.

Finally, unauthorized uses including littering, campfires, party hangouts, and make-shift latrines may occasionally occur. Due to its location, the Preserve is difficult to patrol; however, if these problems are noted restrictive signage will be used to inform and educate. If problems persist a structured patrol of the area will be considered in coordination with other law enforcement services.

The purchase of Carver Preserve by Lee County Conservation 20/20 completely surrounds Big Jim Creek with conservation lands. Charlotte Harbor Preserve State Park and the Calusa Land Trust hold properties to the north. This positive external influence will help to improve water quality and increase wildlife diversity.

D. Legal Obligations and Constraints

i. Permitting

Exotic plant removal projects may require obtaining a de minimis permit from the Florida Department of Environmental Protection (FDEP) due to the extensive mangroves growing along the shoreline that may unintentionally be damaged. The palm grove restoration including leveling the berms and furrows has required an Army Corps of Engineers Nationwide 27 permit as well as a permit from the SFWCD.

ii. Other Legal Constraints

Beyond permitting there are no other legal obligations expected to affect this Preserve.

iii. Relationship to Other Plans

The Lee Plan, Lee County's comprehensive plan, is designed to depict Lee County as it will appear in the year 2020. Several themes have been identified

as having “great importance as Lee County approaches the planning horizon” (Lee County 2004). These themes are:

- The growth patterns of the County will continue to be dictated by the Future Land Use Map.
- The continued protection of the County’s natural resource base.
- The diversification of the County’s traditional economic base.
- The expansion of cultural, educational and recreational opportunities.
- A significant expansion in the County’s physical and social infrastructure.

The entire Lee Plan can be found on the Internet at: http://www3.leegov.com/dcd/Leeplan/Leeplan.pdf. The three chapters that affect the management of SBP and CP are **Chapter II – Future Land Use, Chapter V – Parks, Recreation and Open Space** and **Chapter VII – Conservation and Coastal Management**. Included below are goals, objectives and policies, citied directly from the Lee Plan, which further affect C20/20 preserves.

Chapter II, Policy 1.4.6 states that Conservation Lands include uplands and wetlands that are owned and used for long range conservation purposes. Upland and wetland conservation lands will be shown as separate categories on the FLUM. Upland conservation lands will be subject to the provisions of this policy. Wetland conservation lands will be subject to the provisions of both the Wetlands category described in Objective 1.5 and the Conservation Lands category described in this policy. The most stringent provisions of either category will apply to wetland conservation lands. Conservation lands will include all public lands required to be used for conservation purposes by some type of legal mechanism such as statutory requirements, funding and/or grant conditions, and mitigation preserve areas required for land development approvals. Conservation Lands may include such uses as wildlife preserves; wetland and upland mitigation areas and banks; natural resource based parks; ancillary uses for environmental research and education, historic and cultural preservation, and natural resource based parks (such as signage, parking facilities, caretaker quarters, interpretive kiosks, research centers, and quarters and other associated support services); and water conservation lands such as aquifer recharge areas, flow ways, flood prone areas, and well fields. 2020 lands designated as conservation are also subject to more stringent use provisions of the 2020 Program or the 2020 ordinances. (Added by Ordinance No. 98-09, Amended by Ordinance No. 02-02)

Chapter VII, Objective 104.1: ENVIRONMENTALLY CRITICAL AREAS provides that within the coastal planning area, the county will manage and regulate, on an ongoing basis, environmentally critical areas to conserve and enhance their natural functions. Environmentally critical areas include wetlands (as defined in Goal 114) and Rare and Unique upland habitats. Rare and Unique upland habitats include, but are not limited to: sand scrub (320); coastal scrub (322); those pine flatwoods (411) which can be categorized as "mature" due to

the absence of severe impacts caused by logging, drainage, and exotic infestation; slash pine/midstory oak (412); tropical hardwood (426); live oak hammock (427); and cabbage palm hammock (428). The numbered references are to the Florida Land Use Cover and Forms Classification System (FLUCFCS) Level III (FDOT, 1985). (See also Policy 113.1.4.) The digitization of the 1989 baseline coastal vegetation mapping (including wetlands and rare and unique uplands, as defined above) will be completed by 1996. (Amended by Ordinance No. 94-30, 00-22)

Chapter VII, OBJECTIVE 105.1: DEVELOPMENT IN COASTAL HIGH HAZARD AREAS includes **POLICY 105.1.4:** Through the Lee Plan amendment process, land use designations of undeveloped areas within coastal high hazard areas will be considered for reduced density categories (or assignment of minimum allowable densities where density ranges are permitted) in order to limit the future population exposed to coastal flooding. (Amended by Ordinance No. 92-35, 94-30, 00-22).

Chapter VII, Goal 107: RESOURCE PROTECTION provides to manage the county's wetland and upland ecosystems so as to maintain and enhance native habitats, floral and faunal species diversity, water quality, and natural surface water characteristics. **Objective 107.1: RESOURCE MANAGEMENT PLAN** provides the county will continue to implement a resource management program that insures the long-term protection and enhancement of the natural upland and wetland habitats through the retention of interconnected, functioning, and maintainable hydroecological systems where the remaining wetlands and uplands function as a productive unit resembling the original landscape. (Amended by Ordinance No. 94-30, 00-22) Under **Policy 107.1.1.4e** the county (or other appropriate agency) will prepare a management plan for each acquired site for the long-term maintenance and enhancement of its health and environmental integrity.

Chapter VII, Objective 107.3: WILDLIFE provides the county will maintain and enhance the fish and wildlife diversity and distribution within Lee County for the benefit of a balanced ecological system. (Amended by Ordinance No. 94-30) **Policy 107.3.1:** encourages upland preservation in and around preserved wetlands to provide habitat diversity, enhance edge effect, and promote wildlife conservation. Initiating a prescribed fire regime and removing invasive exotics will follow this policy.

Chapter VII, Objective 107.4: ENDANGERED AND THREATENED SPECIES IN GENERAL provides Lee County will continue to protect habitats of endangered and threatened species and species of special concern in order to maintain or enhance existing population numbers and distributions of listed species. **Policy 107.4.1** states to identify, inventory, and protect flora and fauna indicated as endangered, threatened, or species of special concern in the "Official Lists of Endangered and Potentially Endangered Fauna and Flora of

Florida," Florida Fish and Wildlife Conservation Commission (FWC), as periodically updated. Lee County's Protected Species regulations will be enforced to protect habitat of those listed species found in Lee County that are vulnerable to development.

Chapter VII, Goal 113: COASTAL PLANNING AREAS, Objective 113.1: COASTAL PLANNING AREA IN GENERAL provides that Lee County will manage the coastal planning area to provide a balance among conservation of resources, public safety capabilities, and development. (Amended by Ordinance No. 94-30, 00-22) **Policy 113.1.5** provides that Lee County will protect and conserve the following environmentally sensitive coastal areas: wetlands, estuaries, mangrove stands, undeveloped barrier islands, beach and dune systems, aquatic preserves and wildlife refuges, undeveloped tidal creeks and inlets, critical wildlife habitats, benthic communities, and marine grass beds. (Amended by Ordinance No. 00-22)

Chapter VII, Goal 114: WETLANDS provides that the county maintains and enforces a regulatory program for development in wetlands that is cost-effective, complements federal and state permitting processes, and protects the fragile ecological characteristics of wetland systems. (Amended by Ordinance No. 94-30) **Objective 114.1** provides that the natural functions of wetlands and wetland systems will be protected and conserved through the enforcement of the county's wetland protection regulations and the goals, objectives, and policies in this plan. "Wetlands" include all of those lands, whether shown on the Future Land Use Map or not, that are identified as wetlands in accordance with F.S. 373.019(17) through the use of the unified state delineation methodology described in FAC Chapter 17-340, as ratified and amended by F.S. 373.4211. (Amended by Ordinance No. 94-30, 00-22)

E. Management Constraints

The principle stewardship constraints for SBP and CP include limited funding, limited access, and the brief dry season for conducting land stewardship activities. Although C20/20 has a management fund, it is inadequate to fulfill the restoration activities for this and the other preserves. Efforts to obtain additional funding through grants and/or monies budgeted for mitigation of public infrastructure projects will be pursued. These funds will be used to supplement the operations budget to meet the restoration goals in a timely manner.

F. Public Access and Resource-Based Recreation

Due to the lack of vehicular access and wetland characteristics, no public recreational amenities are proposed at SBP or CP. In accordance with the Land Stewardship Operations Manual (LSOM), these preserves are classified as a Category 4 Resource Protection & Restoration Preserve. As with all designated Category 4 preserves, “if there is a public interest, staff may provide guided field

trips when there are no safety concerns and it is compatible with protecting the animals and plant communities found at the specific preserve."

Big Jim Creek, which is now completely surrounded by conservation lands, runs through CP on its way south and west where it heads into the Charlotte Harbor Preserve State Park. Big Jim Creek is an extremely shallow water feature that drains northwestern Pine Island. Even on a typical high tide, it is too shallow for any watercraft to travel it in its entirety with the exception of canoes and kayaks. The Calusa Land Trust has set up a paddling trail from Fritts Park down several shallow and small mosquito ditches into Big Jim Creek. Paddlers are welcomed and encouraged to explore and enjoy the creek and the banks on Carver Preserve. The Calusa Land Trust may request to work with Land Stewardship staff to choose a location to install a primitive landing area along Big Jim Creek.

The Great Caloosa Blueway is Lee County's paddling trail that provides an ecological tour of the bays, rivers, backwaters, and shorelines of Southwest Florida. Both SBP and CP shorelines are paralleled by the Great Calusa Blueway (www.calusablueway.com).

G. Acquisition

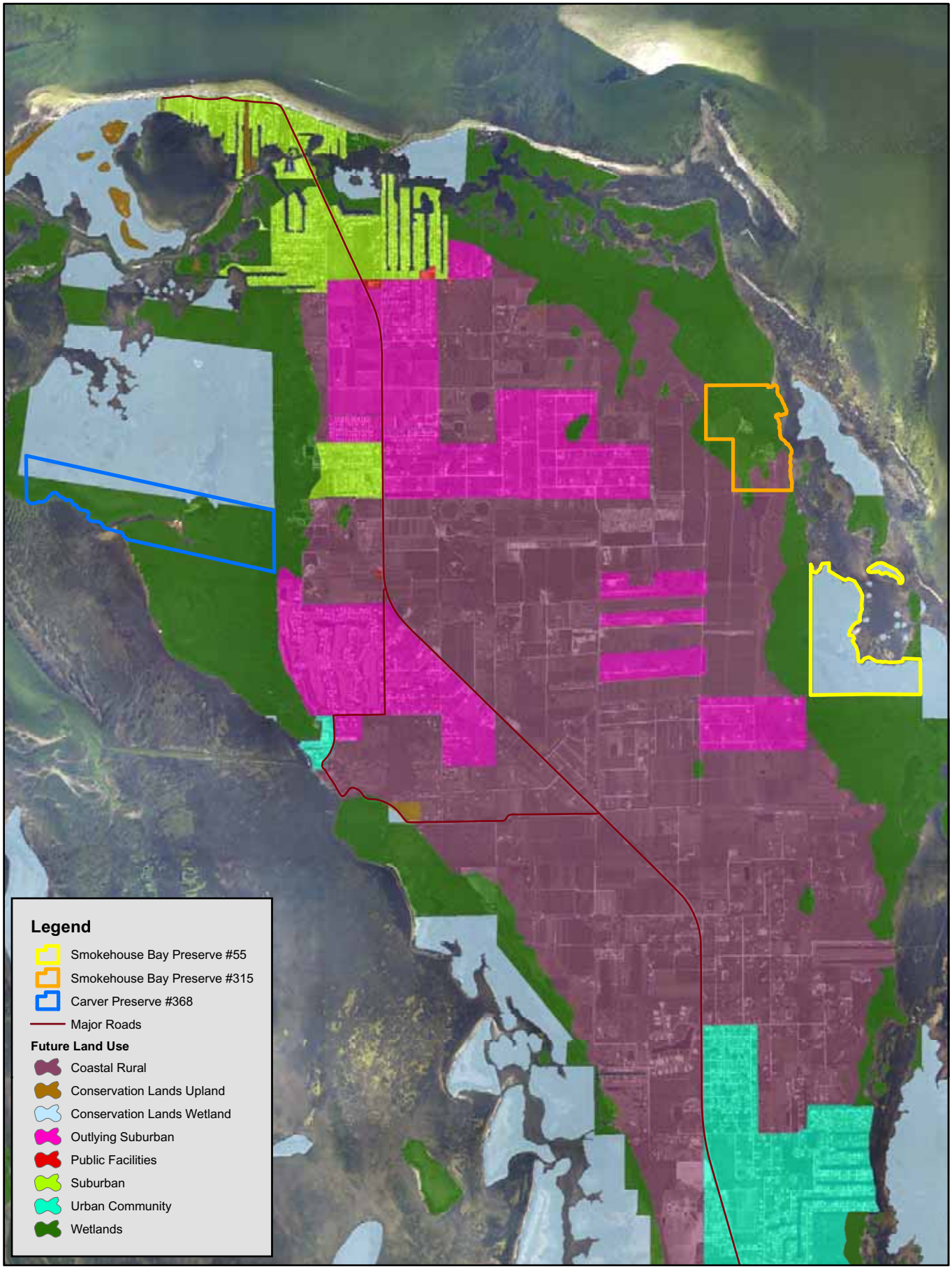
SBP is a 267 acre preserve consisting of two parcels. The first parcel (SBP #55) is shown on the deed as being approximately 158 acres and was purchased in 1999 for $75,000. GIS data and the Lee County Property Appraisers office show that this parcel is currently 113 acres. The second parcel (SBP #315) is shown on the deed as being approximately 110 acres and was purchased in 2007 for $1,345,000. GIS data and a 2003 Harris – Jorgenson, Inc. survey show that SBP #315 is currently 95 acres. C20/20 staff spoke with Lee County's Division of County Lands and Property Appraiser staff to attempt to clear up the SBP #315 acreage discrepancy. The Property Appraisers office has SBP #315 on record as being 114.3 acres and cited an 1876 township plat that was showing the government lots being 208.59 acres. Since Pine Island is a bay island, the natural processes of accretion and erosion could play a small role in the varying acreages listed for this site. GIS data and acreages will be used and referred to throughout this Land Stewardship Plan.

CP is approximately 189 acres and was purchased in 2008 for $321,300. The Caloosa Land Trust donated $5,000 towards the acquisition of CP. The parcels were acquired for a number of reasons including the overall beneficial effects to the surrounding aquatic preserves, preservation of environmentally sensitive lands and proximity to known archaeological resources. The STRAP number for SBP parcel #55 is 04-44-22-00-00001.0010 and SBP#315 is 33-43-22-00-00001.0020. The STRAP number for CP is 1-44-21-00-00001.0000. See Legal Obligations and Constraints section for additional information.

Carver Preserve is the fourth Conservation 20/20 property to be honored in the Legacy Program. The Legacy Program was created as an initiative to attract quality nominations. A seller of exceptional conservation land may petition the County for naming rights of the new preserve. The petition must be approved by the Board of County Commissioners. Through the Legacy Program, Carver Preserve has officially been named in honor of Jack C. Carver, MD, who taught his family the importance of preserving natural environments for future generations.

CP and SBP's future land use category is "Conservation Lands," further sub-categorized as "Wetlands." A small section along the southern boundary of SBP #315 is in the Coastal Rural land use category. Land Stewardship staff will coordinate with Lee County Division of Planning (LCDP) to change the zoning to "Environmentally Critical." Figure 29 depicts the future land use and Figure 30 depicts the zoning of northern Pine Island.

Figure 29: Future Land Use Map



Smokehouse Bay Preserve

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Map created on 4/14/2009 by jwaller@leegov.com
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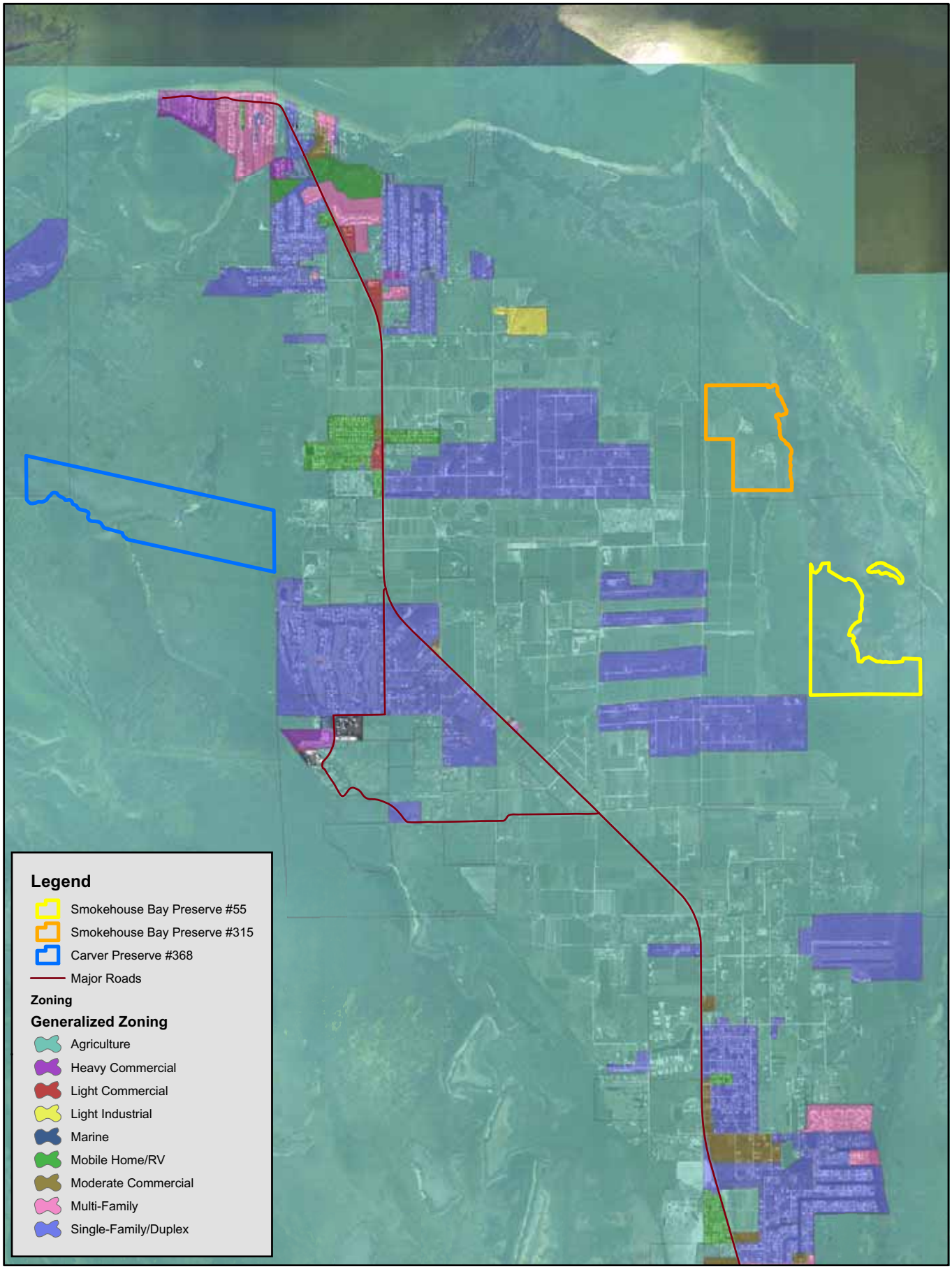
Figure 30: Zoning Map



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VI. MANAGEMENT ACTION PLAN

A. Management Unit Descriptions

Due to their consistent ecological communities and moderate size SBP #55 and CP will not be divided into separate Management Units (MU). SBP #315 will be divided into two MUs based primarily on man-made features (Figure 31).

- SBP #315 Management Unit 1 -- 51 acres
  Management Unit 1 is along the western boundary of the Preserve. It consists entirely of a large abandoned palm grove. This agricultural field has been altered with berms and furrows. MU 1 is surrounded by MU 2 on the northern and eastern sides and the property boundary on the south and eastern sides. Stewardship activities for this MU include grading of the berms and furrows, exotic plant control, and planting of natives in the upland portions.

- SBP #315 Management Unit 2 -- 44 acres
  Management Unit 2 makes up the majority of this site and is bordered by MU 1 on the west and the preserve boundary on the north, east, and south. This MU is dominated by mangroves with scattered exotic species. The northwest corner of the MU has extensive mosquito ditches with spoil piles along the banks of the ditches. These spoil piles are heavily infested with exotic vegetation, specifically Brazilian pepper and Australian pine. Stewardship activities for this MU include restoration of the mosquito ditches and spoil piles, and exotic plant control.

- SBP #55 Management Unit 1 -- 113 acres
  This preserve consists of a dense mangrove forest. Stewardship activities for this preserve include monitoring and treating the site for exotic species.

- CP #368 Management Unit 1 -- 189 acres
  This property is primarily a dense mangrove forest. However, the eastern side of the property has mosquito ditches and associated spoil piles. Exotic species including Australian pine and Brazilian pepper occur on the spoil piles. Stewardship activities for this preserve primarily involve exotic plant control.

Figure 31: Management Units Map

Smokehouse Bay Preserve

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Map prepared on 8/26/2009 by jwaller@leegov.com
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B. Goals and Strategies

While the following are the long-term goals for the Preserve, funding is currently not available to conduct all of these activities. Grants and/or monies budgeted for mitigation of governmental infrastructure projects will be used to supplement our operations budget to meet these goals in a timely manner. The main stewardship goal will be to bring the invasive exotic plants to a maintenance level.

Natural Resource Management

- ✓ Exotic plant control and maintenance
- ✓ Monitor and protect listed species
- ✓ Agricultural field/grove restoration
- ✓ Photo point monitoring
- ✓ Exotic animal removal

Overall Protection

- ✓ Debris removal
- ✓ Boundary and Preserve sign installation
- ✓ Change zoning categories

Public Use

- ✓ Public Information

Volunteers

- ✓ Assist volunteer groups

The following is a description of how each of these goals will be carried out, the success criteria used to measure each goal and a projected timetable outlining when and where each activity will take place.

Natural Resource Management

Exotic plant control and maintenance

The most current FLEPPC's List of Invasive Species will be consulted in determining the invasive exotic plants to be controlled on the Preserves. The goal is to remove/control these exotic species, followed with treatments of resprouts and new seedlings as needed. This goal is to bring the Preserves of Northern Pine Island to their maintenance levels which is defined as having less than 5 percent invasive exotic plant coverage.

Prior to each invasive exotic plant control project at SBP or CP, a Prescription Form (located in the LSOM) will be filled out by Land Stewardship staff. If future

work involves hiring a contractor, the prescription will be reviewed by the contractor(s) and filed appropriately. Contractors involved in these projects will be required to fill out the Daily Report Control Form (located in the LSOM), which will be filed appropriately by staff.

These preserves will require hand crews to hike in and foliar, girdle, basal bark, or cut-stump treat the exotics with the appropriate herbicide. Where feasible or necessary, biomass may be removed from wetland sites to be piled and burned or mulched. Follow-up treatment of these areas will include an application of an appropriate herbicide mixture to the foliage of any resprouts or seedlings. Land Stewardship staff will evaluate replanting on a case-by-case basis.

Land Stewardship staff has already started the exotic control on SBP #315 with several staff and volunteer workdays. Regular additional workdays will be scheduled. Due to the funding that has been secured in the form of two grants totaling $245,000, contractor bids are currently being sought to begin the palm grove restoration and exotic plant control.

Monitor and protect listed species

As discussed in the Designated Species section, there are several listed species that have been documented on the Preserve. These species will benefit from exotic plant control activities. During stewardship activities, efforts will be made to minimize any negative impact to listed species.

SBP and CP are both part of a countywide quarterly site inspection program conducted for all C20/20 preserves. These inspections allow staff to monitor for any impacts and/or changes to each preserve and includes lists of all animal sightings and new plant species that are found. If, during these inspections, staff finds FNAI listed species, they will be reported using the appropriate forms.

Agricultural field/grove restoration

SBP #315 has an extensive palm grove that has berms, furrows, and holes installed throughout the field. Filling in the ditches and leveling this field will recreate this property's historic state and hydrologic function. Land Stewardship staff will continue to coordinate with SFWMD, Lee County of Division of Natural Resources or other appropriate government representatives for the implementation of this restoration goal. After leveling the agricultural field/grove on SBP #315, the field will be replanted, as needed, with native and appropriate vegetation similar to nearby plant communities.

Photo point monitoring

Photo points will be installed prior to the restoration work in the agricultural field/grove to document the long-term restoration of the MU 1. A pre-restoration

photo will be taken, followed by post restoration photos. Additional follow-up restoration photos are taken during quarterly site inspections. Photos will be taken as needed from then on or photo points will be removed after staff has evaluated this effort in five years.

Exotic animal removal

Although there are several exotic animal species that have been recorded on the Preserves of Northern Pine Island, Land Stewardship staff is primarily concerned with is the feral hog. Currently, the only acceptable method of hog removal on C20/20 preserves is trapping. Removal of all hogs is an unreasonable goal; therefore a control program will need to be continuous on a long-term basis.

Although not noted at IMP, these Preserves, like other C20/20 preserves, do not contain nor will it support feral cat colonies. FWC's Feral and Free Ranging Cats policy is *"To protect native wildlife from predation, disease, and other impacts* 133 *presented by feral and free-ranging cats"* (FWC 2003). Any feral cats will be trapped and taken to Lee County Animal Services.

Overall Protection

Debris removal

The Preserves of Northern Pine Island have small amounts of debris on interior portions and on their shorelines. The debris readily accumulates as it washes in. Debris removal will be an ongoing effort at both SBP and CP. During quarterly site inspections, small objects that are encountered will be removed.

Boundary sign installation

Boundary signs have been installed to further inform and delineate the Preserve. Missing or damaged signs will be replaced. C20/20 Rangers or staff will check for boundary signs during the patrols and replace them immediately if possible or report the problem to the C20/20 Supervisor.

Change zoning categories

Staff will coordinate with Lee County Division of Planning staff to update the zoning designation of both SBP and CP. The zoning categories will be changed to "Environmentally Critical" from "Agriculture."

Public Use

Public Information

Information regarding the Preserves of Northern Pine Island as well as all other C20/20 preserves and the C20/20 Program will be made available through the C20/20 website (www.conservation2020.org) and other published media.

Volunteers

Assist volunteer groups

The LSOM identifies the Land Stewardship Volunteer Program's mission statement as:

> *To aid in the management and preservation of Lee County resource-based public parks and preserves and to provide volunteers with rewarding experiences in nature.*

If there is interest from the community to form a volunteer group, staff will work with them to assist with the diverse stewardship activities that will be associated with these preserves, including wildlife monitoring, debris removal, exotic plant removal and other land stewardship projects.

VII. PROJECTED TIMETABLE FOR IMPLEMENTATION

Management Activity	Dec-09	Mar-10	Jun-10	Sep-10	Dec-10	Mar-11	Jun-11	Sep-11	Dec-11	Mar-12	Jun-12	Sep-12	Dec-12	Mar-13	Jun-13
Natural Resource Management															
Maintenance (On-going/Annual)															
Ag field/grove restoration						SBP 315	SBP 315	SBP 315							
Photo points	SBP 315														
Exotic animal control														SBP 315	
Initial exotic plant control										SBP 315	SBP 315	SBP 315		CP	CP
Follow up exotic plant control	On going during Quarterly Site Inspections and Organized Volunteer Workdays														
Trash/Debris Removal	On going during Quarterly Site Inspections and Specific Workdays as Needed														
Overall Protection															
Cultural Resource Inventory										SBP	SBP	SBP		CP	CP
Boundary Sign Installation	SBP CP														
Change Zoning category						SBP CP									
Public Use															
Public Information	SBP CP														
Volunteers															
Assist volunteer group	As Volunteer Groups Require														

Timetable based on obtaining necessary funding for numerous land stewardship projects. Implementation of these goals may be delayed due to changes in staff, extreme weather conditions or a change in priorities on properties managed by Lee County.

VIII. FINANCIAL CONSIDERATIONS

There is a perpetual management fund established for all Conservation 20/20 preserves. Monies from this fund primarily serve to meet the operational needs of the Management section of the C20/20 Program, but a certain amount of this fund will be set aside for planned restoration projects. The Calusa Land Trust has already contributed money for the acquisition of Carver Preserve. Funding has been awarded to begin the restoration of the abandoned palm grove on SBP #315. Leveling the rows and furrows around and throughout the abandoned palm grove will create a more natural and historic movement of water across the property and toward the shore. Native plantings will also be selected and installed as part of the agricultural field restoration. Funding for this project has been awarded to Conservation 20/20 in the form of two grants. The first grant is from the CHNEP for $20,000 and the second is money from the American Reinvestment and Recovery Act of 2009 (stimulus) through the USFWS Coastal Program for $225,000. Projected costs and funding sources are listed in Appendix C.

Possible additional funding for these projects may be requested through grants from agencies such as DHR, FDEP and USFWS.

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X. APPENDICES

Appendix A: Wildlife Species List

Appendix B: Plant Species List

Appendix C: Project Costs and Funding Sources

Wildlife Species List for the Preserves of Northern Pine Island

		Designated Status		
Scientific Name	**Common Name**	**FWC**	**FWS**	**FNAI**
MAMMALS				
Family: Dasypodidae (armadillos)				
Dasypus novemcinctus	nine-banded armadillo *			
Family: Sciuridae (squirrels and their allies)				
Sciurus carolinensis	eastern gray squirrel			
Family: Leporidae (rabbits and hares)				
Sylvilagus floridanus	eastern cottontail			
Family: Felidae (cats)				
Lynx rufus	bobcat			
Family: Procyonidae (raccoons)				
Procyon lotor	raccoon			
Family: Mustelidae (weasels, otters and relatives)				
Lutra canadensis	northern river otter			
Family: Suidae (old world swine)				
Sus scrofa	feral hog *			
BIRDS				
Family: Anatidae (swans, geese and ducks)				
Subfamily: Anatinae (dabbling ducks)				
Anas fulvigula	mottled duck			
Anas discors	blue-winged teal			
Subfamily: Merginae (mergansers)				
Mergus serrator	red-breasted merganser			
Lophodytes cucullatus	hooded merganser			
Family: Podicipedidae (grebes)				
Podilymbus podiceps	pied-billed grebe			
Family: Pelecanidae (pelicans)				
Pelecanus erythrorhynchos	American white pelican			
Pelecanus occidentalis	brown pelican	SSC		G4/S3
Family: Phalacrocoracidae (cormorants)				
Phalacrocorax auritus	double-crested cormorant			
Family: Anhingidae (anhingas)				
Anhinga anhinga	anhinga			
Family: Ardeidae (herons, egrets, bitterns)				
Ardea alba	great egret			G5/S4
Ardea herodius	great blue heron			
Egretta caerulea	little blue heron	SSC		G5/S4
Egretta thula	snowy egret	SSC		G5/S3
Egretta tricolor	tricolored heron	SSC		G5/S4
Bubulcus ibis	cattle egret			
Nyctanassa violacea	yellow-crowned night heron			G5/S3
Family: Threskiornithidae (ibises and spoonbills)				
Eudocimus albus	white ibis	SSC		G5/S4
Family: Ciconiidae (storks)				
Mycteria americana	wood stork	E	E	G4/S2
Family: Cathartidae (new world vultures)				
Coragyps atratus	black vulture			
Cathartes aura	turkey vulture			
Family: Pandionidae (ospreys)				
Pandion haliaetus	osprey			G5/S3S4

Plant list for the Preserves of Northern Pine Island

Scientific Name	Common Name	Native status	EPPC	FDACS	IRC	FNAI
Family: Blechnaceae (mid-sorus fern)						
Woodwardia virginica	Virginia chain fern	native			R	
Family: Pteridaceae (brake fern)						
Acrostichum danaeifolium	giant leather fern	native				
Family: Arecaceae (palm)						
Sabal palmetto	cabbage palm	native				
Family: Poaceae (grass)						
Andropogon virginicus	broomsedge bluestem	native			I	
Cenchrus spiniflex	coastal sandbur	native				
Imperata cylindrica	cogon grass	exotic	I			
Panicum maximum	guinea grass	exotic	II			
Panicum repens	torpedograss	exotic	I			
Sporobolus indicus	smutgrass	exotic				
Family: Aizoaceae (mesembryanthemum)						
Sesuvium portulacastrum	shoreline seapurslane	native				
Family: Amaranthaceae (amaranth)						
Sarcocornia perennis	perennial glasswort	native				
Family: Anacardiaceae (cashew)						
Schinus terebinthifolius	Brazilian pepper	exotic	I			
Family Apocynaceae (dogbane)						
Asclepias tuberosa	butterflyweed	native			R	
Family: Asteraceae (aster)						
Ambrosia artemisifolia	common ragweed	native				
Baccharis halimifolia	groundsel tree	native				
Bidens alba	beggarticks	native				
Borrichia frutescens	bushy seaside oxeye	native				
Elephantopus elatus	tall elephantsfoot	native			R	
Eupatorium capillifolium	dogfennel	native				
Flaveria linearis	narrowleaf yellowtops	native				
Heterotheca subaxillaris	camphorweed	native				
Sphagneticola trilobata	creeping oxeye	exotic	II			
Family: Avicenniaceae (black mangrove)						
Avicennia germinans	black mangrove	native				
Family: Bataceae (saltwort)						
Batis maritima	saltwort	native				
Family: Boraginaceae (borage)						
Heliotropium angiospermum	scorpionstail	native				
Family: Casuarinaceae (sheoak)						
Casuarina equisetifolia	Australian pine	exotic	I			
Family: Combretaceae (combretum)						
Conocarpus erectus	buttonwood	native				
Laguncularia racemosa	white mangrove	native				
Family: Convolvulaceae (morningglory)						
Ipomoea sagittata	saltmarsh morning-glory	native				
Family: Fabaceae (pea)						
Acacia auriculiformis	earleaf acacia	exotic	I			
Dalbergia ecastaphyllum	coinvine	native				
Desmodium incanum	beggar's-tick	native				
Macroptilium lathyroides	wild bushbean	native				
Sesbania herbacea	danglepod	native				
Family: Lamiaceae (mint)						
Callicarpa americana	American beautyberry	native				

Plant list for the Preserves of Northern Pine Island

Scientific Name	Common Name	Native status	EPPC	FDACS	IRC	FNAI
Family: Malvaceae (mallow)						
Urena lobata	caesarweed	exotic	II			
Family: Moraceae (mulberry)						
Ficus aurea	strangler fig	native				
Family: Myrsinaceae (myrsine)						
Rapanea punctata	myrsine	native				
Family: Myrtaceae (myrtle)						
Melaleuca quinquenervia	punktree	exotic	I			
Family: Olacaceae (olax)						
Ximenia americana	hog plum	native				
Family: Polygonaceae (buckwheat)						
Coccoloba uvifera	seagrape	native				
Family: Rhizophoraceae (mangrove)						
Rhizophora ramosior	red mangrove	native				
Family: Sapindaceae (soapberry)						
Cupaniopsis anacardioides	carrotwood	exotic	I			
Family: Veronicaceae (speedwell)						
Bacopa caroliniana	lemon bacopa	native				
Bacopa monnieri	herb-of-grace	native				
Family: Vitaceae (grape)						
Parthenocissus quinquefolia	Virginia creeper	native				

Key

Florida EPPC Status

I = species that are invading and disrupting native plant communities
II = species that have shown a potential to disrupt native plant communities

FDACS (Florida Department of Agriculture and Consumer Services)

E = Endangered
T = Threatened
CE = Commercially Exploited

IRC (Institute for Regional Conservation)

CI = Critically Imperiled
I = Imperiled
R = Rare

FNAI (Florida Natural Areas Inventory)

G= Global Status
T= Threatened
CE= Commercially Exploited

1= Critically imperiled because of extreme rarity (5 or fewer occurrences or less than 1000 individuals) or because of extreme vulnerbility to extinction due to some natural or man-made factor.
2= Imperiled because of rarity (6 to 20 occurrences or less than 3000 individuals) or because of vulnerbility to extinction due to some natural or man-made factor.
3= Either very rare and local throughout its range (21-200 occurences or less than 10,000 individuals) or found locally in a restricted range or vulnerable to extinction from other factors.
4= Apparently secure
5= Demonstrably secure

APPENDIX C: PROJECTED COSTS AND FUNDING SOURCES

Resource Enhancement and Protection

Item	Possible Funding Sources	Estimated Costs
Invasive exotic plant control	USFWS grant, C20/20, other grants	$250,000
SBP Ag field/palm grove restoration	USFWS grant	$50,000
Native plantings	USFWS grant	$10,000
Hydrologic restoration of mosquito ditches	C20/20, grants	$500,000
Total		$810,000

Overall Protection

Item	Possible Funding Sources	Estimated Costs
Preserve and boundary signs	C20/20	$400
Minor debris removal	C20/20	$100
Total		$500

Total Cost Estimate $860,500

*These costs are C20/20 staff estimates as of January 2010. Costs may change.