

RECEIVED
JUN 18 2008

COMMUNITY DEVELOPMENT

"Special Projects"

Seagrass Study and Investigation
Within Hurricane Bay
ADJACENT TO FUTURE DEVELOPMENT PROPERTY
more fully described as
or by STRAP No's: 19-46-24-00-00021.0050;
19-46-24-00-00021.0030; 19-46-24-00-00021.0010;
19-46-24-00-00022.0010

LEE COUNTY
STATE OF FLORIDA

Report Prepared For:

Mr. Robert W. Beasley, Manager
Oyster Bay Land Company & Hanson Marine Properties, Inc.
1711 Main Street
Fort Myers Beach, Florida 33931

Date of Final Seagrass Report:
May 29th, 2008

Seagrass Study and Investigation Report By:

ENVIRONMENTAL LAND SERVICES, INC.
3677 CENTRAL AVENUE
SUITE "G"
FORT MYERS, FLORIDA 33901
(239) 274-8022 OFFICE
(239) 274-8019 FAX

Seagrass Study and Investigation Report Project No.: 2008-1023

TABLE OF CONTENTS

Section Number One: "Seagrass Study Narrative"

Focus On: That part of Hurricane Bay adjacent to real property
Interests of Oyster Bay Land Company & Hanson Marine Properties

Section Number Two: Photographs & Reference Related Maps

Part I - Photo Documentation of Field Collection

Part II - Subject Location Research Material

Part III - Reference Maps

Section Number Three: Official Soils Series Descriptions - USDA

Part I - Kesson Series

Part II - Wulfert Series

Part III - Peckish Series

Part IV - Community Development "Wetland Standards"

Section Number Four: "Pesticides" - Possible Threat to Seagrasses

Lee County: Soil Ratings For Selecting Pesticides

Section Number Five: Associated Stewardship Preserve Plan

"Matanzas Pass Preserve"

Section Number Six: Glossary of Aquatic Vegetation Terms

Section Number Seven: Seagrass Resource Statewide Program (2003)

"Historical Reference"

Section Number Eight: Seagrass Communities Gulf Coast of Florida

"Historical Reference"

(2004)

May 29th, 2008

"Seagrass Study Narrative"

On 05/07/2008, a sampling expedition was conducted whereby discovery was made as to the abundant (Blue-Green Algae) found near the Northern shore areas adjacent to our clients future development interests. Understanding the mechanics and dynamics of the land interacting with the effects upon Hurricane Bay are as follows. During the years considerable freshwater runoff has been monitored as it flows freely into Hurricane Bay. This has impact upon the salinity within that marine environment, causing a starvation of the dissolved oxygen within the subject marine environment. Several studies (Sections 5, 7, and 8) have shown, that such impacts slow and/or prevent the re-establishment of seagrass communities in areas with relatively low oxygen and salinity counts as marine areas go. Oddly enough, blue-green algae – a type of algae natural to our area frequently blooms when it finds the climatic and nutrient conditions favorable. Many times when conditions deteriorate further, some individuals identify this algae as "Brown" odiferous algae.

Our work task and project site includes addressing the geological soils and sand features as well. It is important to understand that seagrasses have a rather unique relationship within the soils and sands where they grow. This relationship is one of mutual benefit, whereby the grasses find nutrient content whereby to develop and flourish, plus the added benefit of a sound structure within which to root itself against the punishing wave and fetch actions of Mother nature.

Uniquely enough, past works close to and within this area of focus reveals that sand grain size and content analyses was made of the top three (3) inches of sediments from numerous cores taken across three (3) species – specific Seagrass beds in Estero Bay Aquatic Preserve, southwestern Florida during 1999. This area in fact is just immediate adjacent to our study area to the North. Within that study can be found this interesting information – The seagrass beds contained some algae with abundant *Thalassia*, *Halodule*, and *Thalassia* – *Halodule* mix, while the sediment was largely composed of varying amounts of quartz sand, silt-sized quartz, and carbonate skeletal particles. Comparison of sediment from different species of Seagrass reveals a difference in terms of pan size characteristics. There is a significantly higher content of silt in *Thalassia* and *Thalassia* – *Halodule* mix sediments than in *Halodule* beds. This species – specific preference difference may not be due to wave-energy and sediment size alone, but may also be due to freshwater runoff influence. Sediment – trap collections during summer and fall of 1999 and 2000, the wet and dry sessions in southern Florida, give a particle flux ranging from 10 to 100 g/diem that increased during periods of high winds, due to the very shallow nature of the bay (<3 feet). During the dry season of 1999/2000 the flux range was lower. It is not known how much of this flux has come from local re-suspension of sediment particles or direct input from the Gulf of Mexico.

Our findings on May 6th, 2008, were that very small communities of *Halophila decipiens* (Paddle-grass) and *Thalassia testudinum* (Turtle-grass) are re-establishing themselves in areas mid-bay and further north. These marine plant communities appear very healthy and show robust growth features which gives us some indication as to the ever increasing

quality and health of Hurricane Bay itself. To date we have NOT identified any such grass species 500 feet +/- North of the Northern most shore line of our client's real property interests.

Important Considerations:

* As to possible issues relating to the expansion of existing docking facilities and/or maintenance of existing facilities. Per our field work we find NO potential conflict between seagrass growth versus upland future development.

* As to continual use and maintenance of existing channel ingress & egress to the existing docking facilities. Again, per our field work we find NO potential conflict between seagrass growth versus upland future development.

In closing, no evidence was discovered within Hurricane Bay with the location of those small young-adolescent marine grass communities re-establishing themselves to the North that would impact our client's real estate interest and/or future development needs. Should the subject property (upland) be further developed in the future it is recommended that at least a Phase I, environmental audit be performed and that additional safety measures with regard to toxic and/or hazardous materials be undertaken during construction or development.

Sincerely yours,



Richard Alan Welch, Sr. V.P.
Environmental Land Services, Inc.
3677 Central Avenue, Suite "G"
Fort Myers, Florida 33901-8226

May 29, 2008

Mr. Robert W. Beasley
1711 Main Street
Fort Myers Beach, Florida 33931

RE: Seagrass Study and Investigation Report 2008-1023

Dear Sir:

A seagrass study was conducted upon the subject marine property on 05/07/2008.

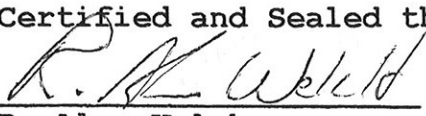
No soil sampling evidence was discovered during the course of the preliminary soils investigation that would lead to a reasonable conclusion that the subject property might be contaminated to an economically significant degree.

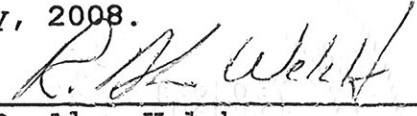
The on-site physical inspection of the seagrass study and investigation did not discover any evidence that would lead to a reasonable conclusion that the subject property might be contaminated to an economically significant degree.

No other warranty, expressed or implied, is made, and any and all other warranties or guarantees are hereby expressly disclaimed.

Please do not hesitate to call if I can help to clarify or be of future professional assistance.

Certified and Sealed this 29th day of May, 2008.


R. Alan Welch
State of Florida
Professional Geologist
Number: PG792


R. Alan Welch
Member: A.I.P.G.
Certified Prof. Geologist
Number: CPG8546

PROFESSIONAL GEOLOGIST CERTIFICATION

This report was prepared or conducted under the direct supervision of Mr. R. Alan Welch, P.G., of Environmental Land Services, Inc., (E.L.S.). Our Professional Services have been performed using that degree of care and skill ordinarily exercised under similar circumstances by other Professional Geologists and Engineers practicing in this field.

No other warranty, expressed or implied, is made as to the Professional advise in this report.

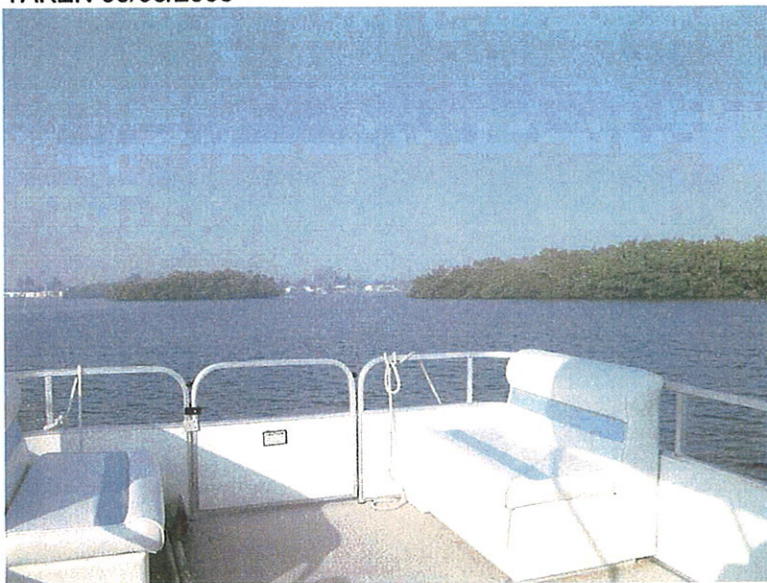


R. Alan Welch
State of Florida
Professional Geologist
No. PG0000792

Date: May 29, 2008

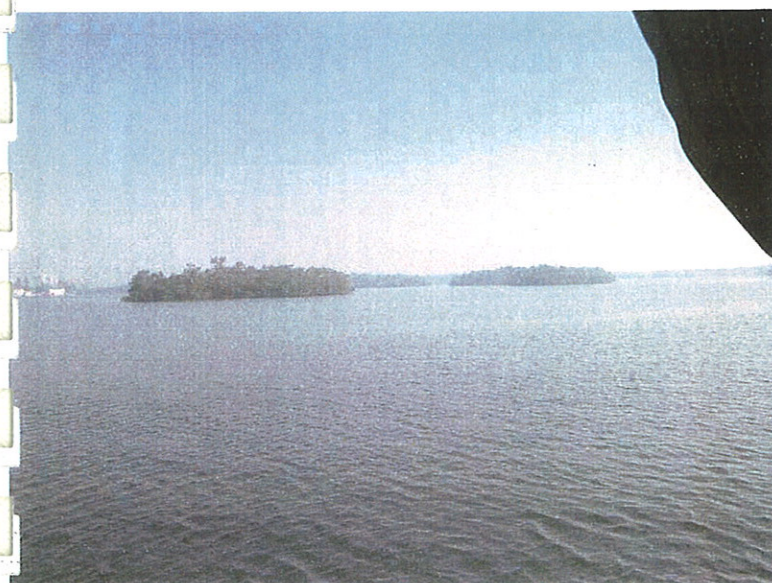
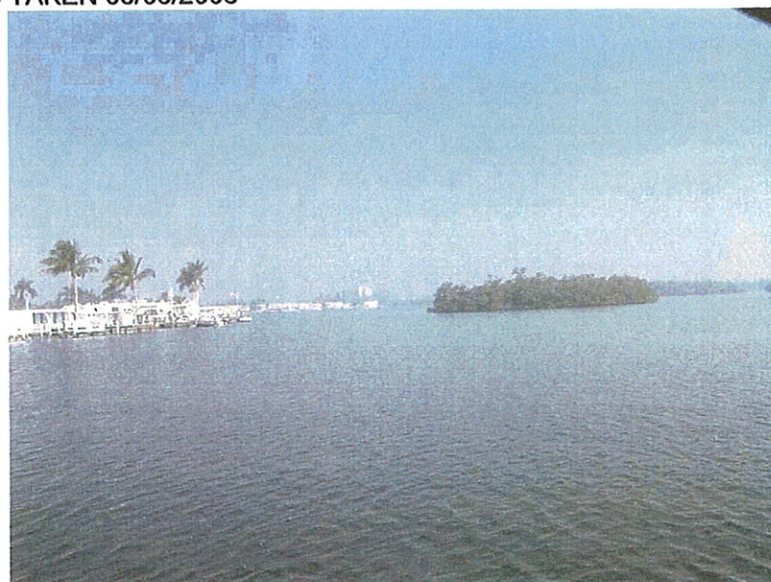
2008-1023

DATE ALL PHOTOS TAKEN 05/06/2008



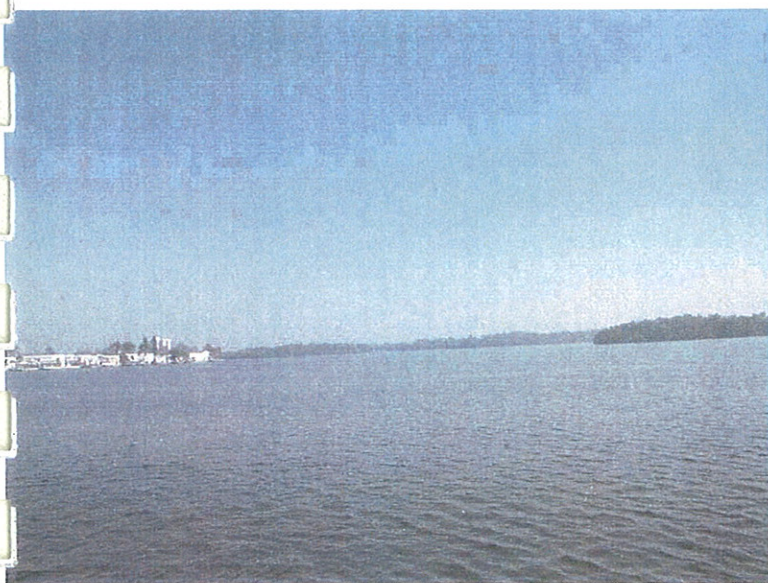
2008-1023

DATE ALL PHOTOS TAKEN 05/06/2008



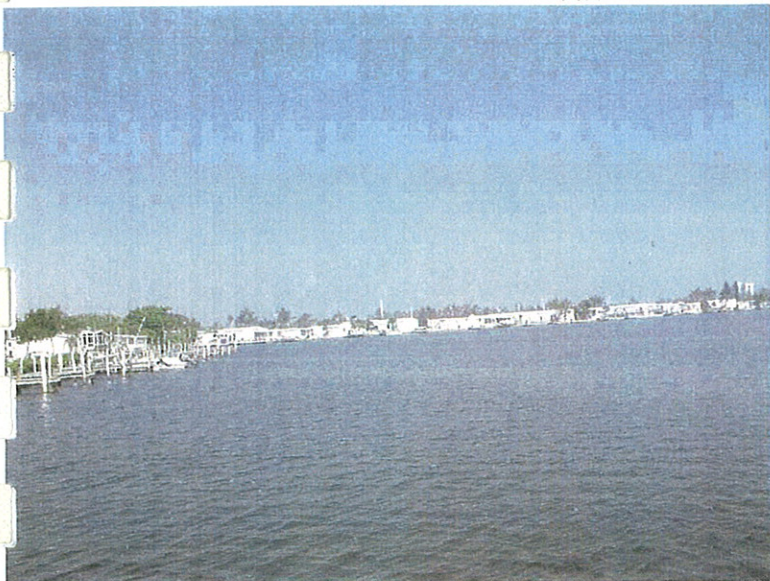
2008-1023

DATE ALL PHOTOS TAKEN 05/06/2008



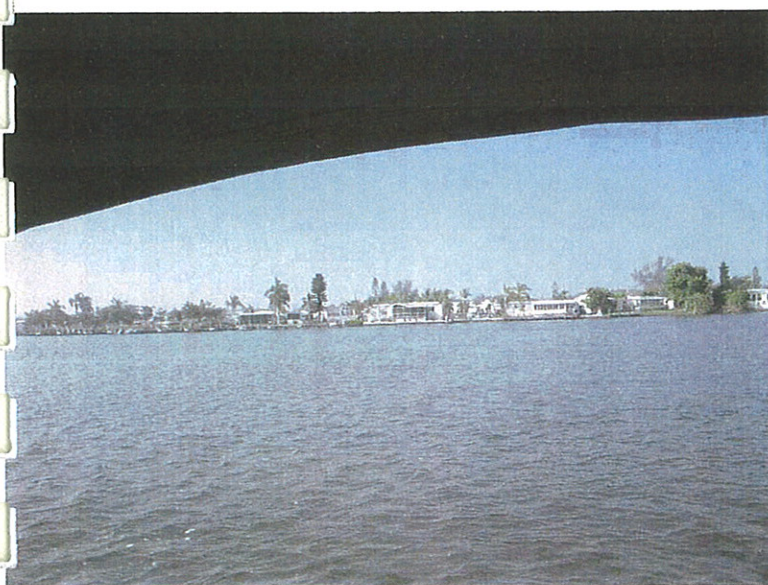
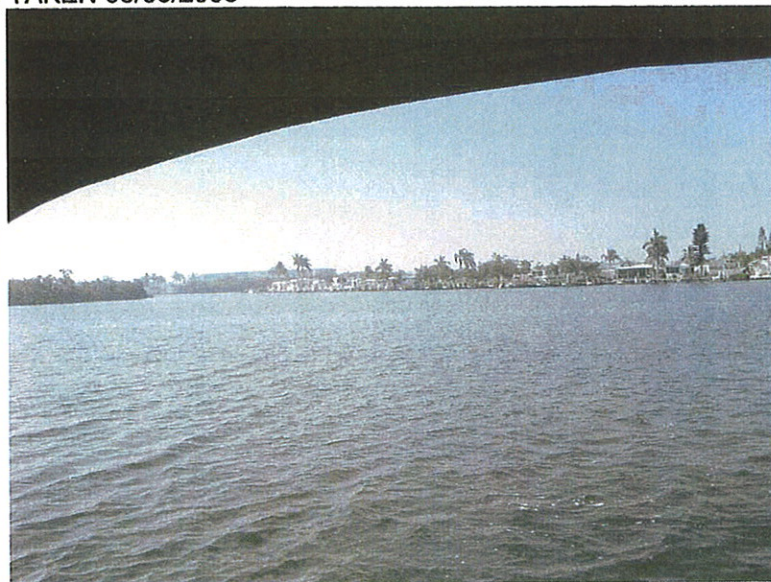
2008-1023

DATE ALL PHOTOS TAKEN 05/06/2008



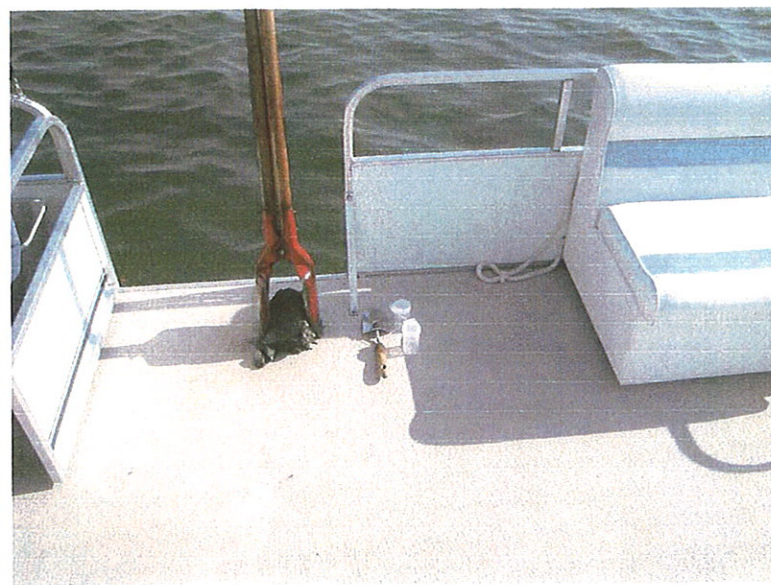
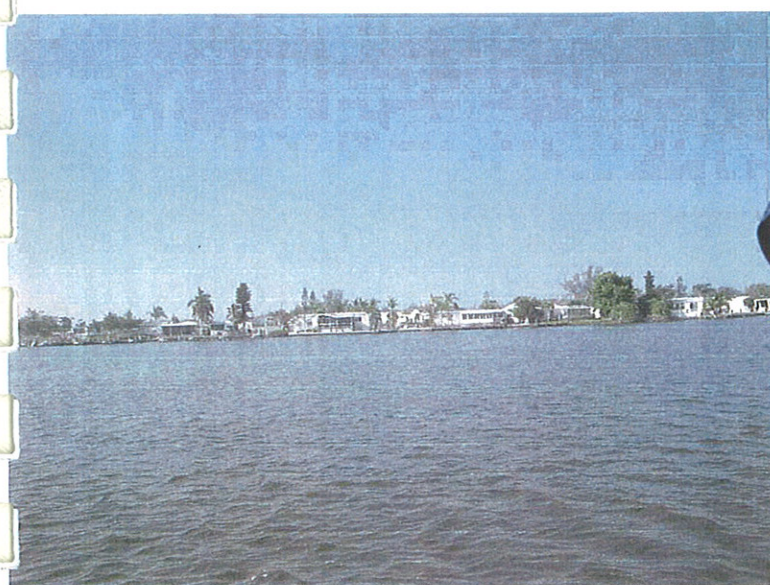
2008-1023

DATE ALL PHOTOS TAKEN 05/06/2008



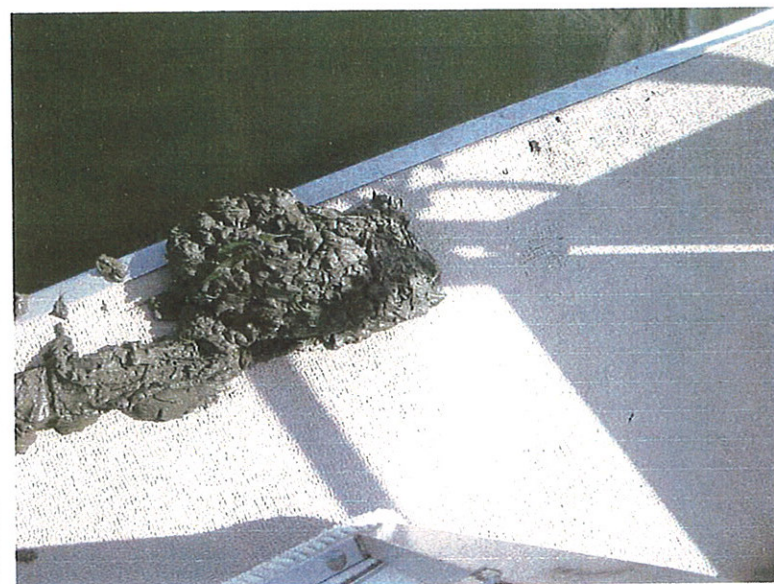
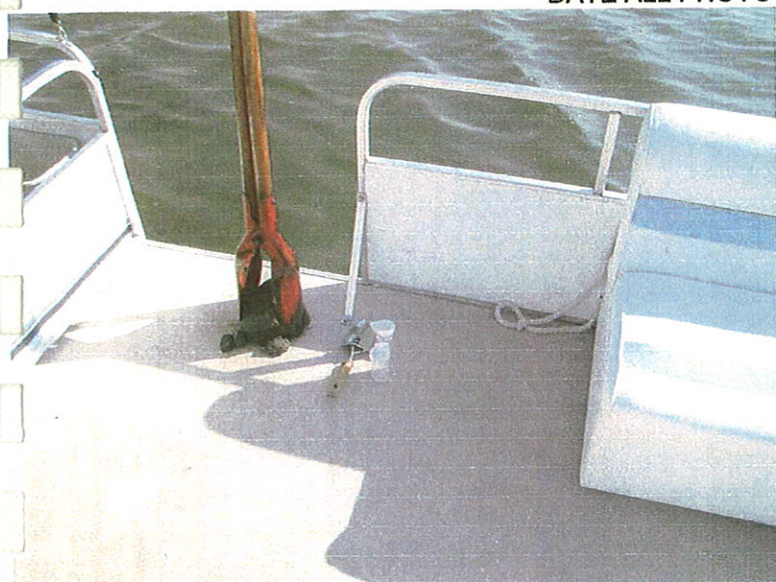
2008-1023

DATE ALL PHOTOS TAKEN 05/06/2008



2008-1023

DATE ALL PHOTOS TAKEN 05/06/2008



2008-1023

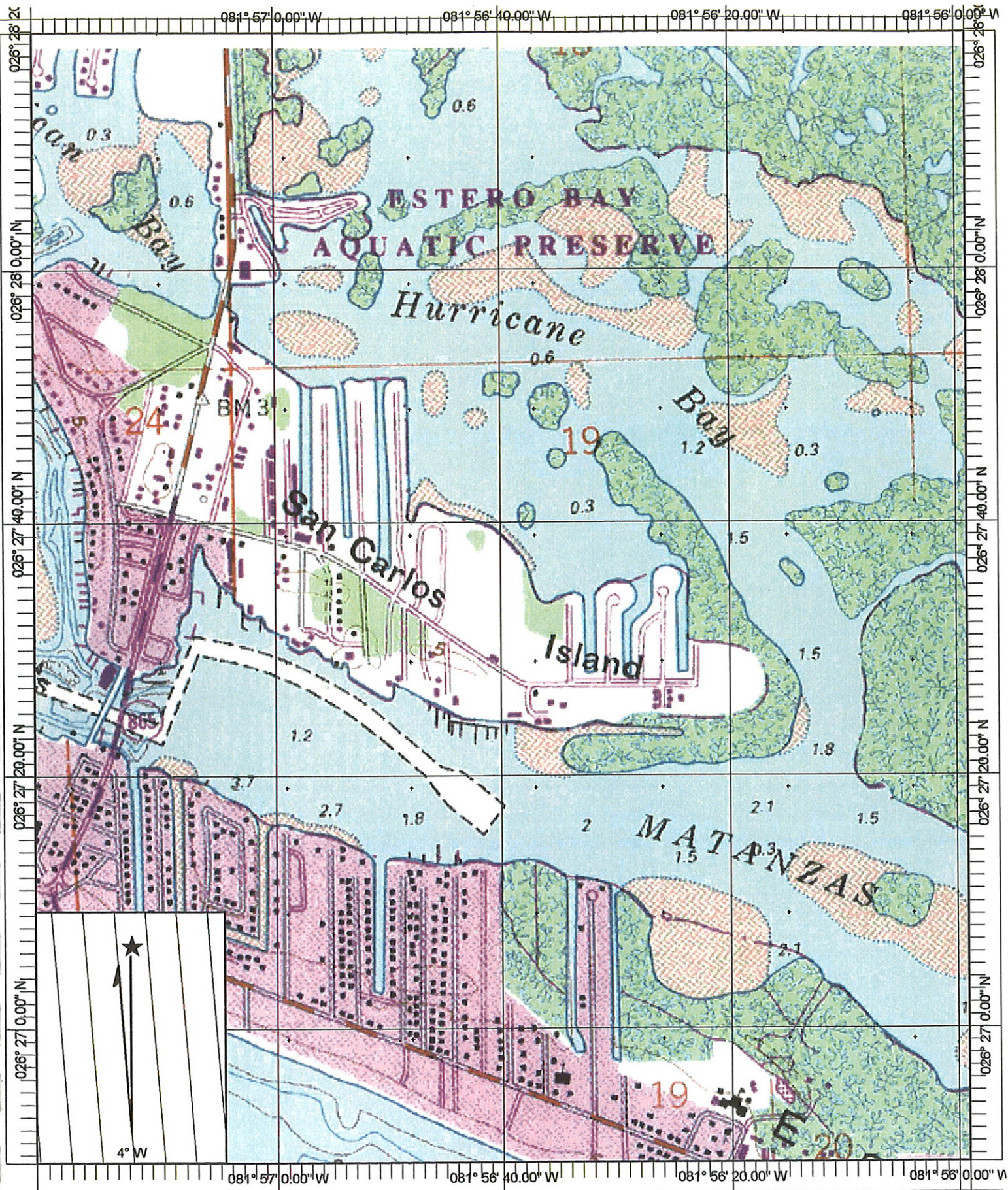
DATE ALL PHOTOS TAKEN 05/06/2008



2008-1023

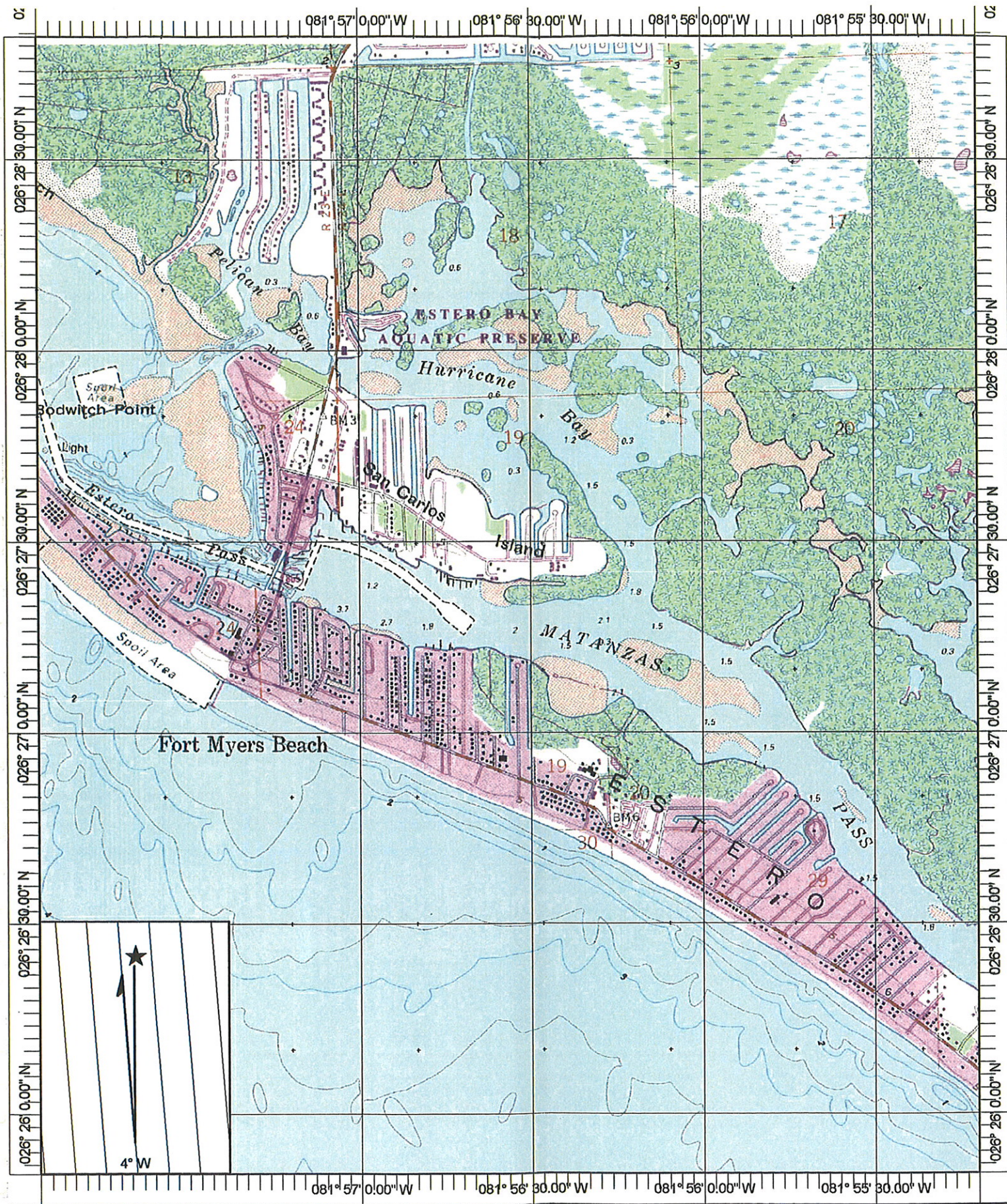
DATE ALL PHOTOS TAKEN 05/06/2008





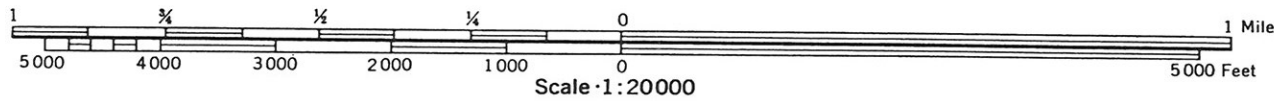
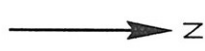
Name: FORT MYERS BEACH
 Date: 3/20/2008
 Scale: 1 inch equals 1000 feet

Location: 026° 27' 34.1" N 081° 56' 40.0" W
 Caption: SeaGrass Study
 2008-1023A



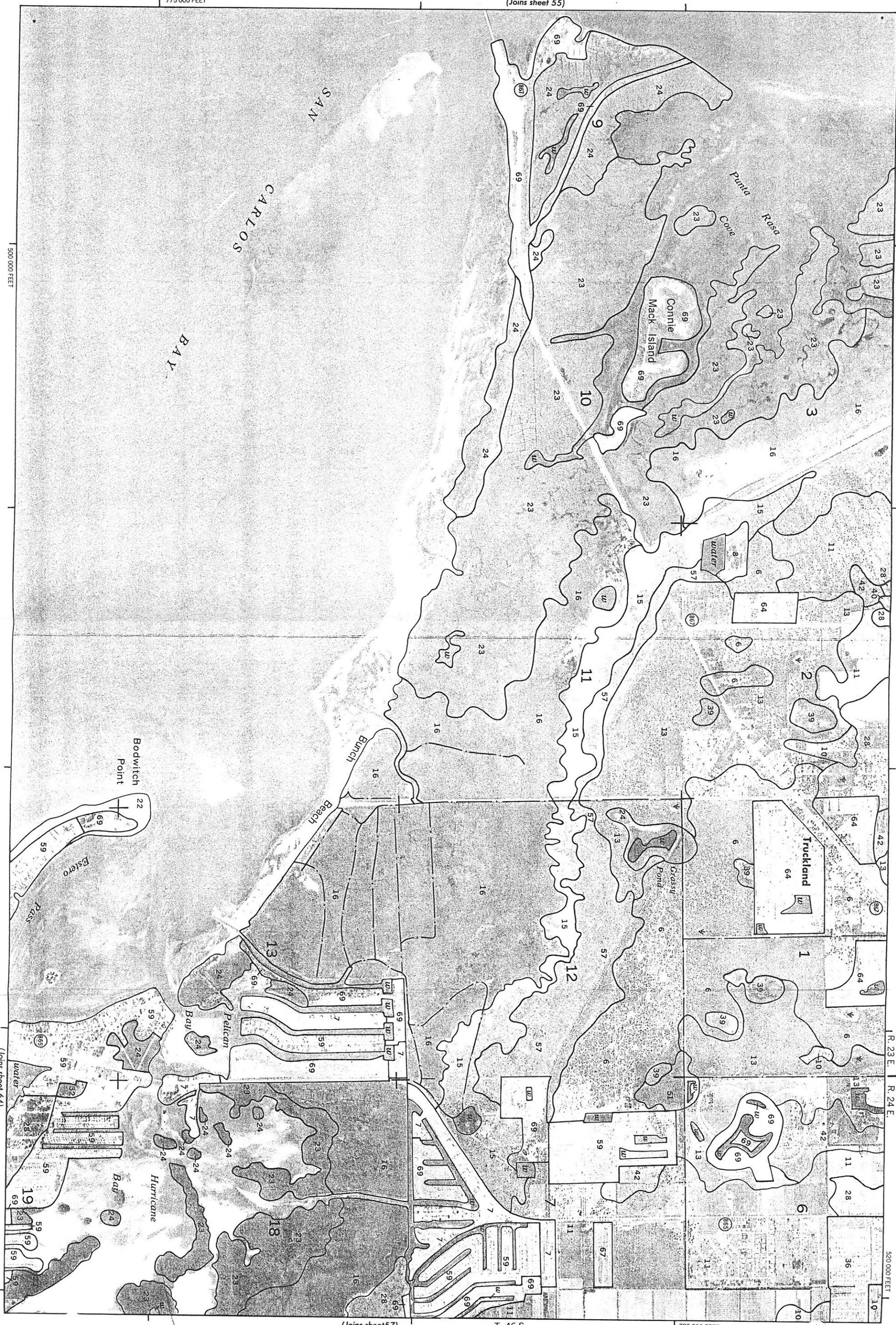
Name: FORT MYERS BEACH
 Date: 3/20/2008
 Scale: 1 inch equals 2000 feet

Location: 026° 27' 20.0" N 081° 56' 34.1" W
 Caption: SeaGrass Study
 2008-1023A



(Joins sheet 55)

775 000 FEET



(Joins sheet 57)

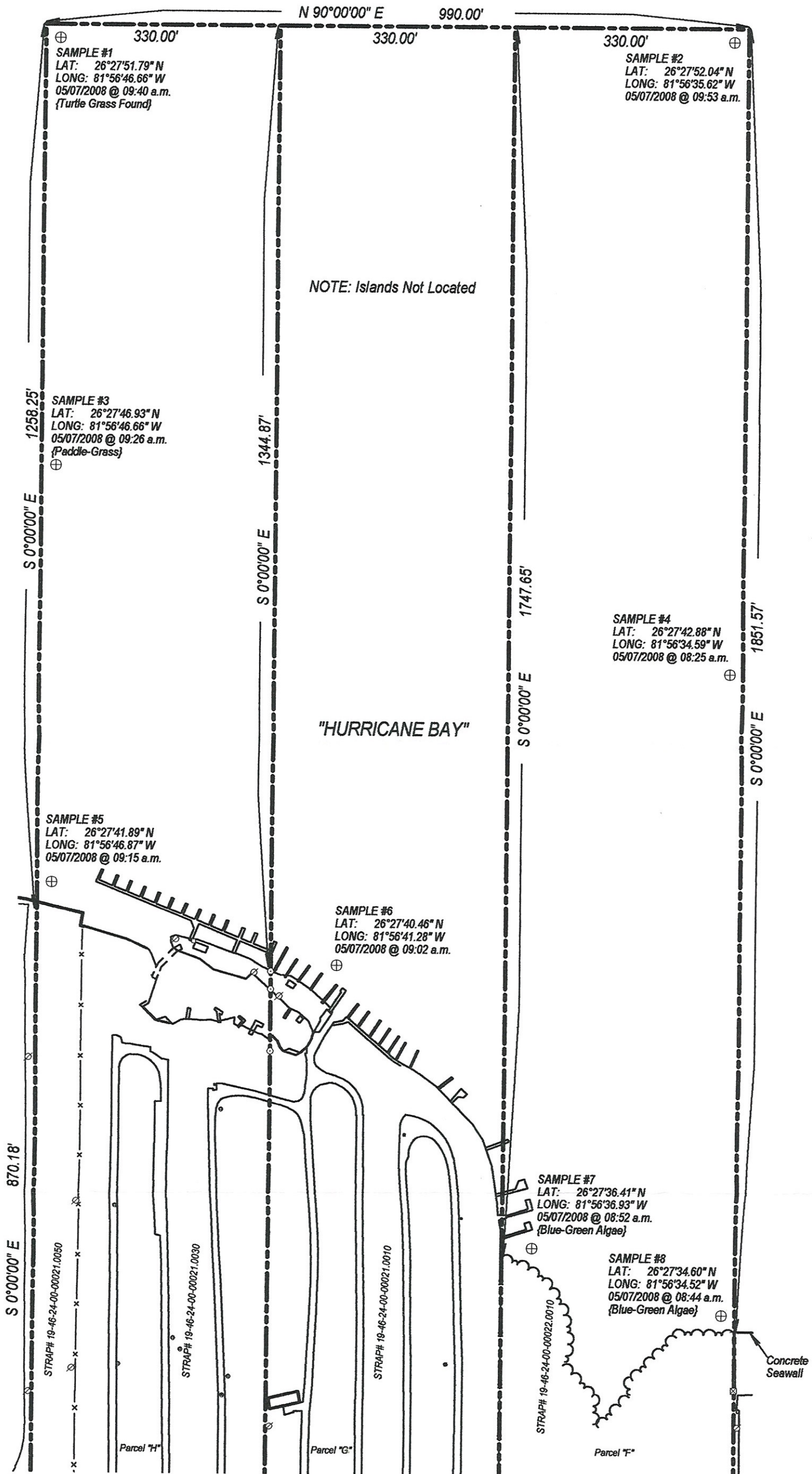
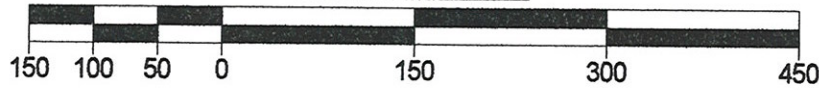
T. 46 S.

785 000 FEET

500 000 FEET

(Joins sheet 64)

SCALE: 1" = 150'



Specific Purpose Sketch

ENVIRONMENTAL LAND SERVICES, INC.
3677 CENTRAL AVENUE, SUITE G
FORT MYERS, FLORIDA 33901
PHONE: (239) 274-8022
FAX: (239) 274-8019 **ELS**

**Oyster Bay Seagrass Study
& Specific Purpose Survey**

Date:
05/07/08

Job #:
2008-1023A

LOCATION KESSON

FL

Established Series

Rev. WGH:AGH

12/84

KESSON SERIES

The Kesson series consists of deep, very poorly drained, rapid to moderately rapid permeable soils that formed in thick marine deposits of sand and shell fragments in tidal swamps and marshes along the Gulf Coast of Peninsular Florida. Slopes range from 0 to 1 percent.

TAXONOMIC CLASS: Siliceous, hyperthermic Typic Psammaquents

TYPICAL PEDON: Kesson fine sand in a tidal area.
(Colors are for moist soil unless otherwise stated.)

A--0 to 6 inches; black (10YR 2/1) fine sand; single grained; loose; common fine and medium roots; about 15 percent shell fragments; moderately alkaline; calcareous; clear smooth boundary. (0 to 7 inches thick)

C1--6 to 10 inches; pale brown (10YR 6/3) fine sand; single grained; loose; common fine and medium roots; about 10 percent shell fragments; moderately alkaline; calcareous; clear smooth boundary. (4 to 34 inches thick)

C2--10 to 13 inches; light brownish gray (10YR 6/2) fine sand; single grained; loose; about 10 percent shell fragments; moderately alkaline; calcareous; clear smooth boundary. (3 to 22 inches thick)

C3--13 to 23 inches; light gray (5Y 7/1) and gray (5Y 6/1) fine sand; common medium distinct dark gray (10YR 4/1) streaks; single grained; loose; about 5 percent shell fragments; moderately alkaline; calcareous; gradual wavy boundary. (10 to 18 inches thick)

C4--23 to 38 inches; light gray (5Y 7/1) fine sand; single grained; loose; about 30 percent shell fragments; moderately alkaline; calcareous; gradual wavy boundary. (15 to 18 inches thick)

C5--38 to 80 inches; white (5Y 8/1) fine sand; single grained; loose; about 5 percent shell fragments; moderately alkaline; calcareous.

TYPE LOCATION: Lee County, Florida; about 1 mile west of intersection of Bailey Road and Bay Drive and 14 feet north; NE1/4NE1/4 sec. 19, T. 46 S., R. 23 E.

RANGE IN CHARACTERISTICS: Sulfur content is more than 0.75 percent within depths of 20 inches. The calcium carbonate equivalent is more than three times the sulfur content for some portion. Reaction ranges from mildly alkaline to strongly alkaline and the soil is calcareous. It does not become extremely acid when dry. Texture is sand or fine sand throughout.

The A horizon has hue of 10YR, value of 2 to 6, chroma of 1 to 3. Content of shell fragments ranges

from about 5 to 15 percent. Some pedons have organic horizons less than 8 inches thick above the A horizon.

The C horizon has hue of 10YR to 5GY, value of 2 to 8, chroma 1 to 3. Content of shell fragments ranges from about 5 to 30 percent.

COMPETING SERIES: These are the Dianola, Hallandale, Plantation, Pompano, Sanibel, and Tatton series. Dianola and Tatton soils have more than 10 percent silt and clay in the 10- to 40-inch control section. Hallandale soils are shallow to limestone. Plantation and Sanibel soils have histic epipedons. Pompano soils are not subject to tidal flooding and have very low salinity.

GEOGRAPHIC SETTING: Kesson soils are in tidal swamps and marshes along the Gulf Coast in Peninsular Florida. Slopes are less than 1 percent. The soils formed in thick deposits of sand and shell fragments. Near the type location, the mean annual precipitation is about 55 inches and the mean annual temperature is about 73 degrees F.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Captiva, Myakka, and Wulfert series. Wulfert soils are organic. Captiva and Myakka soils are poorly drained and are on higher elevations. In addition, the Myakka soils have a spodic horizon.

DRAINAGE AND PERMEABILITY: Kesson soils are very poorly drained. Runoff is slow. Permeability is moderately rapid to rapid. Under natural conditions, the soil is flooded during normal high tides.

USE AND VEGETATION: Kesson soils are used mainly for wildlife habitat. Native vegetation is black mangrove, oxeye daisy, batis, and scattered American mangrove.

DISTRIBUTION AND EXTENT: Coastal tidal area of Peninsular Florida. The series is of small known extent.

MLRA OFFICE RESPONSIBLE: Auburn, Alabama

SERIES ESTABLISHED: Manatee County, Florida; 1980.

REMARKS: This series was formerly mapped as tidal swamp.

National Cooperative Soil Survey
U. S. A.

LOCATION WULFERT

FL

Established Series

Rev. WGH; AGH; GRB

01/2004

WULFERT SERIES

The Wulfert series consists of very deep, very poorly drained, rapidly permeable soils in tidal areas along the Gulf Coast. They formed in well decomposed organic material and underlying materials. Near the type location, the mean annual temperature is about 72 degrees F., and the mean annual precipitation is about 55 inches. Slopes range from 0 to 1 percent.

TAXONOMIC CLASS: Sandy or sandy-skeletal, siliceous, euic, hyperthermic Terric Sulfisaprists

TYPICAL PEDON: Wulfert muck--in a mangrove swamp. (Colors are for wet soil.)

Oa1--0 to 2 inches; dark reddish brown (5YR 2/2) muck; 15 percent fiber, 3 percent rubbed; massive; friable; many fine roots, common medium roots; about 55 percent mineral material; 0.5 percent sulfur; 318 mmho/cm conductivity; slightly acid; clear smooth boundary.

Oa2--2 to 12 inches; dark reddish brown (5YR 3/2) muck; 75 percent fiber, 3 percent rubbed; massive; friable; common coarse roots; about 56 percent mineral material; 1.5 percent sulfur; 350 mmho/cm conductivity; strongly acid; clear smooth boundary.

Oa3--12 to 36 inches; dark brown (7.5YR 3/2) muck; 95 percent fiber, 16 percent rubbed; massive; friable; common fine and medium roots; about 79 percent mineral material; 2.4 percent sulfur; 245 mmho/cm conductivity; extremely acid; gradual wavy boundary. (Combined thickness of the Oa horizons range from 16 to 51 inches)

Cg--36 to 80 inches; gray (5Y 5/1) fine sand; single grained; loose; about 10 percent, by volume, shell fragments; about 0.3 percent sulfur; 74 mmho/cm conductivity; few medium distinct light gray (5Y 7/1) streaks; extremely acid.

TYPE LOCATION: Lee County, Florida; approximately 0.2 mile north of intersection of the power line and dike and about 75 feet west; SE 1/4, SE 1/4, Sec. 7, T. 46 S., R 22 E.

RANGE IN CHARACTERISTICS: Sulfur content ranges from 0.7 to 2.4 percent in the Oa2 and Oa3 horizons. The organic material in all tiers is dominantly sapric material, but in some pedons, hemic material occurs. Conductivity of the saturation extract above the C ranges from about 200 to 400 mmho/cm. Reaction of the Oa horizons ranges from extremely acid to neutral in the natural state and from extremely acid to slightly acid after drying. Reaction of the Cg horizon in the natural state ranges from extremely acid to slightly alkaline and from extremely acid to moderately acid after drying.

The Oa horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 3 or less. Mineral content ranges up to 80 percent. Texture is muck.

The Cg horizon has hue of 10YR to 5Y, value of 3 to 7, and chroma of 1 or 2. Redoximorphic features in shades of yellow, brown, or gray range from none to many. Content of shell fragments range from 0 to 20 percent, by volume. Texture is sand, fine sand, loamy fine sand, loamy sand, their gravelly or mucky analogs.

COMPETING SERIES: The Weekiwachee series is the only known series in the same family. Weekiwachee soils are on similar positions and are moderately deep to limestone bedrock.

GEOGRAPHIC SETTING: Wulfert soils are in tidal swamps and marshes along the Gulf Coast in Peninsular Florida. Slopes are less than 1 percent. They formed in moderately thick deposits of hydrophytic plant remains and sandy marine sediments containing shell fragments. The climate is humid subtropical. The average annual precipitation ranges from 50 to 60 inches, and the average annual temperature ranges from 70 to 74 degrees F.

GEOGRAPHICALLY ASSOCIATED SOILS: These are Captiva and Kesson series. They are both sandy throughout. The poorly drained Captiva soils are on higher positions and have mollic epipedons. Kesson soils are on similar positions.

DRAINAGE AND PERMEABILITY: Very poorly drained; rapid permeability.

USE AND VEGETATION: Wulfert soils are used mainly for wildlife habitat. The native vegetation is dominated by American mangrove, black mangrove, needlegrass rush, seashore saltgrass, marshhay cordgrass, and smooth cordgrass.

DISTRIBUTION AND EXTENT: Gulf Coast tidal area of Peninsular Florida. The series is of small known extent.

MLRA OFFICE RESPONSIBLE: Auburn, Alabama.

SERIES ESTABLISHED: Manatee County, Florida; 1980.

REMARKS: Diagnostic horizons and features in this pedon:

Histic epipedon the zone from 0 to 36 inches (Oa1, Oa2, and Oa3 horizons).

Wulfert soils are flooded during normal daily high tides.

The revision changed the series classification to recognize the 1992 amendments to Soil Taxonomy that introduced changes in classification of Histosols.

ADDITIONAL DATA: Sample number S36-6-(1-4). Soil Characterization Lab., IFAS, University of Florida, Gainesville, FL.

National Cooperative Soil Survey
U.S.A.

LOCATION PECKISH

FL

Established Series

Rev. WGH:HFH

9/82

PECKISH SERIES

The Peckish series consists of deep, very poorly drained, rapidly permeable soils that formed in thick beds of sandy marine sediments in tidal swamps along the coast of Peninsular Florida. Slopes range from 0 to 1 percent.

TAXONOMIC CLASS: Sandy, siliceous, hyperthermic Typic Sulfaquents

TYPICAL PEDON: Peckish mucky fine sand in a mangrove tidal swamp.

(Colors are for moist soil unless otherwise stated.)

A11--0 to 4 inches; dark reddish brown (5YR 2/2) mucky fine sand; massive; friable; 45 percent sulfur; 222 mmho/cm conductivity; very strongly acid; abrupt smooth boundary. (4 to 9 inches thick)

A12--4 to 6 inches; dark grayish brown (10YR 4/2) mucky fine sand; massive; friable; 13 percent sulfur; 59 mmho/cm conductivity; very strongly acid; abrupt smooth boundary. (0 to 2 inches thick)

A13--6 to 9 inches; dark reddish brown (5YR 3/2) mucky fine sand; massive; friable; 26 percent sulfur; 105 mmho/cm conductivity; strongly acid; abrupt smooth boundary. (0 to 3 inches thick)

A21--9 to 12 inches; gray (10YR 5/1) fine sand; single grained; loose; many fine roots; 7 percent sulfur; 32 mmho/cm conductivity; strongly acid; clear smooth boundary. (13 to 33 inches thick)

A22--12 to 25 inches; light gray (10YR 6/1) fine sand; few light gray (10YR 7/1) streaks along old root channels; single grained; loose; few fine and medium roots; few pockets of organic material; 2 percent sulfur; 50 mmho/cm conductivity; very strongly acid; gradual wavy boundary. (11 to 18 inches thick)

A23--25 to 36 inches; light gray (10YR 7/1) fine sand; common medium distinct light brownish gray (10YR 6/2) and grayish brown (10YR 4/2) mottles; single grained; loose; 4 percent sulfur; 25 mmho/cm conductivity; neutral; clear wavy boundary. (0 to 11 inches thick)

B2h--36 to 43 inches; dark grayish brown (10YR 4/2) and very dark grayish brown (10YR 3/2) fine sand; single grained; very friable; sand grains thinly coated with organic matter, many uncoated sand grains; 3 percent sulfur; 29 mmho/cm conductivity; extremely acid; clear smooth boundary. (5 to 7 inches thick)

B3&Bh--43 to 48 inches; brown (10YR 5/3) and dark brown (10YR 4/3) fine sand; common medium distinct very dark grayish brown (10YR 3/2) mottles; single grained; very friable; many uncoated sand grains 6 percent sulfur; 30 mmho/cm conductivity; very strongly acid; gradual wavy boundary. (0 to 7 inches thick)

C--48 to 61 inches; pale brown (10YR 6/3) fine sand; few fine distinct very dark grayish brown (10YR 3/2) streaks along old root channels; single grained; loose; 4 percent sulfur; 27 mmho/cm conductivity; very strongly acid.

TYPE LOCATION: Lee County, Florida; about 0.7 mile southeast of intersection of State Highway 867 and Shell Point Blvd. and 150 feet south in the SE1/4NE1/4 sec. 11, T. 46 S., R 23 E.

RANGE IN CHARACTERISTICS: Sulfur content ranges from 2 to 45 percent within depths of 20 inches. Reaction ranges from very strongly acid to moderately alkaline in the natural state, and from extremely acid to neutral after drying.

The A1 horizon has hue of 10YR, value of 2, and chroma of 1 or value of 3 or 4 and chroma of 1 to 3; hue of 7.5YR, value of 3, and chroma of 2; or hue of 5YR, value of 2 or 3, and chroma of 2. It is mucky fine sand or fine sand.

The A2 horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2; or hue of 2.5Y, value of 5, and chroma of 2.

The Bh horizon does not meet the requirements of a spodic horizon. It has matrix color in hue of 10YR, value of 3 to 5, and chroma of 2 or 3; or hue of 7.5YR, value of 3, and chroma of 2 or is a mixture of these colors. Some pedons have a B3&BH or B3 horizon, where present, the color is in hue of 10YR, value of 4, and chroma of 2, value of 5 or 6, and chroma of 3; or hue of 7.5YR, value of 5, and chroma of 3.

The C horizon has hue of 10YR, value of 5 to 7, and chroma of 3 or less. Texture is sand or fine sand. Shell fragments are in the C horizon in some pedons.

COMPETING SERIES: These are Homosassa and Kesson series in the same family. Homosassa soils have hard limestone within depths of 20 to 40 inches and lack Bh horizons. Kesson soils lack Bh horizons.

GEOGRAPHIC SETTING: Peckish soils are in tidal swamps and marshes. Slopes are less than 1

percent. The soil formed in thick deposits of sand. Near the type location, mean annual precipitation is about 55 inches and mean annual temperature is about 73 degrees F.

GEOGRAPHICALLY ASSOCIATED SOILS: These are Myakka and Hallandale series. Myakka soils lack appreciable amounts of sulfides within 120 inches of the surface and have spodic horizons. Hallandale soils have limestone less than 20 inches below the surface and lack Bh horizons.

DRAINAGE AND PERMEABILITY: Peckish soils are very poorly drained. Runoff is slow. Permeability is rapid. Under natural conditions, the soil is flooded daily during normal high tides.

USE AND VEGETATION: Peckish soils are used mainly for wildlife habitat. Native vegetation is black-mangrove, American mangrove in swamps, and batis, saltwort, bushy sea-oxeye, marshhay cordgrass, and seashore saltgrass in marshes.

DISTRIBUTION AND EXTENT: Coastal tidal area of Peninsular Florida. The series is of small known extent.

MLRA OFFICE RESPONSIBLE: Auburn, Alabama

SERIES ESTABLISHED: Lee County, Florida; 1982.

REMARKS: This series was formerly mapped as tidal swamp, mangrove. This soil would classify as Spodic Sulfaquents if this subgroup were in taxonomy.

National Cooperative Soil Survey
U. S. A.

**Community Development****E-Conn**

Online Perm

Wetlands

- Affordable Housing
- Building Services
- Code Enforcement
- Comprehensive Planning
- Data Resources
- Environmental Sciences
- Historic Preservation
- Zoning
- Applications-Docs-Maps
- Building Permit Reports
- Committees
- Contact Information
- Contractor Licensing
- DCD Newsletter
- Employment with DCD
- Fees Information
- General Information
- Questions & Comments
- Related Links
- Search This Site

Home

What is a Wetland?	Wetland Determination	Wetland Permitting	History of Wetland Protection in Lee County	Wetland Permit Agencies	Hydric Soil Clarification
------------------------------------	---------------------------------------	------------------------------------	---	---	---

WHAT IS A WETLAND?[TOP](#)

Wetlands are those areas defined by [Florida Statutes subsection 373.019\(17\)](#). These areas are usually inundated or saturated by water long enough to create oxygen poor soils which under normal circumstances support wetland vegetation as defined in Chapter 62-340.450 of the Florida Administrative Code (F.A.C.). There are various natural plant communities typical of wetlands in Florida. Hydric pine flatwoods, cypress domes and strands, hydric hammocks, mangrove swamps, marshes and wet prairies are some of the wetland plant communities found in Lee County.

WETLAND DETERMINATION[TOP](#)

Wetlands are determined using the Florida Unified Wetland Delineation Methodology detailed in Chapter 62-340, F.A.C. Persons trained in using this methodology determine if an area contains wetlands based on the type of vegetation present, hydric indicators in the soil, and evidence of hydrology. The historical Soil Survey of Lee County



completed in the early 1980s, serves as guideline for locating potential wetland areas. Frequently flooded, slough (sheet-flow) and depression (ponding and muck) soil types can indicate areas of wetland formation; however, a site visit needs to be conducted by a person trained in wetland delineation methodology to verify the presence or absence of wetlands. For a listing of prominent hydric soils within Lee County, click [here](#). To obtain a copy of the Soil Survey of Lee County, click [here](#). Please note that just because a parcel does not contain a hydric soil mapping unit number does not automatically mean wetland conditions are not present. And the opposite is true – just because a parcel is mapped with a hydric soil number does mean that a wetland is definitely present. Thus, the need for a site inspection by trained personnel. For more information about wetlands and the Florida Unified Wetland Delineation Methodology, please go to www.dep.state.fl.us/water/wetlands/delineation/index.htm

Lee County no longer conducts independent wetland determinations since the passing of Land Development Code Wetland Protection Amendments. However, if a hydric soil



mapping unit, according to the Soil Survey of Lee County, is present on a parcel Lee County requires a wetland determination prior to the approval of applications for single family residence building permits, planned development rezonings, lot splits, and development orders. The Florida Department of Environmental Protection (DEP) provides wetland determinations for single family residence parcels. The South Florida Water Management District (SFWMD) handles parcels zoned for commercial, agriculture and multi-family use. If a wetland determination reveals wetlands are present on a parcel, an Environmental Resource Permit must first be obtained prior to the issuance of Lee County permits and development orders. See Wetland Permitting below.

DEP conducts informal wetland determinations at no cost for single family residence parcels under one acre. To obtain the Request for Informal Wetland Determination form online, go to www.dep.state.fl.us/south. Once completed, the form can be faxed or mailed to DEP. For parcels over one acre or further information on wetland determinations, please contact the [DEP South District Office](#).

To view a copy of Soil Survey of Lee County you can either:

Come to the Lee County Department of Community Development at 1500 Monroe Street, Fort Myers. (get directions [here](#))

OR

Visit the Soil & Water Conservation (Natural Res Conservation) buildings at 3434 Hancock Bridge Parkway, Suite 209-B, 33903 or call 239-995-5678.

WETLAND PERMITTING

[TOP](#)

Impacts to wetlands, including clearing, filling or excavation, typically require an Environmental Resource Permit (ERP) from the [Florida Department of Environmental Protection \(DEP\)](#) or the [South Florida Water Management District \(SFWMD\)](#). Generally, parcels zoned for single family residence are handled by DEP. Parcels zoned for multi-family residence, commercial and agriculture are handled by SFWMD. Prior to the release of Lee County development orders and building permits on parcels containing wetlands (see section above for information on Wetland Determinations), an ERP must be obtained and a copy provided to Lee County. Conditions of the DEP or SFWMD Environmental Resource Permit will be incorporated into Lee County development orders and permits. Lee County Environmental Sciences staff will participate in the compliance and enforcement of permit conditions.



HISTORY OF WETLAND PROTECTION IN LEE COUNTY

[TOP](#)

On September 18, 1996, the Lee County Board of County Commissioners approved amendments to the Wetland Protection Section in Chapter 14 in the Land Development Code. These amendments change the permit process for parcels of land with wetlands.

WETLAND PERMIT AGENCIES - (Federal, State, Regional and Local Agencies)[TOP](#)**U.S. ARMY CORPS OF ENGINEERS - (ACOE)**

Fort Myers Regulatory Office
1520 Royal Palm Square Blvd., Suite 310
Fort Myers, FL 33919
Telephone (239) 334-1975
Fax (239) 334-0797
<http://www.saj.usace.army.mil>

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION - (DEP)

South Florida District Office
2295 Victoria Avenue, Suite 364
Fort Myers, FL 33901
Telephone (239) 332-6975
Fax (239) 332-6969
<http://www.dep.state.fl.us/>

SOUTH FLORIDA WATER MANAGEMENT DISTRICT - (SFWMD)

Fort Myers Service Center
2301 McGregor Boulevard
Fort Myers, FL 33901
Telephone (239) 338-2929
Fax (239) 338-2936
<http://www.sfwmd.gov/>

LEE COUNTY DIVISION OF ENVIRONMENTAL SCIENCES

1500 Monroe Street, 4th Floor
Fort Myers, FL 33901
Telephone (239) 533-8389
Fax (239) 485-8344
<http://www.lee-county.com/dcd/Environmental/Environmental.htm>

PROMINENT HYDRIC SOILS OF LEE COUNTY[TOP](#)**(ACCORDING TO THE USDA / SOIL CONSERVATION SERVICE SOIL SURVEY OF LEE COUNTY)**

Hydric soils are those soils that in their natural conditions are saturated, flooded, or ponded long enough during the growing season (February-December in Lee County) to develop anaerobic conditions that favor the growth and regeneration of hydrophytic (wetland) vegetation.

FLOODING

Soil flooded by moving water from stream overflow, run off or high tides.

Field Symbol	Field Mapping Unit Name
8	Hallandale fine sand, tidal
15	Estero Muck
16	Peckish mucky fine sand
23	Wulfert muck

24	Kesson fine sand
56	Isles muck
57	Boca fine sand, tidal

SLOUGH (SHEET-FLOW)

Broad nearly level, poorly defined drainage way that is subject to sheet-flow in the rainy season.

Field symbol	Field Mapping Unit Name
5	Captiva fine sand
10	Pompano fine sand
12	Felda fine sand
14	Valkaria fine sand
26	Pineda fine sand
34	Malabar fine sand
38	Isles fine sand, slough
74	Boca fine sand, slough
75	Hallandale fine sand, slough
77	Pineda fine sand, limestone substratum

PONDING

Standing water on soils in closed depressions. The water can be removed only by percolation or evapotranspiration.

Field Symbol	Field Mapping Unit Name
19	Gator muck
20	Terra Ceia muck
27	Pompano fine sand, depressional
39	Isles fine sand, depressional
40	Anclote fine sand, depressional
41	Valkaria fine sand, depressional
44	Malabar fine sand, depressional
45	Copeland sandy loam, depressional
49	Felda fine sand, depressional
51	Floridan fine sand, depressional
53	Myakka fine sand, depressional
62	Winder sand, depressional
73	Pineda fine sand, depressional

78

Chobee muck

Note: Soil #6 - Hallendale fine sand and #13 - Boca fine sand have indicated a high percentage of hydric soils within the mapping unit and may also indicate a wetland area.

[back to Environmental Sciences](#)

[return to the top](#)

Lee County: Soil Ratings for Selecting Pesticides¹

G.W. Hurt and T.A. Obreza²

RATINGS FOR LEE COUNTY SOILS FOR PESTICIDE SELECTION

Resource soil scientists with the Florida USDA Natural Resources Conservation Service have rated the soils that are delineated by map units in the Lee County Soil Survey Report¹ for their potential for leaching and runoff of pesticides. The rating criteria are given in a companion publication entitled "Soil Ratings for Selecting Pesticides for Water Quality Goals." These soil ratings have been developed to help pesticide users determine the potential for pesticides to be lost to groundwater or surface water bodies.

As explained in Circular 959², factors that determine pesticide leaching ratings in soil are permeability and the occurrence of mucky layers in the upper 80 inches of the soil. Soils rated High have a high potential for pesticides to leach to groundwater, soils rated Medium have a medium potential for pesticides to leach to groundwater, and soils rated Low have a low potential for pesticides to leach to groundwater. Factors that determine pesticide runoff ratings from soils are hydrologic group, permeability, and slope. Soils rated High have a high potential for pesticide runoff, soils rated Medium have a medium potential for pesticide runoff,

and soils rated Low have a low potential for pesticide runoff.

NOTE: The user may discover that one or more map unit names in Table 1 have been updated from names given in the legend of the soil survey report¹. For example, a soil map unit may be listed in the survey report with a single soil series name, whereas the same soil map unit is shown as comprising two or more soil series in Table 1 (sequence numbers 1, 2, 3, ..) Where this occurs, the user should use the multi-named map unit given **here**, and make pesticide selections based on the most limiting condition to be found on the land in question. If necessary, the local Natural Resources Conservation Service office should be contacted to perform an on-site evaluation of the land in question.

REFERENCES

1. Henderson, W.G. Jr. 1984. *Soil Survey of Lee County Area, Florida*. USDA/NRCS in cooperation with University of Florida, Institute of Food and Agricultural Sciences, Agricultural Experiment Stations, Soil and Water Science Department, and the Florida Department of Agriculture and Consumer Services.

1. This document is SL84, a fact sheet of the Soil and Water Science Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Publication date: April 1991, revised September 2006. Please visit the EDIS Web site at <http://edis.ifas.ufl.edu>.
2. G.W. Hurt, National Leader for Hydric Soils, Natural Resources Conservation Service, USDA; T.A. Obreza, Professor, Soil and Water Science Department, Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL 32611.

2. Obreza, T.A. and G. W. Hurt. 2006. *Soil Ratings For Selecting Pesticides For Water Quality Goals*. Circular 959, Soil and Water Science Department, Cooperative Extension Service, University of Florida, Gainesville, Florida, 32611. 5pp.

ACKNOWLEDGMENTS

The development of this document was supported by the USDA/ES Water Quality Initiative Project # 89EWQI-1-9134.

Table 1. Soil Ratings for Lee County (see footnotes for explanations of column headings).

MUID	SYS NUM	MUSYM	SOIL NAME	SOIL LEACH	SOIL RUNOFF
71002	1	2	CANAVERAL	High	Medium
71004	1	4	CANAVERAL	High	Medium
71004	2	4	URBAN LAND	High	Medium
71005	1	5	CAPTIVA	High	High
71006	1	6	HALLANDALE	Medium	High
71007	1	7	MATLACHA	Medium	Medium
71007	2	7	URBAN LAND	Medium	High
71008	1	8	HALLANDALE	Medium	High
71009	1	9	EAUGALLIE	Low	High
71010	1	10	POMPANO	High	High
71011	1	11	MYAKKA	Medium	High
71012	1	12	FELDA	Medium	High
71013	1	13	BOCA	Low	High
71014	1	14	VALKARIA	High	High
71015	1	15	ESTERO	Low	High
71016	1	16	PECKISH	High	High
71017	1	17	DAYTONA	Low	Low
71018	1	18	MATLACA	Low	Medium
71019	1	19	GATOR	Low	High
71020	1	20	TERRA CEIA	Low	High
71022	1	22	BEACHES	High	High
71023	1	23	WULFERT	Low	High
71024	1	24	KESSON	Low	High
71025	1	25	ST. AUGUSTINE	High	Low
71025	2	25	URBAN LAND	High	High
71026	1	26	PINEDA	Low	High
71027	1	27	POMPANO	Medium	High
71028	1	28	IMMOKALEE	Medium	High
71029	1	29	PUNTA	Medium	High
71033	1	33	OLDSMAR	Low	High
71034	1	34	MALABAR	Low	High
71035	1	35	WABASSO	Low	High
71036	1	36	IMMOKALEE	Medium	High
71036	2	36	URBAN LAND	Medium	High
71037	1	37	SATELLITE	High	Low
71038	1	38	ISLES	Medium	High
71039	1	39	ISLES	Medium	High
71040	1	40	ANCLOTE	High	High
71041	1	41	VALKARIA	High	High
71042	1	42	WABASSO	Low	High
71043	1	43	SMYRNA	Medium	High
71044	1	44	MALABAR	Low	High
71045	1	45	COPELAND	Medium	High
71048	1	48	ST. AUGUSTINE	High	Medium
71049	1	49	FELDA	Medium	High
71050	1	50	OLDSMAR	Low	High

Table 1. Soil Ratings for Lee County (see footnotes for explanations of column headings).

MUID	SYS NUM	MUSYM	SOIL NAME	SOIL LEACH	SOIL RUNOFF
71051	1	51	FLORIDANA	Low	High
71053	1	53	MYAKKA	Medium	High
71055	1	55	COCOA	High	Low
71056	1	56	ISLES	Medium	High
71057	1	57	BOCA	Low	High
71059	1	59	URBAN LAND	Medium	High
71061	1	61	ORSINO	High	Low
71062	1	62	WINDER	Low	High
71063	1	63	MALABAR	Low	High
71064	1	64	HALLANDALE	Medium	High
71064	2	64	URBAN LAND	Medium	High
71066	1	66	CALOOSA	Low	Medium
71067	1	67	SMYRNA	Medium	High
71067	2	67	URBAN LAND	Medium	High
71069	1	69	MATLACHA	Medium	Medium
71070	1	70	HEIGHTS	Low	High
71072	1	72	BRADENTON	Low	High
71073	1	73	PINEDA	Low	High
71074	1	74	BOCA	Low	High
71075	1	75	HALLANDALE	High	High
71076	1	76	ELECTRA	Low	Medium
71077	1	77	PINEDA	Low	High
71078	1	78	CHOBEE	Low	High
71079	1	79	WATER		

Footnotes:

MUID = Natural Resources Conservation Service's map unit identifier.

SEQ NUM = Sequence Number, indicating a particular soil name among one or more names constituting a map unit name.

MUSYM = Map Unit Symbol from the soil map and legend in the Soil Survey of Lee County, Florida. Note that if a MUSYM appears more than once in this list it signifies that two or more soils are co-dominant that map unit, and each such soil is rated separately here.

SOIL NAME = Name of soil or other landscape component (urban land, beaches, water, etc.).

SOIL LEACH = The rating of the soil for leaching of pesticides through the soil profile.

SOIL RUNOFF = The rating of the soil for runoff of pesticides from the soil surface.

NOTE: See "Soil Ratings for Selecting Pesticides for Water Quality Goals" (IFAS Extension Circular 959) for explanations of the criteria used to develop soil ratings presented in the right-hand four columns of this list.

MATANZAS PASS PRESERVE

**198 Bay Road
Fort Myers Beach**

LAND STEWARDSHIP PLAN 2006



Approved by Lee County

Board of County Commissioners: 05/02/2006

TABLE OF CONTENTS

Vision Statement	5
Executive Summary	6
I. Introduction & Purpose	7
II. Location and Site Description	9
III. Natural Resources Description	13
A. Physical Resources	13
i. Climate	13
ii. Geology	15
iii. Topography	15
iv. Soils	17
v. Hydrology and Watershed	19
B. Biological Resources	22
i. Ecosystem Function	22
ii. Natural Plant Communities	23
iii. Wildlife Species	28
iv. Listed Species	29
v. Biological Diversity	34
C. Cultural Resources	35
i. Archaeological	35
ii. Land Use History	35
iii. Public Interest	40

IV. Factors Influencing Management	40
A. Natural Trends and Disturbances	40
B. Internal Influences	41
C. External Influences	42
D. Legal Obligations and Constraints	43
i. Permitting and Mitigation Issues	43
ii. Relationship to other plans	43
E. Management Constraints and Coordination	44
F. Public Access and Resource Based Recreation	45
G. Future Acquisition	48
V. Management Action Plan	48
A. Management Units Description	48
B. Goals, Strategies and Projected Timetable	50
VI. Financial Considerations	54
A. Funding	54
B. Staffing	54
VII. Literature Cited	55
VIII. Appendices	57

LIST OF EXHIBITS

Figure 1 Location Map	11
Figure 2 Aerial Photograph	12
Figure 3 Topography Map	16
Figure 4 Soils Map	18
Figure 5 Watershed Map	21

Figure 6	Natural Plant Communities	27
Figure 7	Historical Aerial, 1944	37
Figure 8	Historical Aerial, 1953	38
Figure 9	Historical Aerial, 1958	39
Figure 10	Master Site Plan	47
Figure 11	Management Unit Map	49
Graph 1	Rainfall Comparison Data	14
Table 1	List of Designated Species	30
Table 2	Goals, Strategies and Projected Timetable for Implementation	51

A. APPENDICES

- A. Plant Species List
- B. Wildlife Species List
- C. Storm surge-Coastal High Hazard
- D. The Great Calusa Blueway Map
- E. Projected Costs and Funding Sources Table

Vision Statement

Continued dedication of residents, visitors, and Lee County Parks and Recreation will insure the preservation of the Matanzas Pass Preserve as a tropical island habitat. Guided nature walks, wildlife viewing from the pavilion on the bay, walking trails, and boardwalks will provide educational opportunities in this versatile outdoor classroom. The Matanzas Pass Preserve enhances opportunities for kayaking/canoeing along with bird watching and fishing in the Estero Bay Aquatic Preserve. Through conservation, restoration and maintenance the Matanzas Pass Preserve will remain a peaceful place of rest and tranquility for wildlife and those who visit.

Executive Summary

The Nature Conservancy donated the 58-acre Matanzas Pass Preserve to Lee County in 1994, after twenty years of stewardship. The physical distance of the Nature Conservancy office in Orlando to Fort Myers Beach made long distance management problematic. A volunteer committee, which became the Friends of Matanzas Pass Preserve, was established by The Nature Conservancy to co-manage the preserve and many projects were developed and completed with volunteer staff. When Lee County assumed stewardship of the Preserve, a site analysis was obtained, surveys prepared, and a Restoration Plan, Master Site Plan, and Resource Management Plan were created. This management plan is a revision and update of the 1996 plan. Since 1996, new recycled plastic boardwalks replaced deteriorated wooden boardwalks and interpretive signs were placed in the preserve with support from the Lee County Visitors Convention Bureau and the Tourist Development Council. Exotic removal began and was effective on air potato, Australian pines, and Brazilian peppers.

The Matanzas Pass Preserve is one of a few undeveloped, protected areas in the developed town of Fort Myers Beach on Estero Island. Walking the preserve boardwalk and trails offers a rare opportunity to view the flora and fauna of a mangrove forest and maritime oak hammock from within. The acquisition of the Matanzas Pass Preserve has insured its protection and preservation for present and future generations of residents and visitors.

Land Stewardship Plans are fluid and change through environmental influences, use changes, and population growth. Many of the issues addressed in the 1996 management plan are the same today - maintenance, exotic pest plant control, and restoration. Many issues evolve over time - resource based uses, carrying capacity, and educational programming.

Revisions to the 1996 plan include: updating surveys, plant community maps, and fauna list and creating management units, management goals, and strategies. Implementation timetables and standards to measure the achievements are included in an easy to read table. Incorporating a vision statement and action plan with this revised plan as well as updated aerial photographs, site plan, and management unit map brings the preserve information up to date.

I. Introduction & Purpose

The Matanzas Pass Preserve (MPP) is located in southwestern Lee County on the seven-mile long island of Estero, in the town of Fort Myers Beach. The 58 acre preserve runs along Matanzas Pass which links San Carlos Bay and Estero Bay, the first aquatic preserve in the state of Florida. The preserve is accessible from Bay Road and ends in a small parking area in front of the Historic Cottage. Three natural plant communities make up the preserve: mangrove swamp, maritime hammock and coastal grassland. The natural plant communities and shady hammock support a variety of wildlife on land and in the estuary.

The efforts of many people, both residents and visitors, have played a part in the acquisition of this parcel of property. Calusa Indians, homesteaders Robert Gilbert and George McAuley, Dr. and Mrs. Winkler, Martha Redd, nature photographer John Dunning, The Nature Conservancy and Lee County Government all are responsible for the preservation of the Matanzas Pass Preserve. The Winkler's came to Estero Island in 1912 by boat and bought 50 acres of land from Robert Gilbert and another 25 acres of land from homesteader George McAuley, which gave them the parcel of property from the Gulf of Mexico to Matanzas Pass including the Preserve area. Dr. Winkler built the two-story Beach Hotel and pier on the Gulf of Mexico by barging lumber to Estero Island.

The Winklers hired Martha Redd to care for them as they aged and when they passed on in 1938, she inherited the property on the bay side of Estero Boulevard in its pristine condition. As the development boom was beginning, Martha Redd was under pressure to sell her large parcel of land. For 36 years Martha had lived on the land in the area of the Matanzas Pass Preserve with little improvement and was criticized for living in a jungle. In 1974 Martha Redd's nieces and nephews inherited the land and were interested in selling it for development. Local residents, realizing the importance of acquiring this land, spearheaded grass roots fund raisers to secure the option to buy.

Nature photographer and island residents, John and Harriett Dunning, purchased 43 acres of the then believed to be 55 acres of the Martha Redd estate for \$125,000.00 in October 1974. Mr. Dunning donated 22 acres to The Nature Conservancy, keeping one acre for himself, and offered to sell

the rest of the property to the residents for \$105,000.00. Through tremendous grass-root efforts residents and visitors raised the money to buy the remaining acres and completed the purchase two years later. With this goal achieved, The Nature Conservancy was given possession of the Matanzas Pass Preserve in 1977 to insure that this area would be properly managed and remain in conservation. A local volunteer committee was established to oversee the property.

The Preserve has historically been referred to as a 42-acre site either due to early surveying techniques or to the area being estimated in size. The Preserve now stands at 58 acres due to corrections made with modern technology in surveying and the donation of approximately one acre of land from the School District of Lee County to the Lee County Board of County Commissioners in 1995. These out parcels can be seen in figure 2: Matanzas Pass Preserve 2005 Aerial.

Clearing paths, hauling debris, building an elevated boardwalk with bridges, placing benches, and trimming vegetation began in 1977 with volunteers including students from teacher Bill Hammond's Environmental Education Program - the Monday Group, from Lee County Schools, and Boy Scout Troops. The Fort Myers Beach Rotary Club built the Rotary Pavilion on the bay, Estero Island Garden Club landscaped the entrance and Lois Gressman, an original member of the Friends group, wrote a trail guide. The Nature Conservancy officially opened the Preserve with a ribbon cutting ceremony January 20, 1979 and the title, Matanzas Pass Wilderness Preserve.

In June 1992, vandals destroyed the main bridge causing the closing of the Preserve. The Nature Conservancy held a meeting September 15, 1992 to investigate management alternatives. After exploring possibilities, The Nature Conservancy donated the property to Lee County in 1994 to insure proper future management and protection of the natural resources. The title of the Preserve was changed to reflect the possible discrepancy of the term "wilderness" and that which the site represents.

In 1995, the School District of Lee County donated an acre of land to serve as an entrance for the preserve, provide parking, and to house the Historic Davison Cottage, the fourth house built on Fort Myers Beach, and to serve as an information area for the preserve. This addition of land gave the Preserve a public access. Americorps volunteer Yih-Ming Hsu completed

the Matanzas Pass Preserve Restoration Plan, Master Site Plan and Resource Management Plan in 1996 for Lee County Division of Parks and Recreation.

Land stewardship for the preserve continues to be a challenge. The upland area and mosquito control ditch spoil piles are invaded with exotics species in the southeast and southwest sections. Boaters and careless visitors contribute to the constant need for litter control. Human disturbances from bicycles and pets occur as well as unwanted, destructive, and irresponsible behavior. Many wading birds and listed species utilize the preserve. A balance is needed between the natural resources and the resource based recreational opportunities this preserve can provide. Limiting the Preserve to pedestrian traffic on trails only, no bicycles or motorized vehicles, and control of unauthorized use along with education for preservation will go a long way to achieving balance.

The purpose of this stewardship plan is to revise the 1996 plan, and to define the conservation, restoration, and preservation goals for the Matanzas Pass Preserve. It is a guide to support the best management practices for Lee County's Department of Parks and Recreation.

II. Location and Site Description

Matanzas Pass Preserve is located in southwestern Lee County, Sections 19-20, Township 46 South, Range 24 East on the island of Estero, south of Sanibel Island and north of Bonita Beach and consists of 58 acres. The Preserve runs along Matanzas Pass, the body of water connecting San Carlos Bay and Estero Bay. The main entrance to the preserve is located on Bay Road off Estero Boulevard in the Town of Fort Myers Beach, Lee County and is an estimated 1.1 miles southeast of the Matanzas Pass Bridge. The north-northeast boundary of the preserve is Matanzas Pass; the south and southeast boundaries border the subdivisions of Shell Mound Park and Zimmer's Addition to Shell Mound Park, Donora Boulevard. The south and southwest boundary are adjacent to the Red Coconut RV Park, Gulf View Colony, Borton's Subdivision, Nature View Court, Fort Myers Beach Elementary School and Lee County's Bay Oaks Recreation Center; the western boundary is the man-made canal along Tropical Shores Way. (Figures 1 & 2)

Many preserves and wildlife sanctuaries are located in the region. Little Estero Critical Wildlife Area is located 4.5 miles to the south and Bowditch

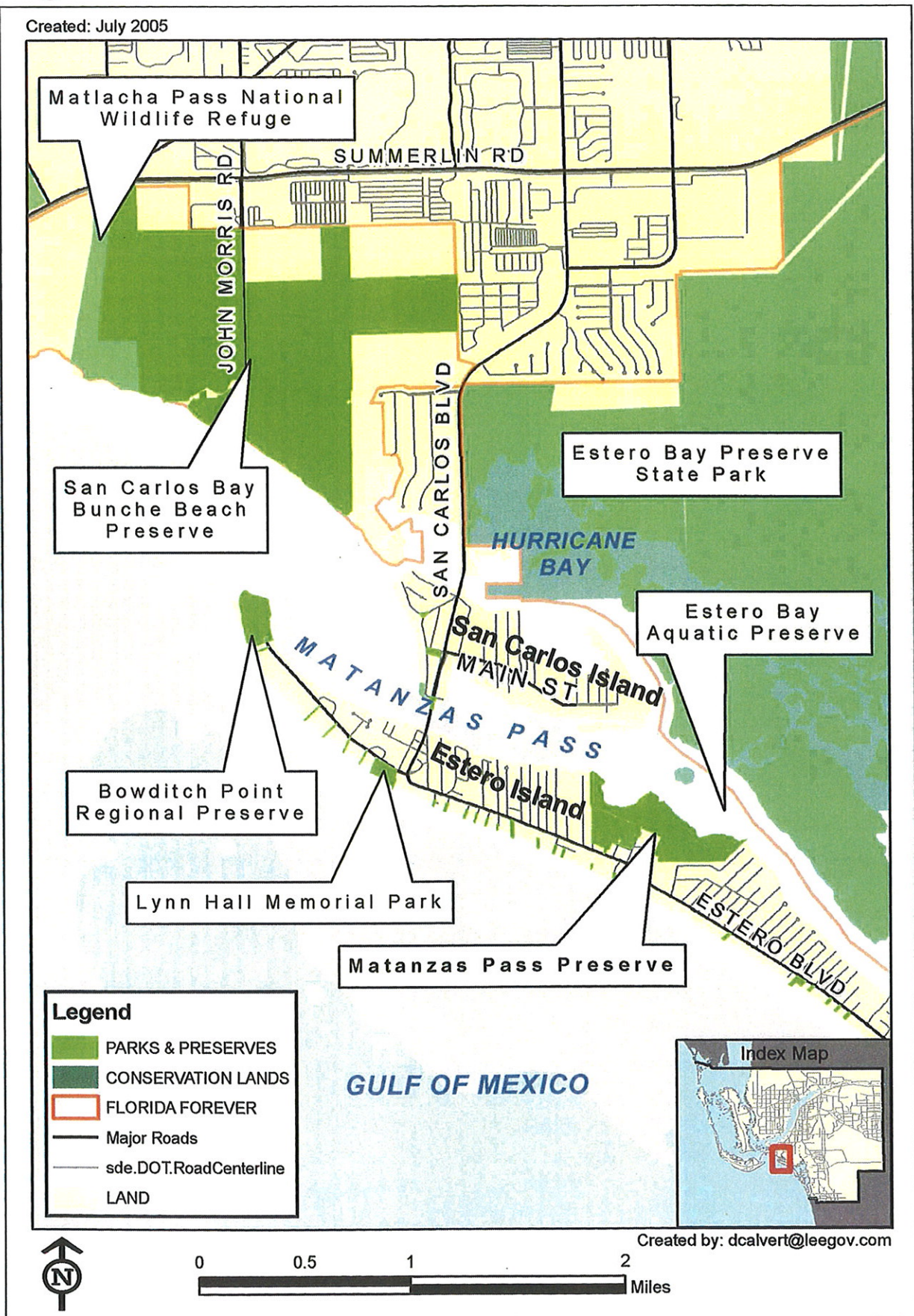
Pointe Regional Preserve is located 1.5 miles to the north. On the mainland to the west is San Carlos Bay –Bunche Beach Preserve located on John Morris Road and J.N. “Ding” Darling National Wildlife Refuge is located on Sanibel Island.

The Preserve consists of three native plant communities: tidal swamp, maritime hammock, and coastal grassland. (Figure 6). These community designations are based upon Florida Natural Areas Inventory’s Guide to the Natural Communities of Florida (Florida State University 1990) (www.fnai.org).

Figure 2: Matanzas Pass Preserve 2005 Aerial



Figure 1: Matanzas Pass Preserve Location Map



III. Natural Resources Description

A. Physical Resources

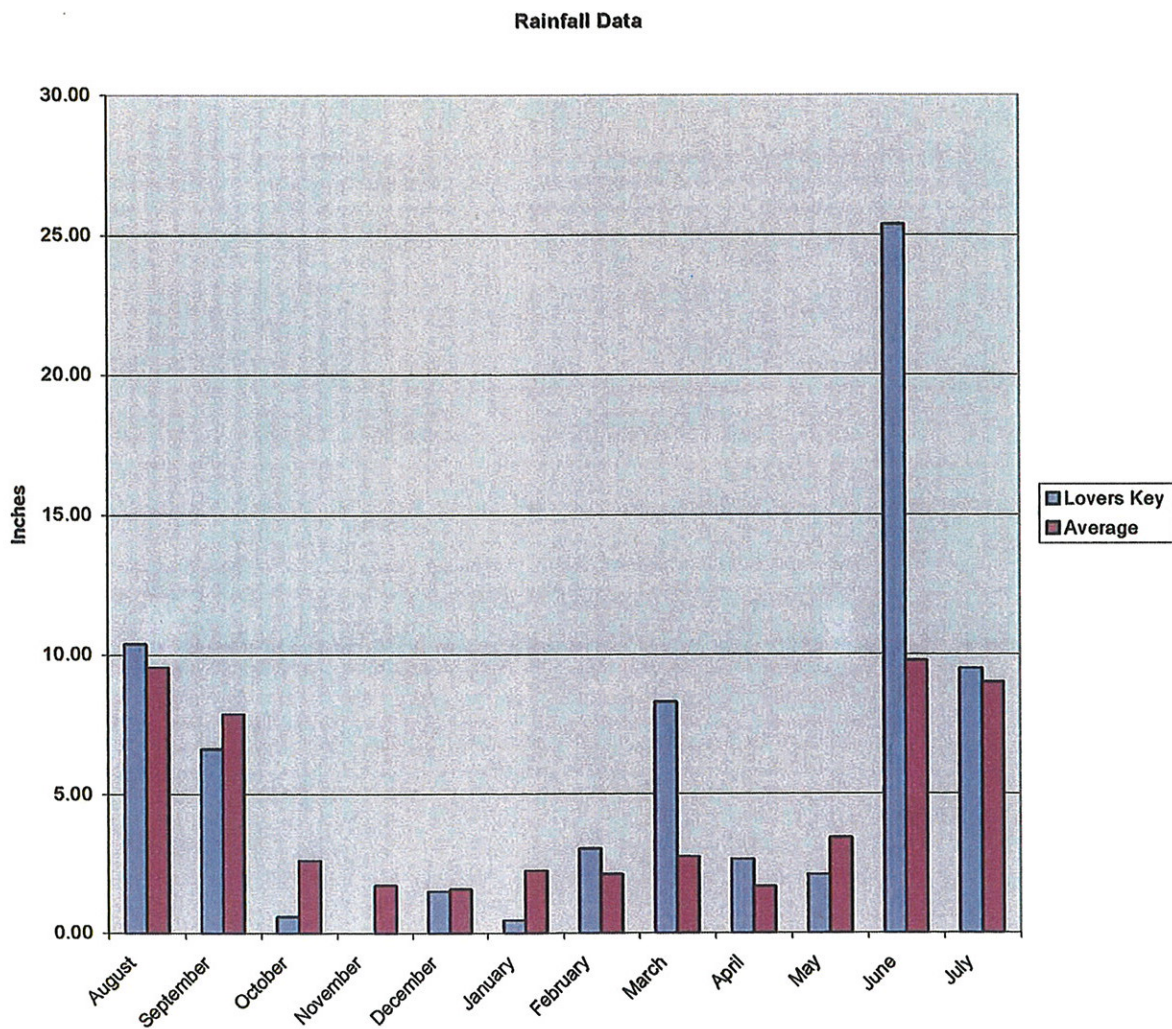
i. Climate

Southwest Florida has a humid, sub-tropical climate due to its maritime influence from the Caribbean Sea and the Gulf of Mexico, with temperature trends linked to its latitude and proximity to these bodies of water. Four seasons occur in Florida if only with slight changes. The seasons influence the weather by length of daylight, precipitation, sea breeze, storm fronts, and extreme events, such as hurricanes and tropical storms. Winters are mild with an average temperature of 65 degrees Fahrenheit, but the jet stream can bring in cool air and freezes. The summer mean monthly temperature is 91 degrees Fahrenheit with high humidity. Average relative humidity in mid-afternoon is about 50 to 60 percent. Humidity is higher at night and the average dawn humidity is about 80 percent.

Rainfall data has not been collected for this Preserve. However, annual rainfall averages 54.7 inches at Lakes Regional Park; a Lee County facility located approximately 5 miles northeast of the Preserve. Additionally, the average annual rainfall at the Sanibel-Captiva Conservation Foundation (SCCF), located on Sanibel Island approximately 7.5 miles west of the Preserve, is 46.59 inches. Total annual rainfall for Lee County is 54.19 inches and in 2004 the average rainfall was 61.92 inches, due to an active hurricane season. 2004 data was collected last year at Lovers Key State Park, five miles south of the Matanzas Pass Preserve and is included in the graph. On average, 60 percent of the rain falls June through September. Afternoon thunderstorms occur during the wet season and help to modify the summer temperature. The entire Preserve lies within Lee County's Coastal High Hazard Area (Appendix C) and is vulnerable to both tropical storms and hurricanes from June to November. The Rainfall Data Graph depicts southwest Florida's typical dry winter and summer rainy season.

Graph 1

Average Lee County rainfall over a 30-year period in inches is depicted with the dark red bars and the August 2004 to July 2005 rainfall data in inches is depicted with blue bars. The 2004-2005 data was collected at Lovers Key State Park, five miles south of the Matanzas Pass Preserve.



ii. Geology

Barrier Island Geology

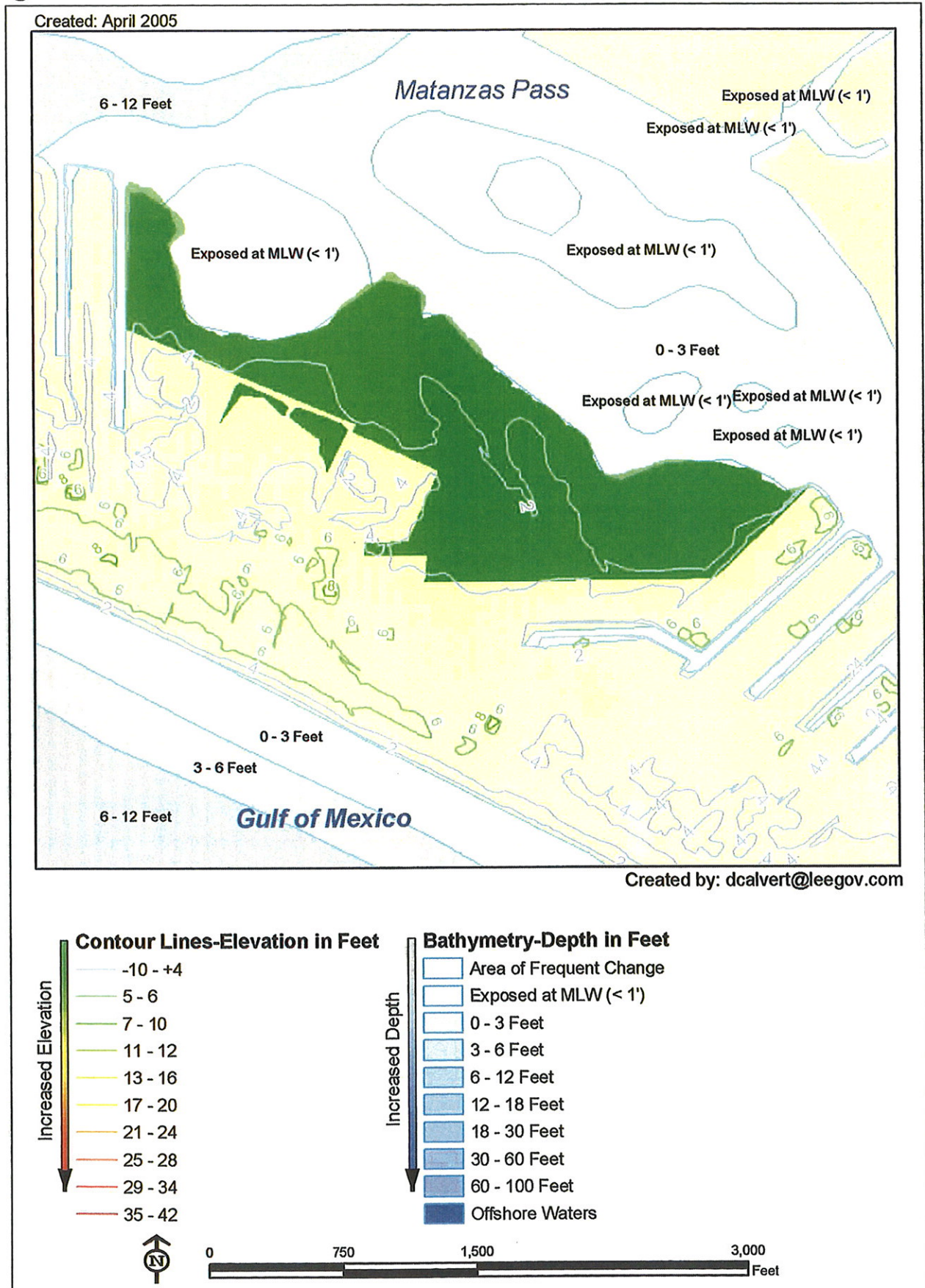
Barrier islands are linear islands of sand that parallel coastlines. They are thought to have been formed in three ways: by the growth of spits from headlands and their subsequent breaching by inlets; by the emergence of underwater shoals; and by the drowning and isolation of mainland dunelines as sea level rose (Schwartz, 1971).

Florida's peninsular Gulf of Mexico barrier islands occur on "highs" in the underlying Pleistocene surface (Johnson and Barbour, 1991). This Pleistocene is of the Anastasia Formation and consists of limestone, sand, and clay (Brown, et al. 1991). The islands bounding Estero Bay are essentially sedimentary deposits that were carried by longshore currents. These deposits originate from sediments deposited at the mouths of rivers and creeks, including the Caloosahatchee River, when rising sea levels flooded this area approximately 5,000 years before present (Johnson and Barbour, 1991).

iii. Topography

The slope of the site ranges from zero to four feet in elevation (Figure 3). A majority of the site falls between zero and two-feet in elevation as the mangrove swamp rises out of Matanzas Pass. When the intertidal zone of Matanzas Pass is exposed at mean low water level, a feeding area is created for resident avian life. Within the Preserve, the elevation reaches four feet as the site approaches the south-southeast and south-southwest boundaries and the land slopes upward. This slight change in elevation makes possible the change in community from a mangrove swamp to a maritime hammock and a small portion of coastal grassland. All elevations are based on the National Geodetic Vertical Datum (NGVD).

Figure 3: Matanzas Pass Preserve Topography Map



iv. Soils

Soils in the Preserve are identified as Entisols and Histosols. Level, poorly drained coastal marshes and swamps of variable-textured mineral and organic materials subject to frequent tidal flooding can dominate these soils. Ecosystems include mangroves, salt marshes, and maritime forests. Primarily used for recreation and wildlife (Ecosystems of Florida, 1990) (Figure 4).

The northern sections of the Preserve consist of Kesson Fine Sand. This is a nearly level, very poorly drained soil in broad tidal swamps, with areas subject to tidal flooding. Slopes are smooth and range from 0 to 1 percent. Natural vegetation consists of black mangrove (*Avicennia germinans*), sea ox-eye daisy (*Borrchia arborescens*), and red mangrove (*Rhizophora mangle*) (USDA/SCS 1984).

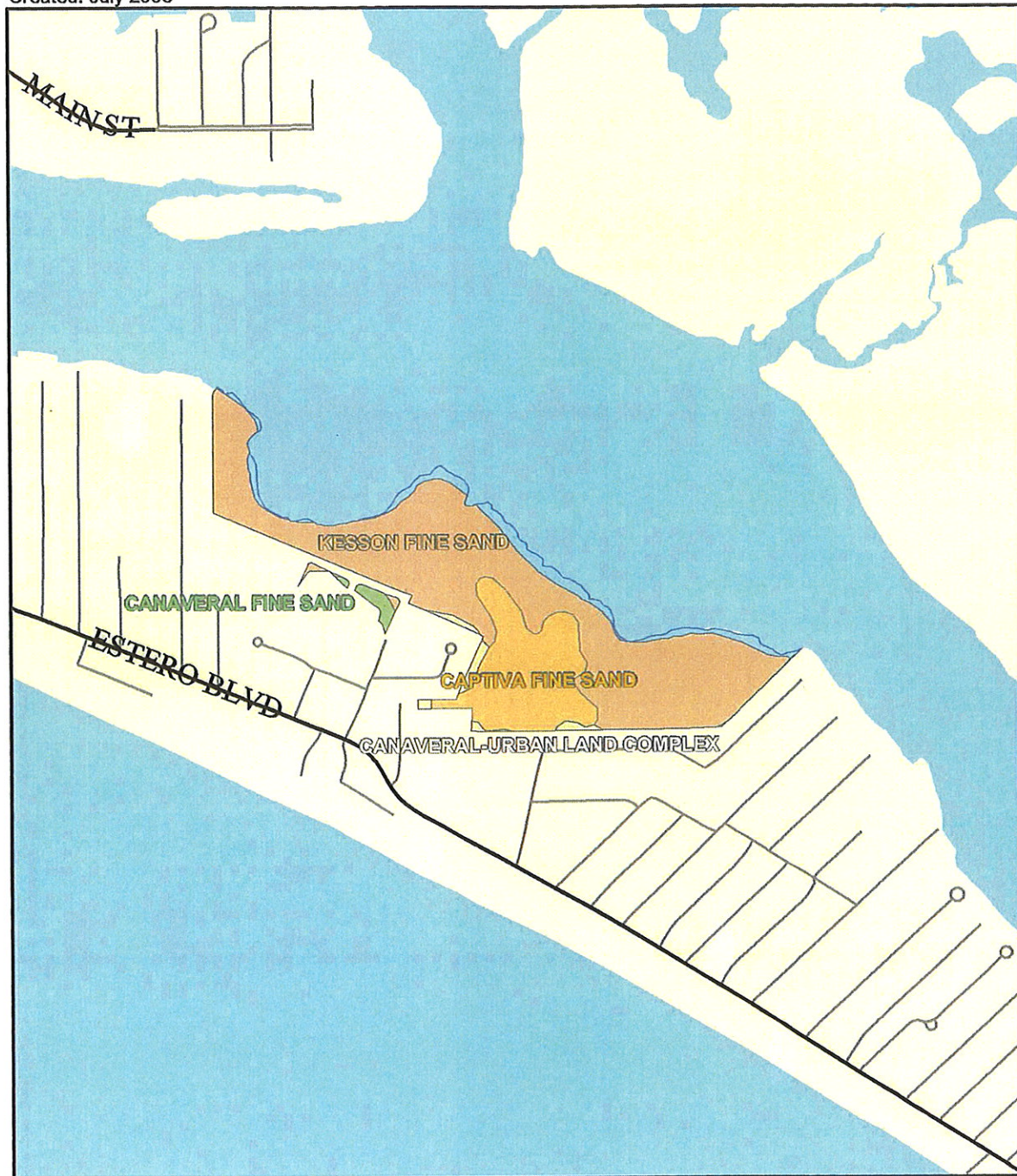
Canaveral fine sand, in the southwestern portion of the preserve, includes small areas (less than ten percent) of Captiva and Kesson soils and is described as nearly level, moderately well drained and somewhat poorly drained soil in low ridges. Slopes are smooth to slightly convex, ranging from zero to two percent. Natural vegetation includes cabbage palm (*Sabal palmetto*), seagrass (*Coccoloba uvifera*), wild coffee (*Psychotria nervosa*) and an understory of vines and herbaceous plants (USDA/SCS 1984).

Captiva fine sand makes up a southeastern central portion of the Preserve. This is nearly level, poorly drained soil in sloughs. Slopes are smooth to concave and range from zero to one percent. Natural vegetation consists of cabbage palm, sand cordgrass (*Spartina bakeri*), leather fern (*Acrostichum danaeifolium*), and wax myrtle (*Myrica cerifera*) (USDA/SCS 1984).

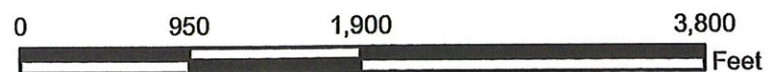
Canaveral-Urban Land Complex soil makes up a limited area of the southern border of the Preserve where homes are located. This complex consists of Canaveral fine sand and areas of Urban land. The Canaveral soil and Urban land are so intermingled that they cannot be separated on the scale used for mapping (SDA/SCS 1984) (Figure 4).

Figure 4: Matanzas Pass Preserve Soils Map

Created: July 2005



Created by: dcalvert@leegov.com



1 inch equals 1,000 feet

v. Hydrology and Watershed

Over three quarters of the Preserve consists of mangrove swamp that is influenced by tidal flow and fresh water run off. The tides bring relatively clean water to the mangroves, and in turn, flush out accumulations of hydrogen sulfide and salts. The mangrove swamp also filters nutrients such as phosphorus and nitrogen from terrestrial runoff, which help to buffer the estuary from water pollution.

The construction of mosquito control ditches in the late 1950's has impacted the site. When the ditches were dug the spoil piles were left on the sides of the ditches creating dirt mounds that prevent natural water flow and increased the area of mangrove habitat. The ditches generally run through the site from northeast to southwest and northwest to southeast, an estimated 6,440 feet in length. Approximately half of the ditching occurs in the submerged mangrove areas where hydrological impacts may not be noticeable.

Matanzas Pass Preserve is located within the Greater Charlotte Harbor Watershed. The Greater Charlotte Harbor Watershed extends over an area of 4,400 square miles. At its northern end, the Peace River basin begins in Polk County near Lakeland with the Myakka River basin starting to the east in Manatee County until it winds and meanders to meet the north side of the Charlotte Harbor. To the south Pine Island Sound and Matlacha Pass connects Charlotte Harbor to the tidal Caloosahatchee River and Estero Bay in Lee County.

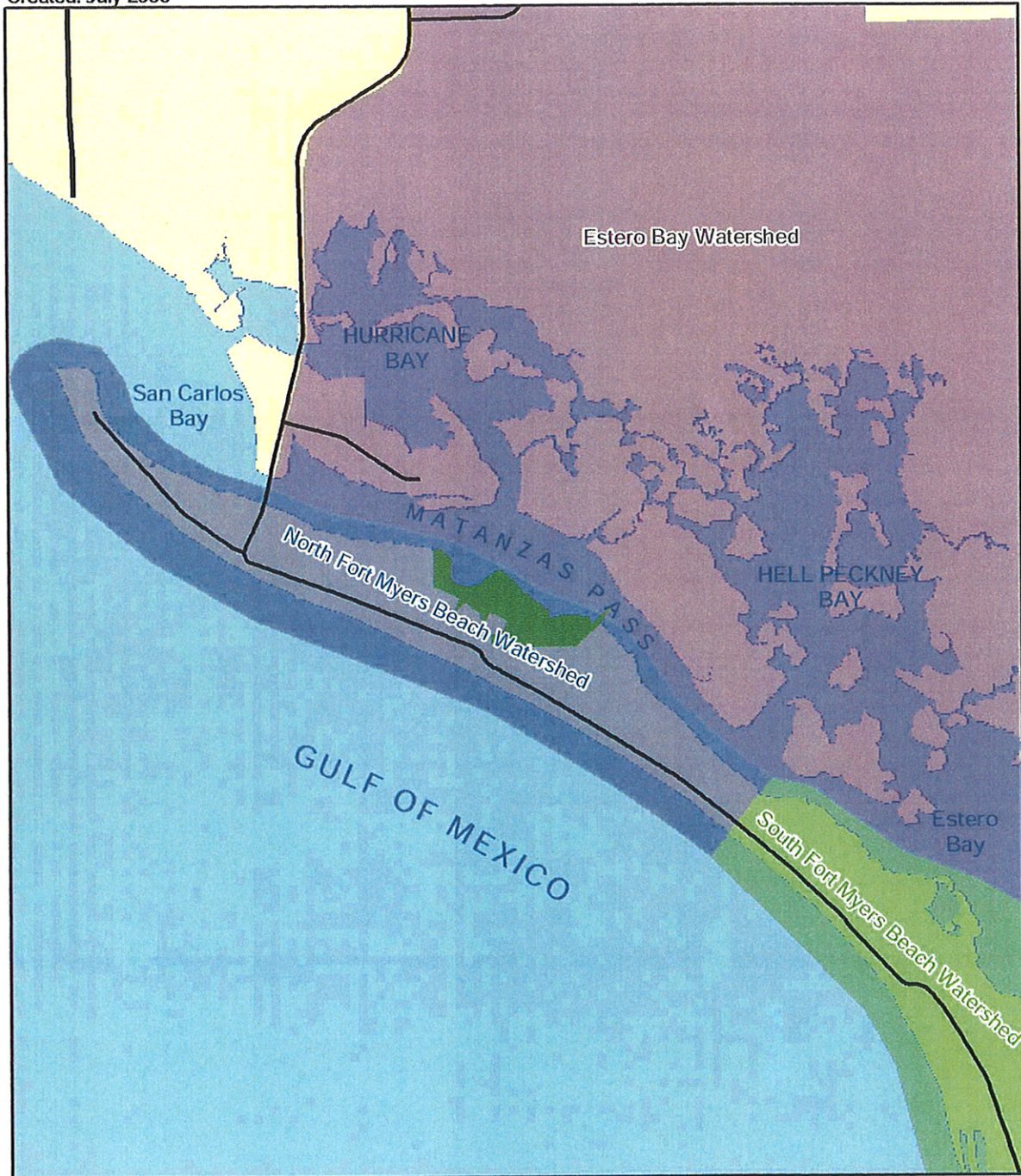
The area south of the Caloosahatchee River mouth, including San Carlos Bay and Matanzas Pass forms the northern boundary of the Estero Bay estuary. Protected on the west by a barrier island chain including the Town of Fort Myers Beach and Bonita Beach, the estuary stretches southeast to the mouth of the Imperial River at the county boundary.

The 300 square mile Estero Bay Watershed includes Ten Mile Canal, Hendry Creek, Mullock Creek, Estero River, Spring Creek, Imperial River, Estero Bay, Hurricane Bay, Hell Peckney Bay, and the waterway known as Matanzas Pass.

This watershed divides near central Fort Myers Beach to become the North Fort Myers Beach Watershed and the South Fort Myers Beach Watershed with the Matanzas Pass Preserve being located in the former. This watershed is subject to storm water runoff, tidal, and storm surge influences that affect the island (Figure 5).

Figure 5: Matanzas Pass Preserve Watershed

Created: July 2005



Created by: dcalvert@leegov.com



Legend

Major Roads

Matanzas Pass Preserve

Watersheds

Estero Bay Watershed

North Fort Myers Beach Watershed

South Fort Myers Beach Watershed

0 0.5 1 2 Miles

B. Biological Resources

i. Ecosystems Function

Flood storage and desynchronization is the process by which wetland basins store and gradually release peak water flows from precipitation or upland runoff. Wetlands that perform this function may provide significant flood control services to nearby communities. Coastal wetlands also store flood waters, thus reducing the flood impact of major storms (Scodari, 1990). The 17.4 acres of maritime hammock and 2.9 acres of coastal grasslands in the Preserve have a lower elevation than that of the immediate surrounding community. This enhances the ability of the Preserve to retain and dissipate runoff from rain and small storms. Storm magnitude and duration are factors that will affect this function.

Shoreline anchoring is the process by which the root system of wetland vegetation stabilizes soil at the water's edge and enhances the accretion of soil and/or peat at the shoreline. Dissipation of erosive forces is the process by which wetland vegetation diminishes the erosive impact on soil by waves, currents, and general water level fluctuations. These wetland functions protect both natural resources and man-made structures by inhibiting shoreline erosion and the creation of eroded sediments that can cause siltation of navigable waterway. Larger wetlands with extensive, persistent vegetation (e.g., forested wetlands) are probably the most effective at dissipating erosive forces

(Scodari, 1990). The 37.7 acre of tidal swamp community provides this function with a forest of red, black, and white mangroves (*Laguncularia racemosa*), and buttonwoods (*Conocarpus erectus*) which dissipate wave energy and anchor soil with their intertwined root system.

Nutrient retention is the process by which wetlands store nutrient waste, such as phosphorus and nitrogen, within their soil and vegetation. Nutrient removal is the process by which wetlands release these retained wastes. More study is necessary to determine the exact role that wetlands play in improving water quality. For example, no literature suggests general criteria for measuring levels of wetland nutrient retention (Scodari, 1990). It is believed that all wetlands serve as nutrient traps to varying degrees. The Preserve is a 58 - acre nutrient trap, serving the Estero Bay Watershed.

The aquatic food chain support function refers to the direct and indirect use of the wetland-derived nutrients by fish and shellfish. This function is known to be important to the production of commercial and sport estuarine fish and shellfish (Scodari, 1990). The detritus material that is produced from the 37.7 acres of tidal swamp community is flushed to areas where fish and aquatic invertebrates can consume it directly or indirectly, or it can be consumed by organisms present near the point of production.

Fisheries habitat support function refers to the "physical and chemical factors, which affect the metabolism, attachment, and predator avoidance of the adult or larval forms" (P. Adamus & L. Stockwell). This function is widely recognized as important; wetlands provide both nursery grounds and food for many species of freshwater and saltwater fish. Most commercial saltwater fish and shellfish depend on coastal estuaries and their wetlands for spawning grounds and nurseries (Scodari, 1990). A total of 37.7 acres of mangrove root systems in the Preserve provide cover, food, and water quality through sediment settlement (turbidity) for larval, juvenile, and adult fish.

Wildlife habitat support is the provision of environmental features that supply food and shelter needs of birds, mammals, and other wildlife. This function gives people the opportunity to engage in bird watching, hunting and other wildlife-oriented recreational activities. Factors affecting a wetland's wildlife support function include availability of cover and freedom from disturbance; availability of food; and availability of specialized habitat needs (Scodari, 1990).

The 58 acres of the Matanzas Pass Preserve is devoted to creating wildlife habitat that provides cover and food availability as well as specialized habitat needs such as coastal grass lands, standing snags, and fruit bearing vegetation for the wildlife population. To prevent disturbances to wildlife no bikes, motorized vehicles, or pets are allowed in the Preserve.

ii. Natural Plant Communities

Florida Natural Areas Inventory's Guide to the Natural Communities of Florida (Florida State University, 1990)(Figure 6) ranks natural areas as significant on a Global (G) or State (S) basis and numerically from 1 to 5 including an uncertain rank marked by a question mark (?). A rank of 1

designates an area as critically imperiled (G1-S1) and a rank of 5, (G5 -S5) as demonstrably secure, although it may be quite rare in part of its range. The three native plant communities of the Matanzas Pass Preserve are ranked as follows:

G3 S3 Tidal Swamp

G4 S3 Maritime Hammock

G3 S2 Coastal Grassland

Definitions of Global (G) element ranks:

G3 = Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range or because of other factors making it vulnerable to extinction throughout its range, 21 to 100 occurrences;

G4 = Apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery;

Definition of State (S) element ranks:

S2 = Imperiled in state because of rarity (6-20 occurrences or little remaining area) or because of some factor(s) making it very vulnerable to extinction throughout its range;

S3 = Rare or uncommon in state (on the order of 21 to 100 occurrences).
Plant species list can be found in Appendix A.

Tidal Swamp Community - 37.7 acres, 65 % of MPP

The northern boundary along Matanzas Pass is vegetated with red mangrove, black mangrove, white mangrove and buttonwood. Typically these species occur in zones defined by varying water level determined by land elevation. Exceptions are seen in the Matanzas Pass Preserve. Red mangroves usually occupy the lowest zone along the shoreline and in the water, black mangrove the intermediate zone a slight increase in land elevation, and white

mangrove and buttonwood share the highest zone. On the mangrove boardwalk, observing red and black mangroves in the same area is not unusual and at times white mangroves, black mangroves and buttonwood occur in the same area.

Other plants associated with Tidal Swamps and seen in the preserve are glasswort (*Salicornia spp.*), sea purslane (*Sesuvium portulacastrum*), saltwort (*Batis maritima*), and sea oxeye. Unconsolidated substrates are usually found in the sub tidal regions surrounding tidal swamps. The Matanzas Pass Preserve supports healthy areas of subtidal, intertidal, and supratidal zones which make up the unconsolidated substrate. The Preserve helps to protect other inland communities by absorbing the brunt of tropical storms and hurricanes.

The condition of this community is good. Invasive exotic plants were treated in December 2004, and are limited to the mosquito ditch berms dug in the 1950's. This area will continue to be monitored and treated as needed in the future for exotic pest plants. Volunteer workdays and designated coastal clean up dates will target this area of the Preserve to have litter removed as trash washes in with the tides and storms.

Maritime Oak Hammock Community - 17.4 acres, 30 % of MPP

Upland parts along the south border and central area of the Preserve are vegetated with live oak (*Quercus virginiana*), cabbage palm, sea grape, strangler fig (*Ficus aurea*), saw palmetto (*Serenoa repens*), beauty berry (*Callicarpa americana*), poison ivy (*Toxicodendron radicans*), coral bean (*Erythrina herbacea*), coontie (*Zamia integrifolia*), and rouge-plant (*Rivina humilis*). Maritime hammocks occur on old coastal dunes that have been stabilized long enough for the growth of a forest as seen in the 1944 aerial.(Figure 7). The oaks and palms of the Preserve support a variety of epiphytes such as golden polypody (*Polypodium aureum*), resurrection fern (*Polypodium polypodioides*), ball moss (*Tillandsia recurvata*), Spanish moss (*Tillandsia usneoides*), and shoestring fern (*Vittaria lineata*). Nutrient recycling is generally accomplished by detrital organisms instead of by fire. Maritime hammocks are used by migrating birds for food and shelter following trans-oceanic or trans-gulf migrations. Maritime hammocks originally occurred in continuous bands on barrier islands but are now

dissected into short strips by development and are rapidly disappearing. The Matanzas Pass Preserve is surrounded by development. (Figure 6)

This community is at maintenance level for invasive exotic vegetation since Lee County took possession. Clean up events, Lee County Staff, and the Friends of the Matanzas Pass Preserve keep this area litter and exotic plant free.

Coastal Grassland Community – 2.9 acres, 5 % of MPP

In the very southern portion of the Preserve is a section called the restoration area because it is in the process of being restored to its former community. Here the elevation increases slightly and a small coastal grassland exists. Characterized by the gently undulating land scattered with small clumps of trees and shrubs. Typical plants include beach morning glory (*Ipomoea stolonifera*), sea oxeye, sand spurs (*Cenchrus spp.*), crowfoot grass (*Dactyloctenium aegyptium*), prickly pear cactus (*Opuntia spp.*), wax myrtle (*Myrica cerifera*), and groundsel bush (*Baccharis spp.*). Coastal grassland is a low flat area behind fore dunes that is found on broader barrier islands, capes, spits, and is best developed along the Gulf Coast. The old fore dune line on Fort Myers Beach lies to the north of present day Estero Boulevard just to the south of the Preserve boundary. It may be flooded by saltwater and covered with sand and debris during major storms. With time, these areas become vegetated with pioneer species, eventually taking on characteristics similar to prairie.

If no major storms occur to renew the process, coastal grasslands will often be colonized by shrubs and trees and eventually may succeed to coastal strand or flatwoods (Figure 6).

Invasive exotics are being removed in this area and the Friends of Matanzas Pass Preserve have obtained funding from the Charlotte Harbor National Estuary Program to restore this area with wax myrtle, sea oxeye, beautyberry (*Callicarpa americana*) and white indigoberry (*Randia aculeata*).

Figure 6: Matanzas Pass Preserve Natural Plant Communities



iii. Wildlife Species

The two types of tidal swamps in the Preserve are over wash swamps, found on islands that are frequently inundated by tides, and narrow fringe swamps, located along waterways. These communities are significant because they function as nursery grounds for most of the state's commercially and recreationally important fish and shellfish. This natural area is also the breeding grounds for a substantial population of wading birds, shorebirds, and other animals. The continuous shedding of mangrove leaves and other plant components produce as much as 80% of the total organic material available in the aquatic food web.

Typical animals that rest, forage, or nest in the Preserve are mangrove water snake (*Nerodia clarkia compressicauda*), brown pelican (*Pelecanus occidentalis*), osprey (*Pandion haliaetus*), bald eagle (*Haliaeetus leucocephalus*), herons (*Ardea*), egrets (*Egretta*), and raccoons (*Procyon lotor*).

Tidal swamp grades into the maritime hammock with hardwood forest and dense understory. This area of the Preserve is centrally located and at a slightly higher elevation from the tidal swamp area, providing good habitat and foraging area for yellow rat snakes (*Elaphe obsoleta quadrivittata*), gray squirrel (*Sciurus carolinensis*), raccoon, opossum (*Didelphis virginiana*), blue jay (*Cyaocitta cristata*), northern cardinal (*Cardinalis cardinalis*), and pileated woodpecker (*Dryocopus pileatus*).

The smallest area in the preserve is the coastal grassland and has the largest number of private residences for neighbors, the highest natural elevation, and the most open space. Habitat for marsh rabbit (*Sylvilagus palustris*), butterflies, red-shouldered hawk (*Buteo lineatus*), American kestrel (*Falco sparverius*), and box turtle (*Terrapene carolina*) is unique to this area.

A Wildlife Species List can be found in Appendix B. As staff explores the preserve monthly the FNAI field reports for rare animal and plant species will be consulted and filled out if applicable. These can be found in the Land Stewardship Operations Manual

iv. Listed Species and their Designation

Providing habitat for a wide range of animals may protect designated species included on Florida's Endangered Species, Threatened Species, and Species of Special Concern document maintained by Florida Fish and Wildlife Conservation Commission in accordance with Rules 68A-27.003, 68A-27.004 and 68A-27.005 respectively Florida Administrative Code (F.A.C.) as well as those listed by the federal government in the Endangered Species Act.

Maintaining the native biological communities will benefit all species and proper stewardship practices in the Preserve will ensure protection of designated species. Management practices in the Preserve include the control of exotic plants and litter, wildlife monitoring, restoring native plants to areas cleared of exotic plants, and enforcement of unacceptable behavior in the Preserve such as camping, biking, motorized vehicles, weapons, and pets.

Table 1 documents designated species that occur in the Preserve. Many other species inhabit the Preserve as well (Appendix B). Following the list and key to abbreviations and notations is a brief summary of a few of the species, why they are in decline and management measures that will take place to protect them in the Matanzas Pass Preserve.

Table 1

Listed Species Found at Matanzas Pass Preserve and their designated status

Common Name	Scientific Name	FWC	USFWS	Occurrence
Reptiles				
American alligator	<i>Alligator mississippiensis</i>	SSC (1,3)	T (S/A)*	confirmed
Gopher tortoise	<i>Gopherus polyphemus</i>	SSC (1,2,3)		confirmed
Birds				
Brown pelican	<i>Pelecanus occidentalis</i>	SSC (1)		confirmed
Reddish egret	<i>Egretta rufescens</i>	SSC (1,4)		confirmed
Snowy egret	<i>Egretta thula</i>	SSC (1)		confirmed
Little blue heron	<i>Egretta caerulea</i>	SSC (1,4)		confirmed
Tricolored heron	<i>Egretta tricolor</i>	SSC (1,4)		confirmed
White ibis	<i>Eudocimus albus</i>	SSC (2)		confirmed
Osprey	<i>Pandion haliaetus</i>	SSC (1,2)		confirmed
Roseate spoonbill	<i>Platalea ajaja</i>	SSC (1,4)		expected
Bald eagle	<i>Haliaeetus leucocephalus</i>	T	T	expected
Peregrine falcon	<i>Falco peregrinus</i>	E		expected
Mammals				
Florida manatee	<i>Trichechus manatus latirostris</i>	E	E	confirmed
Plants				
Golden leather fern	<i>Acrostichum aureum</i>	T	E	confirmed
Joe wood	<i>Jacquinia keyensis</i>	T		confirmed
Wild cotton	<i>Gossypium hirsutum</i>	E		confirmed

Key to Abbreviation and Notations

FDA	= Florida Department of Agriculture & Consumer Services
FWC	= Florida Fish and Wildlife Conservation Commission
USFWS	= United States Fish and Wildlife Service
E	= Endangered
T	= Threatened
SSC	= Species of Special Concern
T (S/A)*	= Threatened/Similarity of Appearance to a Threatened Taxon in the Entire Range

Below is a brief description of a few of the species listed in Table 1, as well as management recommendations for the Matanzas Pass Preserve in regard to the needs of these species.

American Alligator

The best know reptile in Florida was once on the way to extinction due to habitat destruction and a market for hunting hides. Laws protecting the alligator have enabled this species to make a remarkable recovery.

Occasionally an alligator is sited at the preserve. Alligators can co-exist with man as long as care is taken not to feed the alligators.

The major threat to the American alligator existence is the destruction of suitable habitat. Matanzas Pass Preserve does not provide habitat for the alligator, yet they have been sited using the pond.

Gopher Tortoise

Gopher tortoises were last sited in the preserve in 1999. The habitat is not typical of sand hills, scrub, upland pine flatwoods, or pastures but increased growth in the area may have forced them into the Preserve or they may have been released by people.

Little can be done in the Matanzas Pass Preserve to enhance habitat for gopher tortoise due to the low elevation and lack of upland habitat.

Brown Pelican

The brown pelican is perhaps Florida's most distinctive and recognized bird. It wanders inland upon occasion; pelicans are graceful in the air as they flap and glide over the water. Endangered at one time by effects of pesticides, the pelican has made a good come back since the use of DDT was outlawed. Food shortages, human disturbance, increased turbidity from dredging and pollution (especially entanglement in fishing gear) are all factors that led to their decline between the 1970's through the mid 90's (Hipes et.al. 2000).

Education about the importance of proper disposal of monofilament, litter, and keeping a distance from the pelicans will protect this bird and its habitat. Continued use of trash receptacles and scheduled volunteer clean up days will concentrate on monofilament and debris that can endanger pelicans and other wildlife.

Reddish Egret

The reddish egret is Florida's least common heron. Still suffering the effects of century past plume hunting, this wading bird's rate of recovery following protection has been much slower than that of other species. Red mangroves appear to be a favored nest site (Kale & Maehr 1990) and it is not unusual to observe this egret in the preserve feeding.

Continued protection of red mangroves, a litter free preserve, maintain the "no dog" policy, and teaching visitors to observe wildlife from a distance will be beneficial to the reddish egret.

Snowy Egret

Long filmy feathers (aigrettes), prominent head, neck, and back plumes of breeding adults made snowy egrets a prime target for plume hunters during the last century. This wading bird has made a remarkable come back from drastically low numbers and nest in multi-species colonies located in shrub-covered wetlands or islands in lakes and coastal lagoons (Kale & Maehr 1990).

Management for this species will include education in the proper behavior of people and their domesticated animals and the importance of habitat preservation and restoration.

Little Blue Heron

The general population trend for this species is in decreasing. This may be related to wetland losses and there is speculation that competition with cattle egrets for nest sites may be contributing to this decline (Kale & Maehr 1990).

Management issues for the little blue heron species will be the same as the snowy egret.

Osprey

Drastic declines in osprey population in the 1950s and 60s were due to environmental contaminants. Banning of chlorinated hydrocarbon pesticides has helped this species recover. The birds will nest readily on tall manufactured platforms and other structures. (Kale & Maehr 1990).

Ospreys are seen frequently using the snags in the Preserve for hunting and eating. Preservation of the Matanzas Pass Preserve will provide a foraging area as well as a future nesting site if tall man-made platforms are constructed (Kale & Maehr 1990).

Peregrine Falcon

Peregrine Falcons also suffered decline due to habitat destruction and environmental contamination. It has made a fairly good come back since the use of DDT has stopped (Kaufman 2000). As one of the wintering areas for the falcon, the Preserve provides good hunting grounds and an area with little human disturbance

Management will be the same as for the osprey.

Florida Manatee

The manatee has been documented by Lee County Parks and Recreation staff swimming in Matanzas Pass adjacent to the preserve. Increased boat traffic in the area is the main concern for this species, as frequent scaring and some deaths due to boat encounters are documented. Sea grass beds just off the coast of the preserve provide food for manatees and a channel provides a waterway for this mammal.

Signage for a manatee zone would be appropriate for the pavilion in the Preserve, as well as education for residents and visitors.

v. Biological Diversity

Many species of birds, reptiles, invertebrates, fish, and mammals inhabit, forage, nest, or rest in the Matanzas Pass Preserve. At low tide, wading and shore birds take advantage of the mud flats and ditches that are teeming with food. The mangroves provide nesting and roosting area for birds. Many species of fish either breed or spend some part of their juvenile life in the protection of the mangroves. The integrity and diversity of the Matanzas Pass Preserve and its associated waters must be protected when and where possible. Management staff will perform the following actions in this regard:

- Control of invasive exotic vegetation and annual follow-up maintenance will provide suitable habitat for native wetland and terrestrial species.
- Removal of any debris and prevention of future dumping on site will improve and protect water quality.
- Removal of hazardous debris such monofilament line and other potential entrapment debris will also contribute to the quality of surrounding waters and protect wildlife species that utilize this area.
- On-going species surveys conducted by volunteers and staff will confirm and protect the diversity that is present.
- Provide educational opportunities for visitors through both interpretive signs and programs.

C. Cultural Resources

i. Archaeology

Human disturbance in the Matanzas Pass Preserve consists of the mosquito ditching that took place in the 1950's and the original boardwalk constructed in the 1970's through the mangrove swamp. This all occurred prior to 1987 when Piper Archaeological Research, Inc. conducted an archaeological site inventory of Lee County.

Although the Preserve is not likely to contain archaeological material due to its wet nature, it is located less than one mile from the Florida Master Site File number 8LL 1101, which is locally known as the Mound House. This site is an archaeologically significant Calusa shell mound. The shell mound was altered first in 1906 with the construction of a home that was enlarged through the years and again in the 1950's with the dredging of canals surrounding the property in order to create the Shell Mound Park subdivision. The most western canal dug to fill the Shell Mound Park subdivision is the east boundary of the Preserve.

ii. Land use History

Prior to 1958, the Preserve was virtually undisturbed by man except for a few foot trails and a jeep trail, seen in the 1944 and 1953 aerials (Figures 7&8). Since 1958, the Matanzas Pass Preserve and the surrounding areas have gone through great changes, as seen in the aerial photo taken in 1958 (Figure 9). Land adjacent to the Matanzas Pass Preserve has been developed with roadways, home sites, a school, and canals visible in the aerials. Mosquito control ditches were excavated in the central and eastern section of the Preserve with a 750 foot unpaved mosquito control service road, visible in the 1958 aerial. These ditches were used frequently in Florida to drain wetlands and reduce mosquito-breeding habitat. Spoil piles were left in place and can be seen as white spots along the ditches in the 1958 aerial.

The higher elevations of the spoil piles and the disturbed land made these areas susceptible to invasion by exotic vegetation. In 1996, shortly after Lee County took possession of the Preserve from The Nature Conservancy, control of invasive exotic vegetation began. By removing Brazilian pepper (*Schinus terebinthifolius*) and Australian pines (*Casuarina*

Figure 7: Matanzas Pass Preserve 1944 Aerial

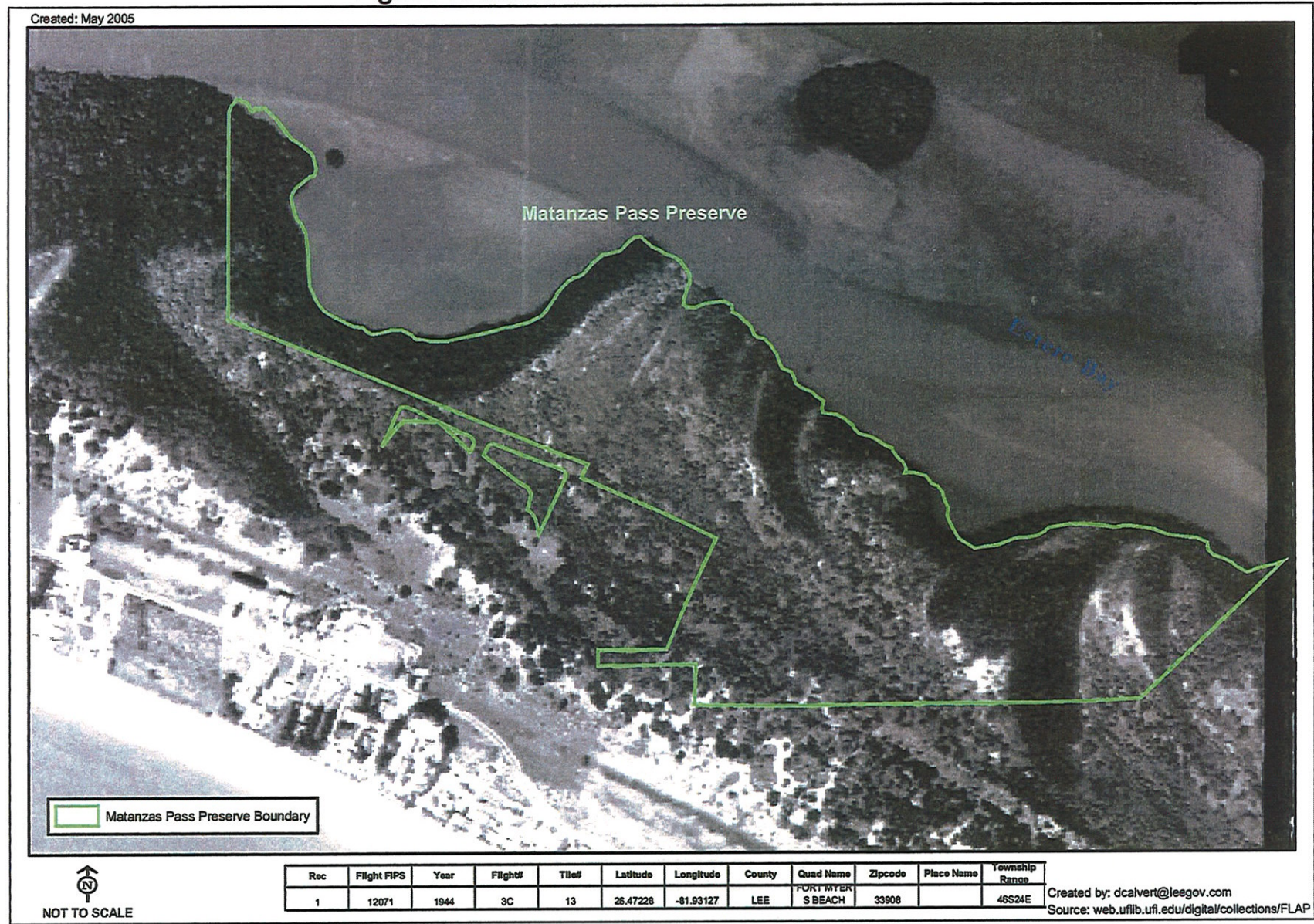


Figure 8: Matanzas Pass Preserve 1953 Aerial

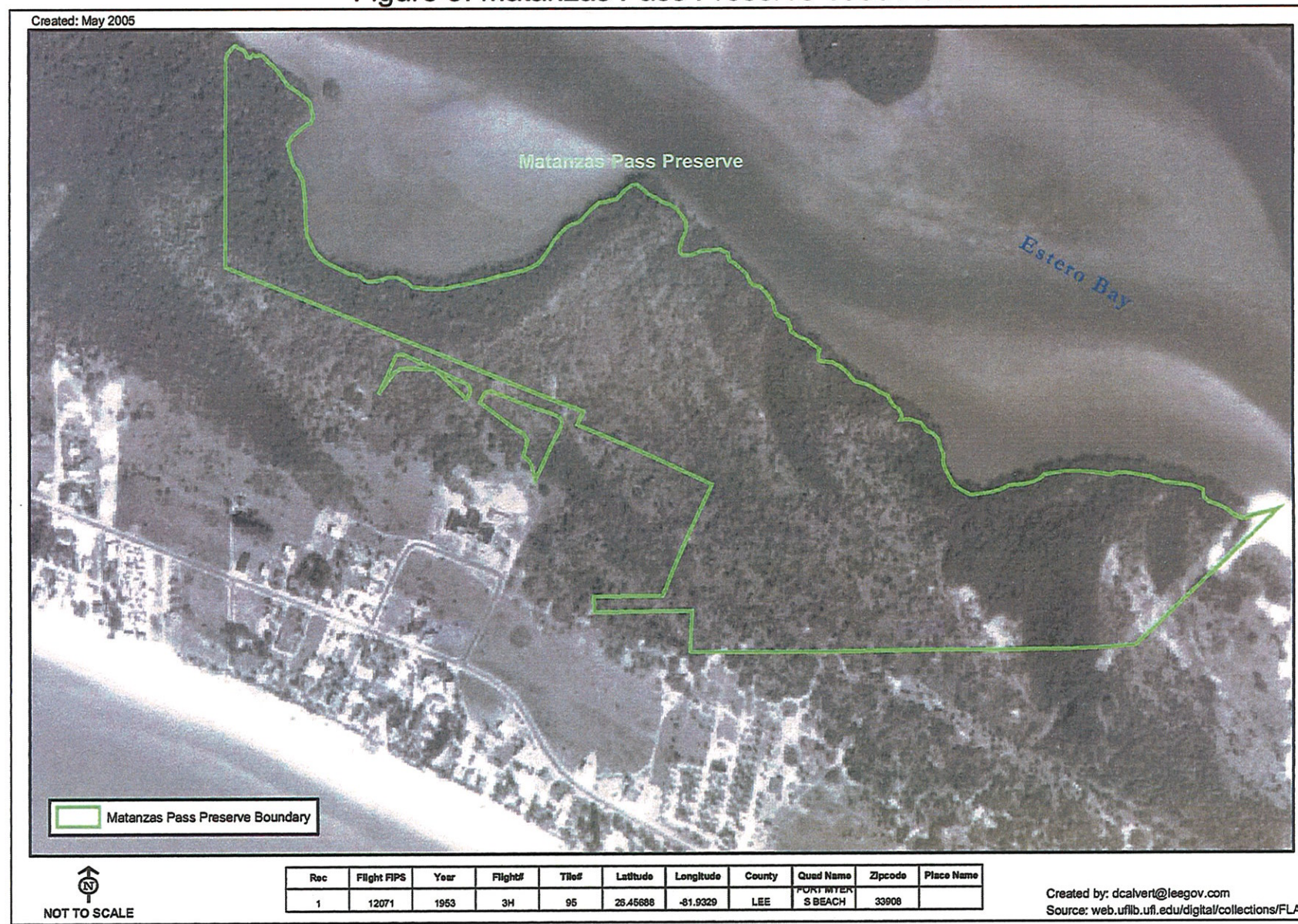
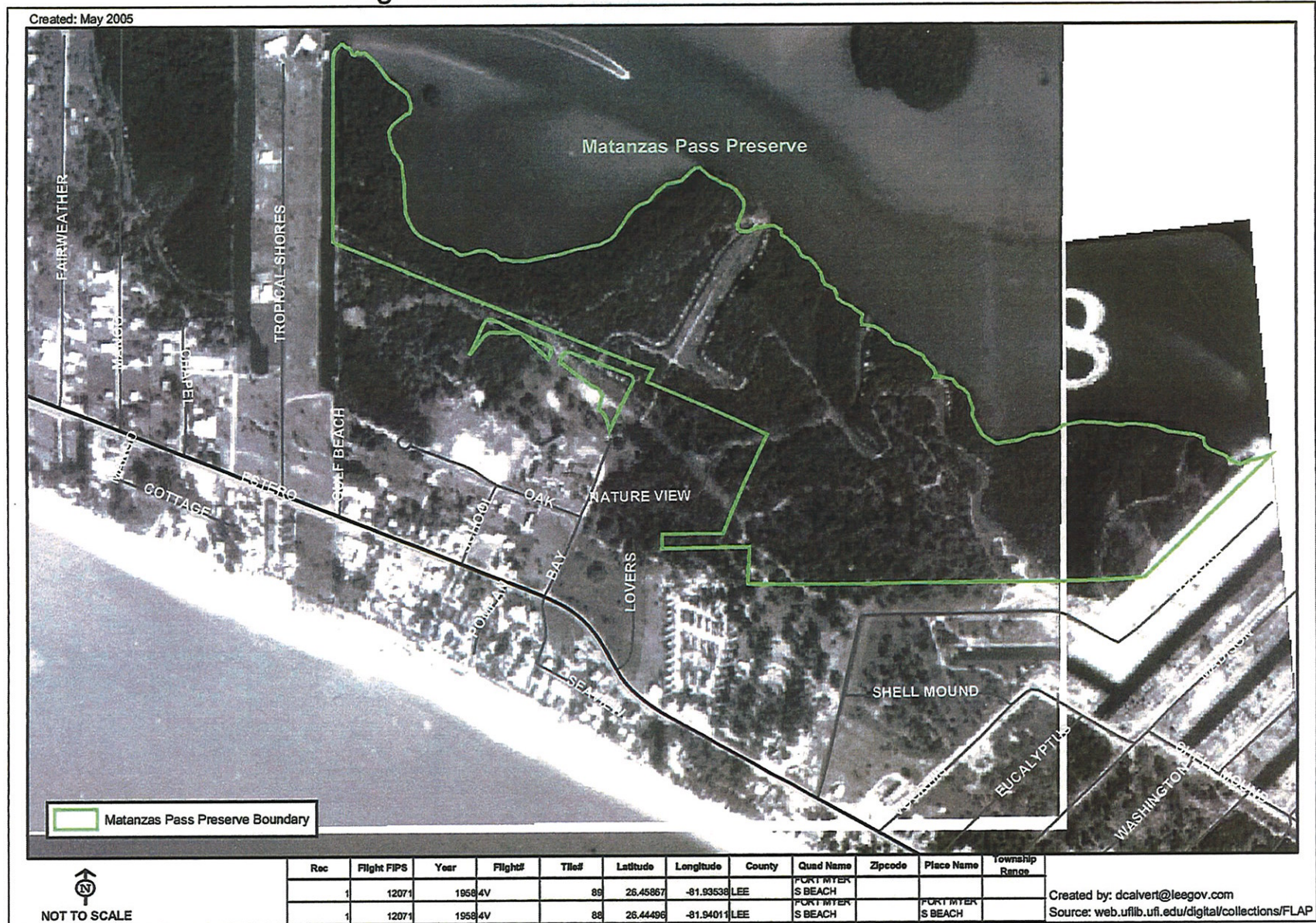


Figure 9: Matanzas Pass Preserve 1958 Aerial



iii. Public Interest

The entrance to Matanzas Pass Preserve is anchored by two cottages. The *We're Here* cottage, which was the fourth home built on Fort Myers Beach in the early 1900's, and a 1950's style cottage. Both are the present day home of the Estero Island Historic Society and host the display information for the Preserve. One block west is the Fort Myers Beach Elementary School and Fort Myers Beach Library. One block north of the Preserve is Bay Oaks Recreation Complex and Town Pool. Two blocks west is the beach and Gulf of Mexico. A grocery store, church, restaurants, homes, offices, and fire station are within walking distance. Florida Gulf Coast University is located thirty minutes away by car.

Florida Gulf Coast University, public and private school groups, private and non-profit organizations use the Preserve as an outdoor classroom due to the close location. Coastal geomorphology and ecology can be experienced at its best in this rare 58-acre area of coastal grassland, mangrove swamp, and maritime hammock on Estero Island.

IV. Factors Influencing Management

A. Natural Trends and Disturbances

Natural trends influencing stewardship include hurricanes, drought, tropical storms, tidal flooding, patterns of wet and dry seasons, bird migration and nesting seasons. Coastal grassland communities depend on occasional saltwater flooding to keep from transforming into a coastal strand community. High intensity wind and long durations of standing salt water from tidal flooding or storm surge effects even salt tolerant plant species by weakening or eventually killing them. Bird nesting and migration will be considered when work is conducted in the Preserve to minimize disturbance to the foraging birds resting, feeding, and raising young.

Significant storms can and have caused damage to the vegetation in the Preserve with mortality and dieback of slash pines, buttonwood, strangler figs, and live oaks. Only the maritime hammock area of the preserve can support heavy equipment to remove large vegetation from the Donora Street access after a storm and this is not recommended. If restoration needs to

take place after a significant storm, plant community and site elevation will be taken into consideration. After flooding, low-lying areas of the Preserve are prone to hold saltwater for a period of time. It is not unusual to have a storm tide wash over a barrier island and no precautions other than the removal of hazard trees needs to be taken.

B. Internal Influences

There are varieties of human influences as mentioned in previous sections of the plan that impact the Matanzas Pass Preserve.

In the past visitors became accustomed to a lack of enforcement of county regulations relating to littering, motorized vehicles, camping, biking, and walking pets. The following will help to explain these issues further and specify stewardship measures to reduce or eliminate these problems.

Several mosquito ditches are located in the central and east-southeast portion of the Preserve. The associated berms and mounds have had invasive exotic plants on them in the past and will need continued monitoring and treatment. When applying any chemicals for invasive exotic plant removal Land Stewardship Staff will follow the procedures described in the Land Stewardship Operations Manual. (see management action plan Table 2, units 1, 2, 3, 4)

The coastal grassland community, in the southeast section, has had a great deal of human disturbance from dumping and motorized vehicles. There is also scattered trash spread in portions of this area. Much of the trash washed up during storms, but most is from visitors and neighbors of the Preserve. This area was the target area for exotic removal in 1995 and is part of the restoration area.

Since staff has been hired, organized trash removal is a goal with volunteers and the Friends group. This problem will continue to decrease over time as the trash is regularly picked up.

(management action plan, Table 2, Units 1, 2, 3, 4).

A live aboard boating community anchors just off shore and a heavily used boating channel is adjacent to the Preserve. Continual clean up of debris that washes up on the shore, including containers of cleaning solutions, oil, and paint, collected before the pollutants leak into the waters will improve water quality (see management action plan, Table 2, Units 1-4).

Fishing is allowed at the Matanzas Pass Preserve, which could lead to a problem with monofilament line litter. Monofilament line can cause injury and death to birds and other wildlife when tangled or ingested. Coordination with the Monofilament Recovery and Recycling Program (<http://fishinglinerecycling.org/>) to organize volunteer clean-up days and set up recycling bins will help alleviate this problem (see management action plan Table 2, Unit 2).

Because the Preserve is in a secluded area, enforcing the regulations that apply to all county parks and preserves has been difficult. It will take time for visitors to the Preserve to learn that these and other practices will no longer be tolerated and that there will be a regular staff presence to enforce these regulations.

Visits by the Lee County Park Rangers staff, Lee County Maintenance staff, Lee County Parks and Recreation staff, and the Lee County Sheriffs Office has improved the behavior by visitors in the Preserve.

C. External Influences

There are forty-four existing single-family residences and two mobile home/recreational vehicle parks that directly abut the south-southeast and south-southwest property boundaries. These are the sources of two major problems.

First, illegal dumping of both garbage and vegetation waste into the Preserve has littered the area and continues to occur on some boundaries. Second, there exist structural encroachments, which include a fence and tool sheds. The Preserve has been used as a campsite by vagrants and for illicit activities such as drug and alcohol use. The level of this type of use has decreased greatly. Problems prevalent today are the use of motorized vehicles (mopeds and scooters) and bicycles, vandalism to the boardwalk and pavilion, and littering throughout the area.

The mobile home communities and residential homes to the south and southeast section of the Preserve are possible areas for horticultural dumping and encroachment concerns. The situation should be monitored and if necessary, the use of signage and presentations/public workshops incorporating "When Nature is your Neighbor" and "Florida Yards and

Neighborhoods” will be used to alleviate any problems. (see management action plan, Table 2, Unit 3).

D. Legal Obligations and Constraint

i. Permitting and Mitigation Issues

Because the Preserve is comprised mainly of wetland plant communities, should any construction be considered, required permits would need to be obtained from various agencies, including the U. S. Army Corps of Engineers, Florida Department of Environmental Protection and the South Florida Water Management District.

Since the entire area of the Preserve is located within the Coastal High Hazard Area any construction considered will need to take this into consideration. (Appendix C)

Lee County’s Local Mitigation Strategy supports the efforts of the County to purchase environmentally sensitive areas in high hazard flood zones through Conservation 20/20 funds. It also supports natural resource protection activities that preserve or maintain natural areas through restoration and renourishment. The management of this Preserve implements this strategy.

ii. Relationship to Other Plans

The Lee Plan, 2004 Codification, is used as a vision for the future. In the first chapter of the Lee Plan, entitled Lee County – A vision for 2020, the three broad purposes of the plan are listed:

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

The entire Lee Plan is found on the Internet at: <http://www.leecounty.com/dcd1/Leeplan/Leeplan.pdf>. The two chapters of the Lee Plan

that affect the management of the Matanzas Pass Preserve are Chapter V Parks, Recreation and Open Space and Chapter VII Conservation and Coastal Management.

Chapter V, provides that Land Stewardship staff ensure that any public use facilities constructed at the Matanzas Pass Preserve complies with Goal 85: Park Planning and Design. Staff will also work to provide, whenever staffing and funding permit, appropriate environmental programs to the public in order to meet Goal 86: Environmental and Historic Programs.

Under Chapter VII, Goal 107: Resource Protection within Objective 107.1: Environmentally Critical Areas, Lee County Land Stewardship Staff has the responsibility to conserve and enhance the natural functions of environmentally critical lands such as the wetland habitats found at the Matanzas Pass Preserve.

Objective 107.2: Plant Communities, states Lee County will protect, maintain and routinely update an inventory of native plant communities.

Objective 107.3: Wildlife, states that Lee County has a responsibility to maintain and enhance the fish and wildlife diversity for the benefit of a balanced ecological system.

Within Objective 106.1: Coastal High Hazard Area Expenditures, Policy 106.1.1 describes the need to seek approval from the county commission for the use of public funds in a Coastal High Hazard Area, in which the entire Matanzas Pass Preserve is located, for the development of public use facilities.

E. Management Constraints and Coordination

The main constraints to management of the Preserve are funding and staffing. The Matanzas Pass Preserve has received a grant for assistance with exotic plant removal and native plant restoration from The Charlotte Harbor National Estuary Program. The Friends of the Matanzas Pass Preserve wrote and provided the in kind match for this grant. Obtaining funds through grants and other sources will continue.

Coordination with other agencies and adjacent landowners will also be an important part of managing the Preserve. Bowditch Point Regional Preserve

is located 1.5 miles west on Estero Boulevard and staff will coordinate activities that would affect both Preserves when necessary. Environmental education relating to the dynamics of barrier islands would be productive for both preserves.

F. Public Access and Resource Based Recreation

The public has used the Matanzas Pass Preserve for at least 60 years, as evident in the 1944 aerial (Figure 7). For more information on the historic use of the Preserve see the Land Use History section. There is presently no parking fee at Matanzas Pass Preserve due to the lack of facilities and limited parking.

Public use of this Preserve will always need to be monitored and controlled to ensure that it does not interfere with the health of the ecosystem or the wildlife that utilize it. There will be at least one staff person on site that will play a very important role with interacting with the public. Staff will make sure that the public is complying with Lee County Parks and Recreation's rules as well as educating visitors about the Preserve and what makes it such a unique and important area. The environmental education programs offered each year will also be important for educating visitors and instilling respect for the resources while enjoying the Preserve.

This Preserve is Highlight number 4 on the Estero Bay portion of The Great Calusa Blueway, Lee County's paddling trail that provides an ecological tour of the bays, rivers, backwaters and shorelines of southwest Florida. Information on this canoe trail can be found at www.thegreatcalusablueway.com and a map of the Estero Bay portion of this trail is located in Appendix D.

Existing improvements to the property are the 7,091 feet of trail system that includes 2,986 feet of elevated boardwalk, which meanders down to the pavilion over looking the bay. The elevated boardwalk, along with the estimated 4,105 feet of foot hiking trails provide an enjoyable hiking area, as well as wildlife viewing, fishing, and photography. The elevated boardwalk includes a landing area for visitors arriving by canoe and kayak (Figure 10).

The Master Site Plan for the Preserve (Figure 10) displays other existing improvements such as the teaching amphitheater, pavilion on the bay, resting areas, and the Historic Cottage.

The challenge of providing a positive experience for visitors, while protecting the fragile ecosystem of the Preserve, will always be a focus for county staff.

Figure 10: Matanzas Pass Preserve Site Plan



G. Future Acquisition

Adjacent lands to the Preserve will be considered for acquisition. Conservation 20/20 nominations number 283 and 284 are adjacent to the preserve and have recently been acquired. This estimated acre of land consists of maritime oak hammock and will be added to management unit 2 goals and strategies.

V. Management Action Plan

A. Management Units

The Matanzas Pass Preserve has been divided into management units to better organize and achieve management goals. Figure 11 delineates the four management units, which were created based on community habitat type, management needs, and restoration required.

Management unit #1 is 13.14 acres and located in the western portion of the Preserve and consists of a mangrove swamp community which extends north to Matanzas Pass and west to the canal off Tropical Shores Way, east to the elevated boardwalk and south to the boundary lines of a roadway easement belonging to the Town of Fort Myers Beach.

Management unit #2 is the 15.10 acres tract east of the Mangrove Passage boardwalk and extends north to Matanzas Pass, east to a boundary line where the single foot trail ends and splits into three trails, and south to residential home boundaries. It is comprised of maritime hammock and mangrove swamp.

Management unit #3 is 17.04 acres and is located south of unit #2 and consists of coastal grasslands, maritime hammock and mangrove swamp. This area is known as the restoration area and is the target area for exotic pest plant control and future native plant restoration.

Management unit #4 consists of 12.75 acres of the east section of the preserve and is entirely mangrove swamp with east and west boundaries being mosquito ditches, the south property line behind residential homes on Donora Avenue and the north boundary is Matanzas Pass.

Figure 11: Matanzas Pass Preserve Management Units



B. Goals, Strategies and Projected Timetable

The Matanzas Pass Preserve is part of a countywide quarterly site inspection program for all preserves. A copy of the site inspection form is available in the Land Stewardship Operations Manual. The inspection allows staff to monitor any impacts and/or changes to each preserve and includes listing all animal sightings and new plants found. If during these inspections at the Preserve staff finds FNAI listed species, staff will report those findings to FNAI using the appropriate form located in the Land Stewardship Operations Manual.

The Florida Exotic Pest Plant Council's List of Invasive Species (www.fleppc.org) will be consulted in determining the invasive exotic plants to be controlled in every management unit. The invasive exotic plant control will be conducted with the least amount of impact to the preserve possible and with appropriate herbicides (as per the Land Stewardship Operations Manual).

Table 2 outlines the goals, strategies and projected timetable for projects in the Preserve.

A. Goals, Strategies and Projected Timetable for Implementation

The table below outlines the goals for each management unit and strategies for achieving the goals.

Table 2: Goals, Strategies, Implementation Timetable and standards for success in all Management units in the MPP.

Management units	Goals	Strategies	Projected Timetable for Implementation	Performance Measures
All	1. Develop a self guided walk	Develop a self-guided trail to coincide with markers sensitively placed throughout the trail.	This project may be funded by grants and completed by November 30, 2010.	Placing of markers
	2. Establish photo points to monitor changes	A panoramic view taken from GIS points at designated times of the year.	The photos will be taken annually under similar conditions.	Photos will provide staff with visual documentation of changes in the preserve
U1 12.99 acres	1. Invasive exotic plant control, keep unit at maintenance level	Monitor and maintain invasive exotic plants on the existing mosquito control ditches with hand clearing methods using appropriate herbicide mix for each exotic plant species.	Ongoing project. Monitor unit one for exotics during quarterly inspections.	All target invasive exotic vegetation treated. Seed sprouts and re-sprouts will be treated annually
	2. West boundary on Tropical Shore Lagoon canal and North boundary along Matanzas Pass kept free of debris	Work with volunteer groups, such as the Friends of Matanzas Pass Preserve, Annual Coastal Clean Up, and Monofilament Madness to keep this area free from debris.	At least four-scheduled debris pick up days annually.	The coastline boundary of U1 kept free from debris
U2 14.99 acres	1. Invasive exotic plant control, keep unit at maintenance level.	Control Brazilian pepper, Australian pine, and air potato, in the southeast area and along spoil piles created from mosquito ditching. Cut stump and foliar applications of appropriate herbicide mix for each exotic plant species and removal of air potato tubers.	Treatment of Brazilian pepper, Australian pines and air potato to be completed by July 30, 2006. This project is funded by a grant from Lee County Visitor & Convention Bureau, Beach and Shoreline Project.	All target invasive exotic vegetation controlled to a 95% level
	2. Planting native plants in restoration area	Appropriate native plants will be selected to re-vegetate the restoration area.	Plantings will be installed by September 30, 2005. This project will be funded by a grant from the Charlotte Harbor National Estuary Program.	Natural recruitment of native plants has occurred and plantings achieved a 90% survival rate.

Table 2: Goals, Strategies, Implementation Timetable and Standards for success for all management Units in the MPP.

Management units	Goals	Strategies	Projected Timetable for Implementation	Performance Measures
U2	3. Contact adjacent neighbors about controlling invasive exotic vegetation.	Work with neighbors to control invasive exotic vegetation that is a seed source to Management Unit 2	Ongoing project	Staff will work with appropriate entity to control off-site invasive exotic plant seed source
	4. Monitor coastal and upland areas, keep free of debris.	Target volunteer groups and special events such as Coastal Clean up to aid in debris removal	Staff will work with volunteer groups to keep the area clean on a monthly basis or as needed	Coastal and upland areas of unit 2 will be kept free of debris
	5. Develop and implementation of environmental education programs.	Continue to support guided walks through the preserve	Weekly guided walks through the preserve will be provide by Bay Oaks programming staff and volunteers	Program staff to offer environmental education programs ranging from plant and animal identification to barrier island dynamics will be available to the public
U3 17.09 acres	1. Goals #1, 2, 3, 4, and 5 or Unit 2 also apply to Unit 3.			
	6. Prevent inappropriate use of the preserve	Install signs with clearly stated rules and regulation. Implement stepped up surveillance by Lee County Park Rangers, staff at Bay Oaks, and the Lee County Sheriff's department	Replace old and install new signs and increase surveillance by January 30, 2006	Inappropriate behavior in the preserve will be controlled
	7. Prevent dumping and encroachments from adjacent neighbors	Preserve boundary/no-dumping signage. Maybe required to control encroachments and dumping, such as yard waste. Meeting with neighbors to educate about living next to nature	Ongoing project as neighbors change	Encroachments and dumping will be prevented

Table 2: Goals, Strategies, Implementation Timetable and standards for success in all management units in the MPP

U4 12.96 acres	1. Invasive exotic plant control, keep unit at maintenance level	Control Australian pine, Brazilian pepper, and air potato along spoil piles created from mosquito ditching. Cut stump and foliar applications of appropriate herbicide mix for each exotic plant species and remove air potato tubers.	On going project	All targeted invasive exotic vegetation controlled to a 95% level
U4	2. Research and create enhancement of trail system	Discover possibilities of extending trail system to include access off of Donora Street for local population.	Staff will determine if this project is possible and can be accomplished by December 30, 2008	If this goal can be accomplished there will be a new trail system with an access off Donora Street for public use

VI. Financial Consideration

A. Funding

Funding sources will be researched and applications will be made for appropriate grants or other sources of funding such as Florida Department of Environmental Protection Bureau of Invasive Plant Management for the exotic control projects.

Project cost and funding sources are listed in Appendix E.

B. Staffing

Maintenance for the Matanzas Pass Preserve is divided into operations and land stewardship; both are located in the Department of Parks and Recreation. The land stewardship section is responsible for the management of all preserves, and consists of a manager, supervisor, coordinators, contracts coordinator, and field technician. A land steward's job consists of conservation and restoration of biological communities, which includes exotic plant removal and monitoring, debris removal, forming contacts with other groups and agencies to share the latest data on similar land management activities, establishing volunteer programs for the sites, protecting water resources, establishing opportunities for multiple uses and compatibility, providing public access and response to public use. Land Stewardship staff from other preserves are available to assist with management from time to time.

Partnerships with the Fort Myers Beach Historic Society, Town of Fort Myers Beach, Fort Myers Beach Elementary School, Florida Gulf Coast University, Lee County Master Gardeners, and the Department of Environmental Protection have created educational opportunities for thousands of people to explore the mangrove and maritime forest of a barrier island, learning the importance of native vegetation and conservation.

VII. Literature Cited

- Florida Natural Areas Inventory and Florida Department of Natural Resources. (1990). Guide to the Natural Communities of Florida. Tallahassee: FNAI & FDNR
- Scodari, Paul F., Wetlands Protection: The Role of Economics (1990). Environmental Law Institute, Washington, D.C.
- Hsu, Yih-Ming, Matanzas Pass Preserve, Restoration Plan, Master Site Plan, Resources Management Plan (1996).unpublished manuscript
- Myers, Ronald & Ewel, John, Ecosystems of Florida (1990). University of Central Florida Press, Orlando
- Charlotte Harbor National Estuary Program, Committing To Our Future, A Comprehensive Conservation and Management Plan for the Greater Charlotte Harbor Watershed (2000).
- Lee County Parks and Recreation Land Stewardship Operations Manual (2003). Unpublished manuscript
- South Florida Ecosystem Restoration Taskforce (1996). South Florida Ecosystem Restoration: Scientific Information Needs Subregion 10. Retrieved 4-16-2003 from <http://everglades.fiu.edu/taskforce/scineeds/sub10.pdf>.
- Henderson, W.G. Jr. 1984. Soil Survey of Lee County, Florida. U.S. Department of Agriculture/Soil Conservation
- Brandt, Karla & Chafin, Linda, Rare, Threatened, and Endangered Species in Forest of Florida (2003)
- Kaufman, Kenn, Birds of North America (2000).Houghton Mifflin Company, New York

Florida Exotic Pest Plant Council [Internet] 2005. Fort Lauderdale, FL.
List of Florida's Invasive Species; Available from:
<http://www.fleppc.org/05list.htm>

Wunderlin, Richard P. and Hansen, Bruce F. 2003. Guide to the
Vascular Plants of Florida. Second Edition. Gainesville, Florida:
University Press of Florida

Appendices

Appendix A

Plant sightings at Matanzas Pass Preserve

Appendix A: Plant Sightings at Matanzas Pass Preserve

Scientific names for this list were obtained from Wunderlin & Hansen, 2003

Scientific Name	Common Name	Native Status
Family: Surianaceae (BayCedar)		
<i>Suriana maritima</i>	Bay cedar	native
Family: Convolvulaceae (Morning-Glory)		
<i>Ipomoea alba</i>	Moonflower	native
<i>Ipomoea pes-caprae</i>	Railroad Vine	native
<i>Ipomoea sagittata</i>	Saltmarsh Morning Glory	native
Family: Callicarpa		
<i>Callicarpa americana</i>	Beautyberry	native
Family: Rhizophoraceae		
<i>Rhizophora mangle</i>	Red mangrove	native
Family: Avicenniaceae		
<i>Avicennia germinans</i>	Black mangrove	native
Family: Combretaceae		
<i>Laguncularia racemosa</i>	White mangrove	native
<i>Conocarpus erectus</i>	Buttonwood	native
Family: Lentibulariaceae		
<i>Utricularia amethystina</i>	Bladderwort	native
Family: Rhamnaceae		
<i>Rhamnus caroliniana</i>	Buckthorn	native
Family: Fabaceae		
<i>Pithecellobium unguis-cati</i>	Catclaw Blackbead	native
<i>Sophora tomentosa</i>	Necklacepod	native
<i>Dalbergia ecastophyllum</i>	Coinvine	native
<i>Caesalpinia bonduc</i>	Nickerbean	native
<i>Abrus precatorius</i>	Rosary pea	exotic
Family: Zamiaceae		
<i>Zamia intergrifolia</i>	Coontie	native
Family: Poaceae		
<i>Dactyloctenium aegyptium</i>	Crowfoot grass	native
<i>Spartina bakeri</i>	Sand cord grass	native
<i>Panicum maximum</i>	Guineagrass	exotic
Family: Ruppiaceae		
<i>Sansevieria hyacinthoides</i>	Bowstring hemp	exotic
Family: Anacardiaceae		
<i>Schinus terebinthifolius</i>	Brazilian pepper	exotic
<i>Toxicodendron radicans</i>	Eastern poison ivy	native
Family: Asteraceae		
<i>Eupatorium capillifolium</i>	Dogfennel	native
<i>Ambrosia artemisiifolia</i>	Common ragweed	native
<i>Borrchia frutescens</i>	Seaside oxeye	native
<i>Pluchea camphorata</i>	Camphorweed	native
<i>Solidago sempervirens</i>	Seaside goldenrod	native
<i>Baccharis angustifolia</i>	Saltwater falsewillow	native
<i>Bidens bipinnata</i>	Spanish needle	native
Family: Anacardiaceae		
<i>Salicornia bigelovii</i>	Glasswort	native
Family: Bataceae		
<i>Batis maritima</i>	Saltwort	native

Appendix A: Plant Sightings at Matanzas Pass Preserve (continued)

Scientific Name	Common Name	Native Status
Family: Fagaceae		
<i>Quercus virginiana</i>	Live oak	native
Family: Burseraceae		
<i>Bursera simaruba</i>	Gumbo limbo	native
Family: Cactaceae		
<i>Opuntia humifusa</i>	Prickly pear cactus	native
Family: Apocynaceae		
<i>Asclepias tuberosa</i>	Milkweed	native
Family: Annonaceae		
<i>Toxicodendron radicans</i>	Poison ivy	native
Family: Phytolaccaceae (pokeweed)		
<i>Rivina humilis</i>	Rouge-plant	native
Family: Polypodiaceae (polypody)		
<i>Phlebodium aureum</i>	Golden polypody	native
Family: Pteridaceae		
<i>Acrostichum danaeifolium</i>	Giant leather fern	native
Family: Vittariaceae		
<i>Vittaria lineata</i>	Shoestring fern	native
Family: Pinaceae		
<i>Pinus elliotii</i>	Slash pine	native
Family: Arecaceae (palm)		
<i>Sabal palmetto</i>	Cabbage palm	native
<i>Serenoa repens</i>	Saw palmetto	native
Family: Agavaceae		
<i>Yucca aloifolia</i>	Spanish bayonet	native
Family: Bromeliaceae		
<i>Tillandsia flexuosa</i>	Twisted airplant	native
<i>Tillandsia recurvata</i>	Ball moss	native
<i>Tillandsia usneoides</i>	Spanish moss	native
Family: Musaceae		
<i>Musa acuminata</i>	Dwarf banana	exotic
Family: Orchidaceae		
<i>Encyclia tampensis</i>	Florida butterfly orchid	native
Family: Moraceae		
<i>Ficus aurea</i>	Strangler fig	native
Family: Polygonaceae		
<i>Coccoloba uvifera</i>	Seagrape	native
Family: Rubiaceae		
<i>Psychotria nervosa</i>	Wild coffee	native
<i>Randia aculeata</i>	White indigoberry	native
Family: Sapindaceae		
<i>Cupaniopsis anacardioides</i>	Carrotwood	exotic
Family: Solanaceae		
<i>Lycium carolinianum</i>	Christmasberry	native
Family: Vitaceae		
<i>Parthenocissus quinquefolia</i>	Virginia creeper	native
Family: Myricaceae		
<i>Myrica cerifera</i>	Wax myrtle; southern bayberry	native