# ENVIRONMENTAL FIELD SURVEY
of
# TWO ESTERO ISLAND PARCELS LYING IN SEAGRAPE SUBDIVISION

**Section 19 - Township 46S – Range 24E**

**FORT MYERS BEACH, LEE COUNTY, FLORIDA**

by

**OSTEGO BAY ENVIROMENTAL INC.**

**1130 Main Street, Fort Myers Beach, Florida 33931 (239) 463-9326**

**Project ID #03212009**

# ENVIRONMENTAL FIELD SURVEY

of

# TWO ESTERO ISLAND PARCELS LYING IN SEAGRAPE SUBDIVISION

**Section 19 - Township 46S – Range 24E**

**FORT MYERS BEACH, LEE COUNTY, FLORIDA**

by


**OSTEGO BAY ENVIROMENTAL INC.**

**1130 Main Street, Fort Myers Beach, Florida 33931 (239) 463-9326**


**Project ID #03212009**

# OUTLINE

# EXECUTIVE SUMMARY

At the request of the owner, Mr. James J. Jamieson, a site field environmental survey was performed, on the 21st March 2009 and again on 28th March 2009 during a rising tide, in order to make an assessment of two parcels, lying in the Seagrape Subdivision of section 19, Township 46 South, Range 24 East, Fort Myers Beach, Estero Island, southwestern Florida. The subject property is undeveloped and there are no utilities on the sites. The weather was sunny, no rain, during both environmental surveys with about 20% cloud cover and a maximum air temperature of 86°F during the daytime with a low of 61°F during the nighttime. Water temperature was about 76°F in Matanzas Pass. A strong wind was blowing, in gusts up to 37mph, throughout the day.

The principal objectives were to determine the presence, if any, of any exotic species exist or frequent the site, wetland delineation, and to determine the sediment origin and soil type in order to relate to onshore SCS recorded types.

It was observed that there were no endangered species on the site during the time of the environmental survey. The only site major vegetation observed on the site was mangroves and some oak trees.

An initial environmental survey established baseline data for the site. A GPS (Global Positioning System) was used to locate each soil sample position, recorded both in decimal latitude/longitude and UTM (Universal Transverse Mercator). At the time of sampling, a digital camera was used to document all environmental survey activity at the location. The date, time of day, tide level, temperature, rainfall, and weather conditions were also recorded.

A core sample of soil was obtained from each location during the environmental survey. In the laboratory, the samples were split and an aliquot of about 100 grams selected. Each aliquot was then photographed and microscopically examined for content and to document changes in environment.

The beach ridges of San Carlos and Estero islands were probably joined as one complex in the past when originally formed. Later storms and the rise in sea level caused the formation of Matanzas Pass that was originally a low-lying swale area in between the ridges. This remnant swale area is marked by a deep channel that presently exists along the shoreline of Estero Island. Beach ridges commonly occur on the barrier islands along the Lee County coast. A nearby example is that of the Sanibel Island beach ridges which were formed in a similar fashion and approximately at the same time as those on Estero and San Carlos Islands. The historical photographs and this study of the cores of the subsurface indicate that the area was formerly a beach ridge complex, also the microscopical sediment analysis confirms that the area was formerly part of a beach ridge and swale complex.

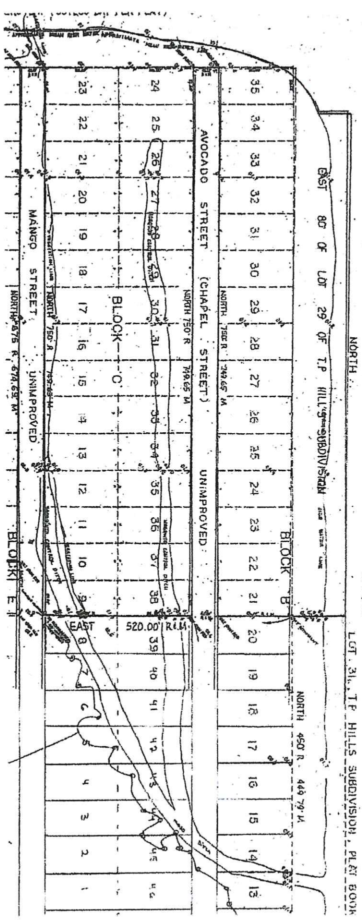
Another purpose of the environmental survey is to delineate existing wetlands, uplands, and wetlands created solely due to Mosquito Control canal activities. The site is traversed by canals constructed by Mosquito Control ditches. This is evidenced by the records of the Lee County Mosquito control district.

Prior to mosquito control activities the property was primarily upland dune-swale system edged with a small mangrove fringe: as is evidenced by historical photos demonstrating the small strand of mangroves in a limited portion of the site over several decades until the introduction of mosquito control ditches which resulted and allowed in the spread of mangroves over large portions of the site.

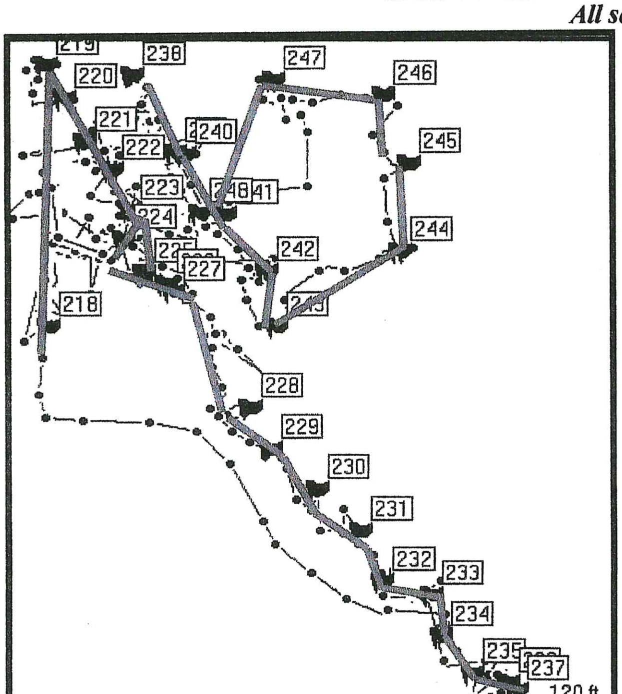
An investigation of the soils on the site demonstrates that the property is composed of upland non-hydric soils that have only had organic soils develop after the construction of mosquito ditches which created elevated groundwater levels on site and allowed the migration of mangroves inland into the interior of the property. Without the construction of the mosquito control ditches the mangrove seedlings would not have had an avenue to the interior of the property nor would the tidal watertable level on the property been raised to provide an environment that would support the existing mangrove forest. Also, without the changes in the disturbed land by the introduction of canals, the mangroves would not have had a competitive edge over the existing upland vegetation that had existed on the property since the island was formed.

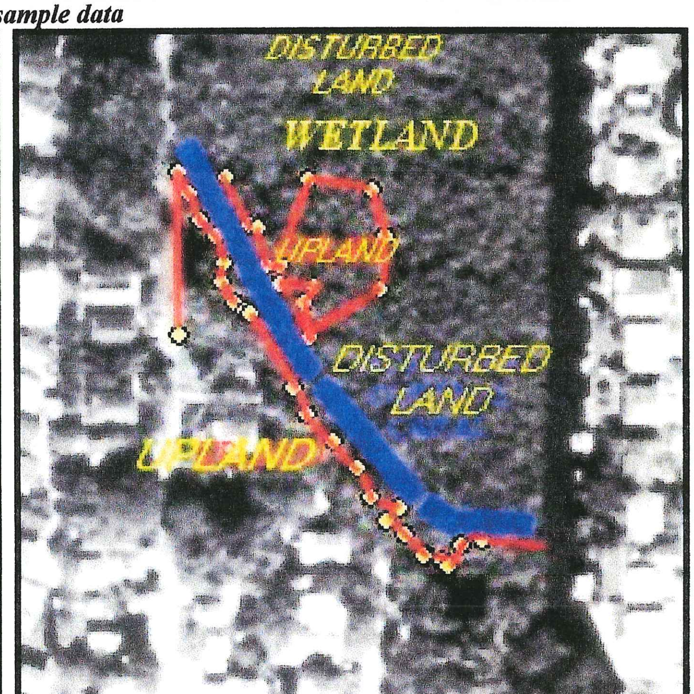
The delineation/inspection began, at the northwest end of the property on Mango Street, by differentiating between the upland flora and the flora on the spoil piles, that had been deposited from western mosquito control canal, and the present-day wetland area. For the marking of the wetland delineation, 18" wooden stakes were driven in the ground, flagged with orange tape and marked with the GPS location.

# PROJECT SUMMARY




***All sample data***




***Wetland delineation showing GPS waypoints and tracks (left) and plot (red) and canal (blue)***

# OBJECTIVES

**The principal objective was to determine the physical biological aspects of properties located in Seagrape Subdivision on Estero Island, Fort Myers Beach, with regard to historical records.**

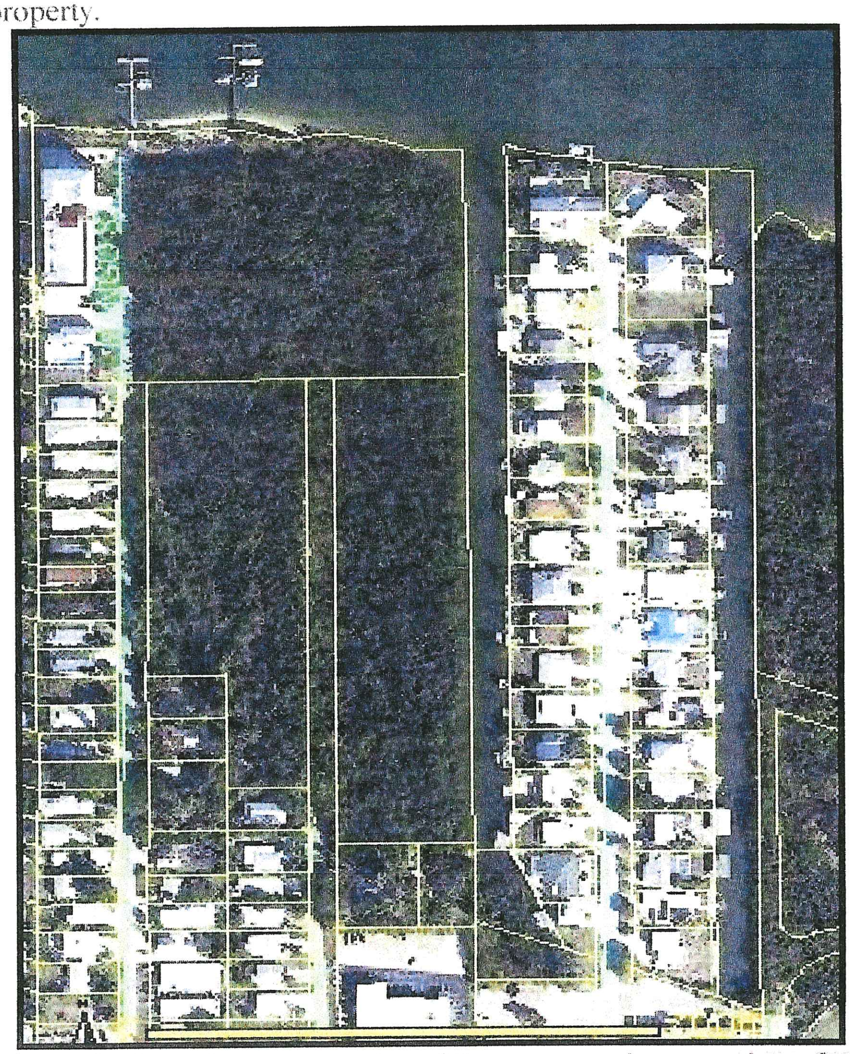
The objectives of the project were:-

1) Soil sampling, by coring, to determine if the extent of the property was formerly uplands or wetlands. It is known that in the early 1950's, a canal was dug on the eastern edge and subsequently large Mosquito-control ditches were dug on the property which introduced salt water and mangroves. Historical aerials of the site, as well as the line drawings from Mosquito Control regarding the proposed ditches dug in the 1950's, are available.
2) An environmental survey to determine vegetation and the quantity of exotics that may be on the site.
3) A critter environmental survey to determine if endangered species will be performed.
4) A wetland delineation environmental survey will also be performed on the property.

The site is located at Fort Myers Beach on Estero Island between the streets of Mango and Tropical Shores. The strap numbers for the subject parcels are:

19-46-24-W3-0120C.0060 or section 19, township 46, range 24
19-46-24-W3-0120B.0120 or section 19, township 46, range 24

The field environmental survey also included the property shoreline along the canal located on the eastern side of the property.

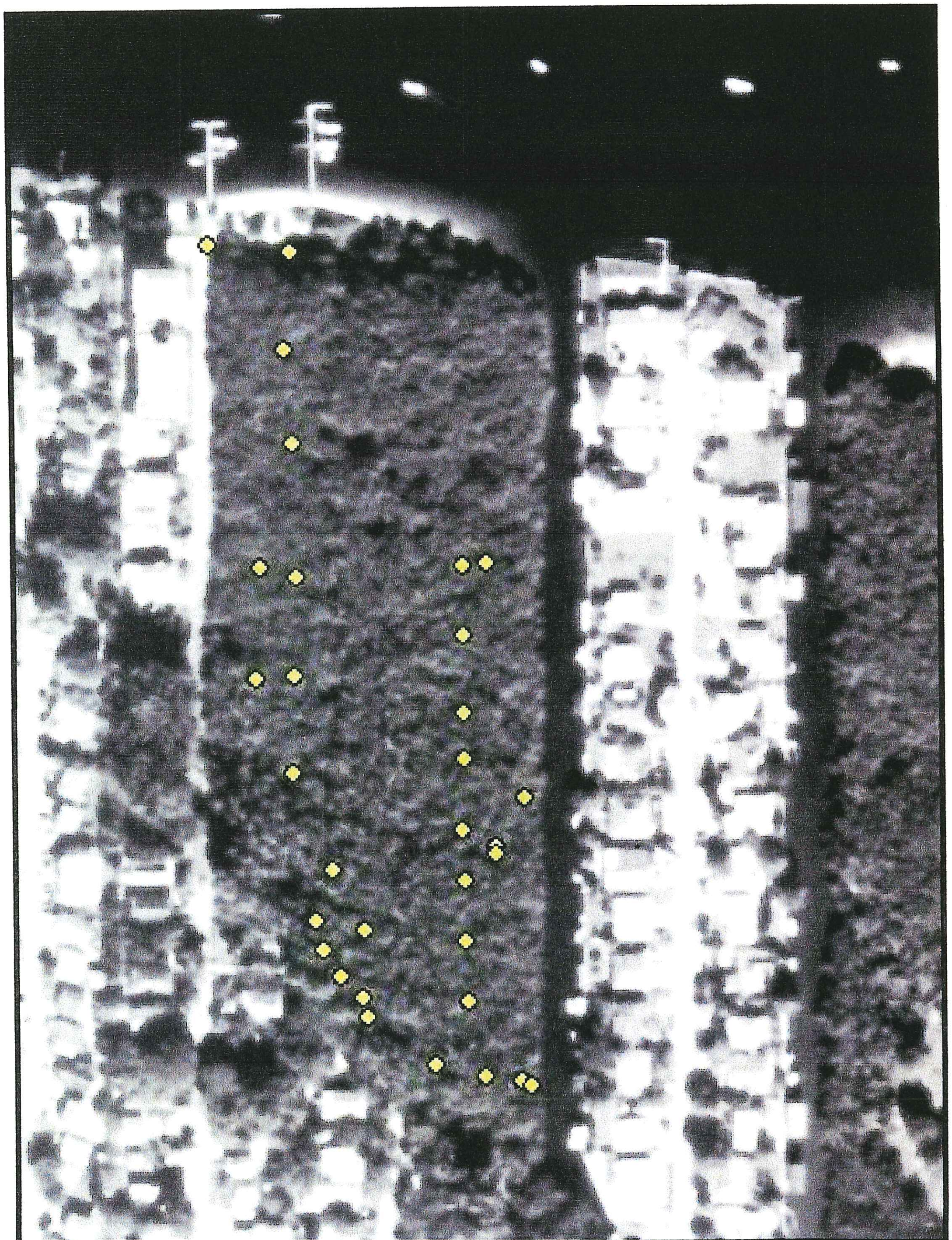


***The main canal, along the eastern edge of the property, is approximately 13m wide***

An initial search of all available historical documents was made to established baseline data for the site. The two parcel site distances, and canal depth, were measured both in meters and feet. Two GPS WAAS (Global Positioning System), Garmin CSx, were used to locate each sample position and to record locations in both decimal latitude/longitude and UTM (Universal Transverse Mercator) metric measurements.

At the time of sampling, a digital camera documented each location. The date, time of day, tide level, temperature, rainfall, and weather conditions were also recorded.

A core sample of sediment was obtained from each location during the environmental survey. In the laboratory, the samples were split and an aliquot of about 100 grams selected. Each aliquot was then photographed and microscopically examined for content and to document changes in environment.



***Core sampling sites recorded using GPS on an aerial overlay***

# INTRODUCTION

Lee County was established from a division of Monroe County on 13th May 1887 and named for General Robert E. Lee. Lee County is 803 square miles located in southwest Florida and is bordered by Charlotte Harbor and the Gulf of Mexico and by Charlotte, Hendry, and Collier counties. The county has 238 square miles of water. The average January temperature is 63.8° F, and the average August temperature is 81.5 ° F. The climate in Lee County is subtropical, with a long-term average annual rainfall of 1430 mm (56.3 inches). Generally, the majority of this rainfall occurs between June and September during the wet season, that is, May through October.

**Matanzas Pass Basin, San Carlos Island (on the left), and Estero Island (on the right). The Seagrape Subdivision can be seen in the center**

Estero Bay was the first aquatic preserve established in Florida in 1966, and was brought under standard management by the Florida Aquatic Preserve Act in 1975. Estero Bay Aquatic Preserve covers an area of about 4,525 hectares (11,200 acres).in southwestern Florida, and is located approximately 24 km (15 mi) south of Fort Myers and about 26 km (16 mi) north of Naples, along the western coastline of, and entirely within, Lee County. The surface water area of the preserve is more than 38 $km^2$ (15 $mi^2$). The drainage basin encompasses 758.5 $km^2$ (293 $mi^2$). The watershed of the Preserve covers an area of 59,878 acres (Charlotte Harbor National Estuary Program, 1997). The forested freshwater wetlands cover an area of 41,029 acres, while those of non-forested area are 16,790 acres (Charlotte Harbor National Estuary Program, 1997). The open water area of the bay is 2,059 acres (Charlotte Harbor National Estuary Program, 1997).

In the basin area, there is only one incorporated city in the immediate area, Fort Myers Beach incorporating Estero Island (it should be noted that San Carlos Island is not incorporated with Estero Island). The city of Fort Myers is 24 km (15 mi) to the north, while unincorporated mainland areas of Estero and Bonita Springs are located near the eastern boundary of the preserve.

The Estero Bay estuary complex began to form approximately 5,000 years ago when a rise in sealevel drowned the area. This flooding caused marine sediments to be deposited in the bay area. The clastic sediment from rivers and streams and from offshore quartz grain deposits were transported by the longshore currents as barrier islands and they also filled the bay to its present shallow depth. Within the bay area, there are hundreds of low-lying islands and oyster bars, many covered with mangroves. These back-bay islands have no upland areas, except on Mound and Dog keys. Mangrove trees are by far the most dominant vegetation in the estuarine complex. Marine grassbeds are found in certain protected shallow areas.

The site area is bordered on the east and west by Holocene beach ridges. Estero Island (Ft. Myers Beach) is connected to the mainland by a high bridge at the northern end of Estero Island. On Estero Island land use is composed of mostly single family residential, restaurants, and marinas on the Bay side, with mostly multi-family residential and commercial uses along the Gulf beach side.

# TAX DESCRIPTION OF PARCELS

There are two parcels separated, north-south divided, by a road easement – Chapel street extension.

Property Data for Parcel 19-46-24-W3-0120B.0120
Tax Year 2008

Parcel data is available for the following tax years:
[ 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 ]

[ Next Lower Parcel Number | Next Higher Parcel Number | Display Tax Bills on this Parcel | Tax Estimator ]

Ownership, Legal, Sales and District data are from the current database. Land, Building, Value and Exemption data are from the 2008 Roll.

## Property Details

**Owner of Record**

JAMIESON JAMES J +
LINEHAN ROBERT M T/C
131 GULF ISLAND DR
FORT MYERS BEACH FL 33931

**Site Address**

200 CHAPEL ST
FORT MYERS BEACH FL 33931

**Legal Description**

SEAGRAPE SUBD BLK B PB 4 PG 17
LTS 12-27 LESS N7FT 27 TOGETHER PARCEL LYING WITHIN 80FT TO THE EAST OR 3641/2920

**[ Viewer ] Tax Map [ Print ]**


**[ Pictometry Aerial Viewer ]**

| Taxing District | DOR Code |
|---|---|
| 032 - TOWN OF FT MYERS BEACH | 00 - VACANT RESIDENTIAL |

**Property Values (Tax Roll 2008) [ History Chart ]**

| | |
|---|---|
| Just | 75,340 |
| Assessed | 75,340 |
| Assessed SOH | 75,340 |
| Taxable | 75,340 |
| Building | 0 |
| Building Features | 0 (Incl. in bldg value) |
| Land | 75,340 |
| Land Features | 0 (Incl. in land value) |
| SOH Difference | 0 |

**Exemptions**

| | |
|---|---|
| Homestead | 0 |
| Widow | 0 |
| Widower | 0 |
| Disability | 0 |
| Wholly | 0 |
| Agriculture | 0 |

**Attributes**

| | |
|---|---|
| Land Units of Measure | SF |
| Total Number of Land Units | 150,670.00 |
| Frontage | 793 |
| Depth | 190 |
| Bedrooms | |
| Bathrooms | |
| Total Building SqFt | |
| 1st Year Building on Tax Roll | 0 |

## Sales/Transactions

| Sale Price | Date | OR Number | Transaction Details | Vacant / Improved |
|---|---|---|---|---|

| Historic District | No | | | | Type | Description | |
|---|---|---|---|---|---|---|---|
| | | 100 | 12/2/2003 | 4118/3008 | 04 | Disqualified (Multiple STRAP # - 01,03,04,07) There are 1 additional parcel (s) with this document (may have been split after the transaction date)... 19-46-24-W3-0120C.0060 | V |
| | | 86,700 | 4/30/2002 | 3641/2919 | 08 | Disqualified (Doc Stamps Greater than .70/ SP Gr. than $100) | V |
| | | 86,700 | 4/30/2002 | 3641/2913 | 08 | Disqualified (Doc Stamps Greater than .70/ SP Gr. than $100) | V |
| | | 100 | 12/1/1979 | 1415/729 | 04 | Disqualified (Multiple STRAP # - 01,03,04,07) There are 7 additional parcel (s) with this document (may have been split after the transaction date)... 19-46-24-W3-0120C.0060, 19-46-24-W3-0120E.0180, 19-46-24-W3-0120E.0190, 19-46-24-W3-0120E.0200, 19-46-24-W3-0120E.0210, 19-46-24-W3-0120E.0220, 19-46-24-W3-0120E.0230 | V |
| | | 100 | 1/1/1900 | 577/258 | 04 | Disqualified (Multiple STRAP # - 01,03,04,07) There are 6 additional parcel (s) with this document (may have been split after the transaction date)... 19-46-24-W3-0120C.0060, 19-46-24-W3-0120E.0180, 19-46-24-W3-0120E.0190, 19-46-24-W3-0120E.0200, 19-46-24-W3-0120E.0210, 19-46-24-W3-0120E.0220 | V |

## Parcel Numbering History

**Creation Date - Unavailable**

| Prior STRAP | Renumber Reason | Renumber Date |
|---|---|---|
| 19-46-24-W3-00449.0000 | Split and Combine - No Delete Occurs | Thursday, May 23, 2002 |
| 19-46-24-12-0000B.0120 | Reserved for Renumber ONLY | Thursday, January 12, 1995 |

## Elevation Information

| Storm Surge Category | Flood Insurance (FIRM FAQ) | | | | |
|---|---|---|---|---|---|
| | Rate Code | Community | Panel | Version | Date |
| TS | AE-EL10 (NAVD88) | 120673 | 0554 | F | 8/28/2008 |

[ Show ] **Appraisal Details**

TRIM (*proposed* tax) Notices are available for the following tax years
| 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |

Property Data for Parcel 19-46-24-W3-0120C.0060
Tax Year 2008

Parcel data is available for the following tax years:
[ 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 ]

[ Next Lower Parcel Number | Next Higher Parcel Number | Display Tax Bills on this Parcel | Tax Estimator ]

Ownership, Legal, Sales and District data are from the current database. Land, Building, Value and Exemption data are from the 2008 Roll

# Property Details

**Owner of Record**

JAMIESON JAMES J
131 GULF ISLAND DR
FORT MYERS BEACH FL 33931

**Site Address**

266 MANGO ST
FORT MYERS BEACH FL 33931

**Legal Description**

SEAGRAPE SUBD BLK C
PB 4 PG 17 LTS 6 THRU 15
LTS 32-45 LESS N7FT 15&32

**[ Viewer ] Tax Map [ Print ]**


**[ Pictometry Aerial Viewer ]**

| Taxing District | DOR Code |
|---|---|
| 032 - TOWN OF FT MYERS BEACH | 00 - VACANT RESIDENTIAL |

| Property Values (Tax Roll 2008) [ History Chart ] | | |
|---|---|---|
| Just | | 66,000 |
| Assessed | | 66,000 |
| Assessed SOH | | 66,000 |
| Taxable | | 66,000 |
| Building | | 0 |
| Building Features | 0 | incl. in bldg value. |
| Land | | 66,000 |
| Land Features | 0 | incl. in land value. |
| SOH Difference | | 0 |

| Exemptions | |
|---|---|
| Homestead | 0 |
| Widow | 0 |
| Widower | 0 |
| Disability | 0 |
| Wholly | 0 |
| Agriculture | 0 |

| Attributes | |
|---|---|
| Land Units of Measure | SF |
| Total Number of Land Units | 132,000.00 |
| Frontage | 0 |
| Depth | 0 |
| Bedrooms | |
| Bathrooms | |
| Total Building SqFt | |
| 1st Year Building on Tax Roll | 0 |
| Historic District | No |

## Sales/Transactions

| Sale Price | Date | OR Number | Transaction Details Type | Transaction Details Description | Vacant / Improved |
|---|---|---|---|---|---|
| 148,000 | 2/10/2009 | 2009000039943 | 06 | Qualified (Fair Market Value / Arms Length / One STRAP #) | V |
| 100 | 12/2/2003 | 4118/3008 | 04 | Disqualified (Multiple STRAP # - 01,03,04,07) There are 1 additional parcel(s) with this document (may have been split after the transaction date)... 19-46-24-W3-0120B.0120 | V |

| | | | | | |
|---|---|---|---|---|---|
| 100 | 1/1/1900 | 577/258 | 04 | Disqualified (Multiple STRAP # - 01,03,04,07) There are 6 additional parcel(s) with this document (may have been split after the transaction date)... 19-46-24-W3-0120B.0120, 19-46-24-W3-0120E.0180, 19-46-24-W3-0120E.0190, 19-46-24-W3-0120E.0200, 19-46-24-W3-0120E.0210, 19-46-24-W3-0120E.0220 | V |

## Parcel Numbering History

**Creation Date - 1/1/1987**

| Prior STRAP | Renumber Reason | Renumber Date |
|---|---|---|
| 19-46-24-12-0000C.0060 | Reserved for Renumber ONLY | Thursday, January 12, 1995 |

## Elevation Information

| Storm Surge Category | Flood Insurance (FIRM FAQ) | | | | |
|---|---|---|---|---|---|
| | Rate Code | Community | Panel | Version | Date |
| T S | AE-EL10 (NAVD88) | 120673 | 0554 | F | 8/28/2008 |

[ Show ] **Appraisal Details**

TRIM (*proposed* tax) Notices are available for the following tax years
[ 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 ]

# HISTORICAL AERIAL PHOTOGRAPHS

The following are the available historical aerial photos of the site:-


On this, the oldest available aerial of 1944, the beach ridges and swales can be easily determined. The ridges also indicate how the island beach ridges were formed and developed.

Development has changed the topography of these ridges and swales over time.

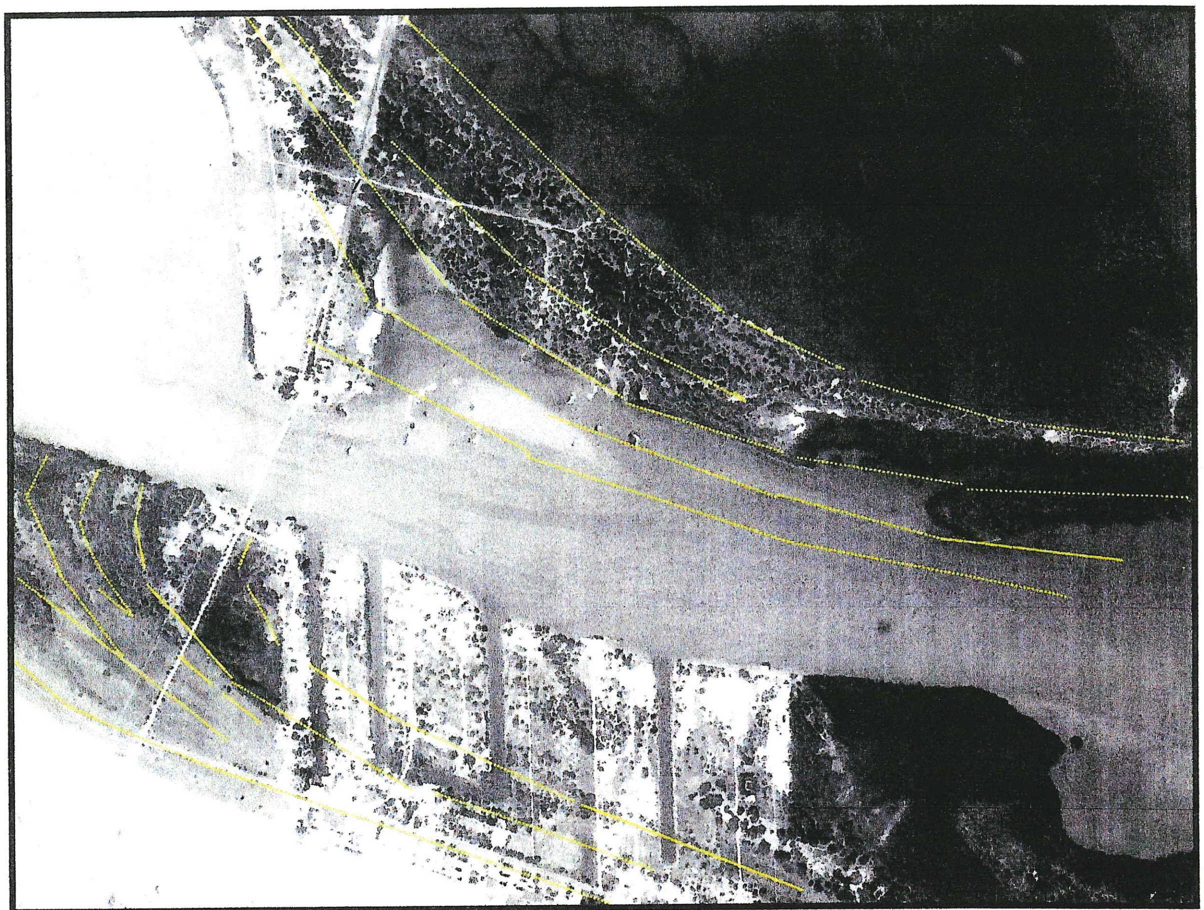
This 1944 aerial photograph (above) clearly shows the development of curving beach ridges in the past and the present on-going build-up of sand at Bowditch Point on the western end of Estero Island.

The small island in the eastern side of this photograph indicates in past geologic time there was an inlet to the SSE, cutting through Estero Island, probably by major storm activity. Subsequent sand movement developed beach ridges and swales that can be seen on this aerial.

Major storms cutting inlets is not unknown in present time – in 2004 a major hurricane divided North Captiva Island into two parts.

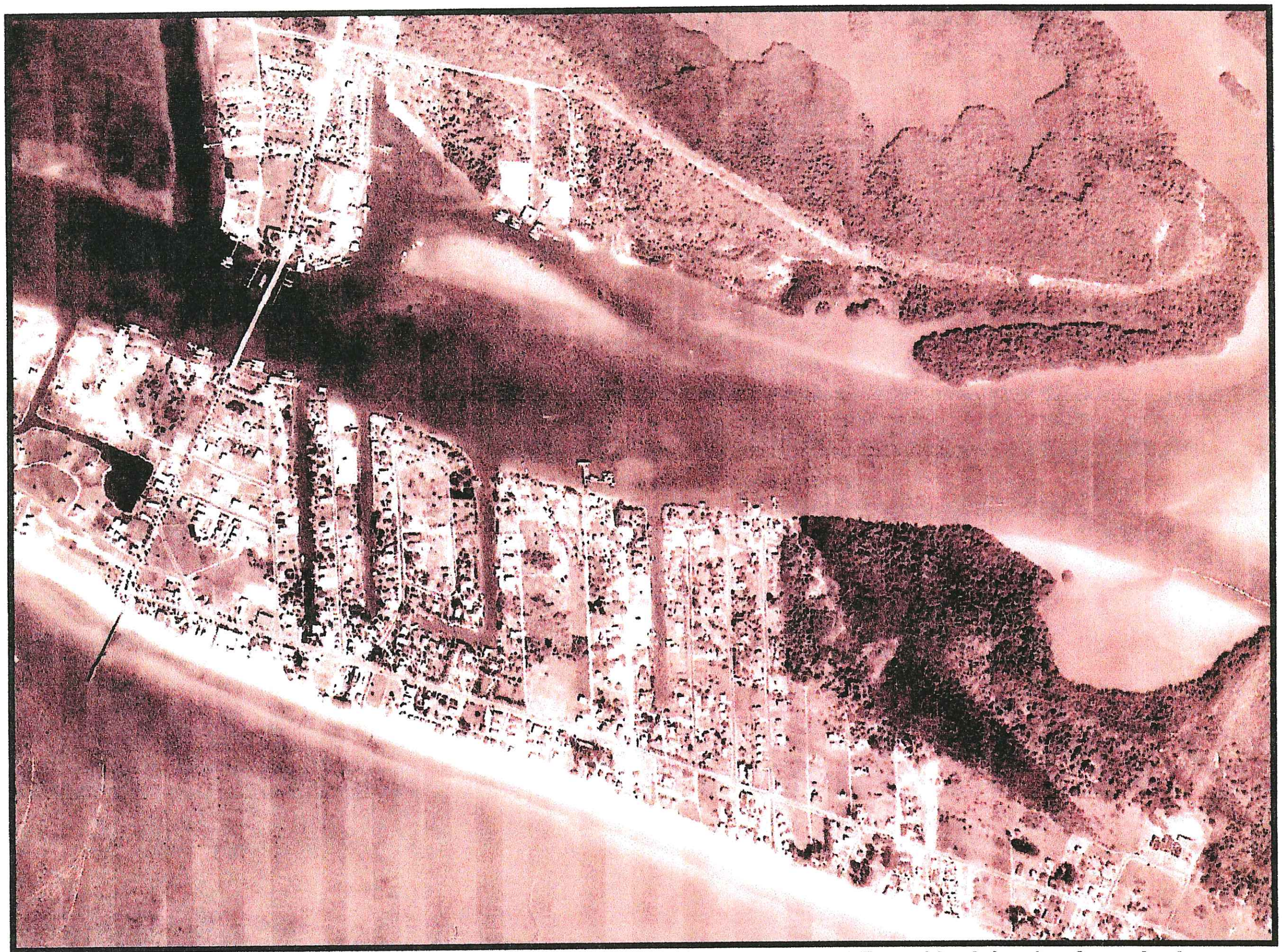
***1944 aerial photo: beach ridge complexes are apparent, but separate, on both San Carlos and Estero islands.***

**1944 aerial photo: The beach ridges and swales are apparent on Seagrape Subdivision on Estero island**



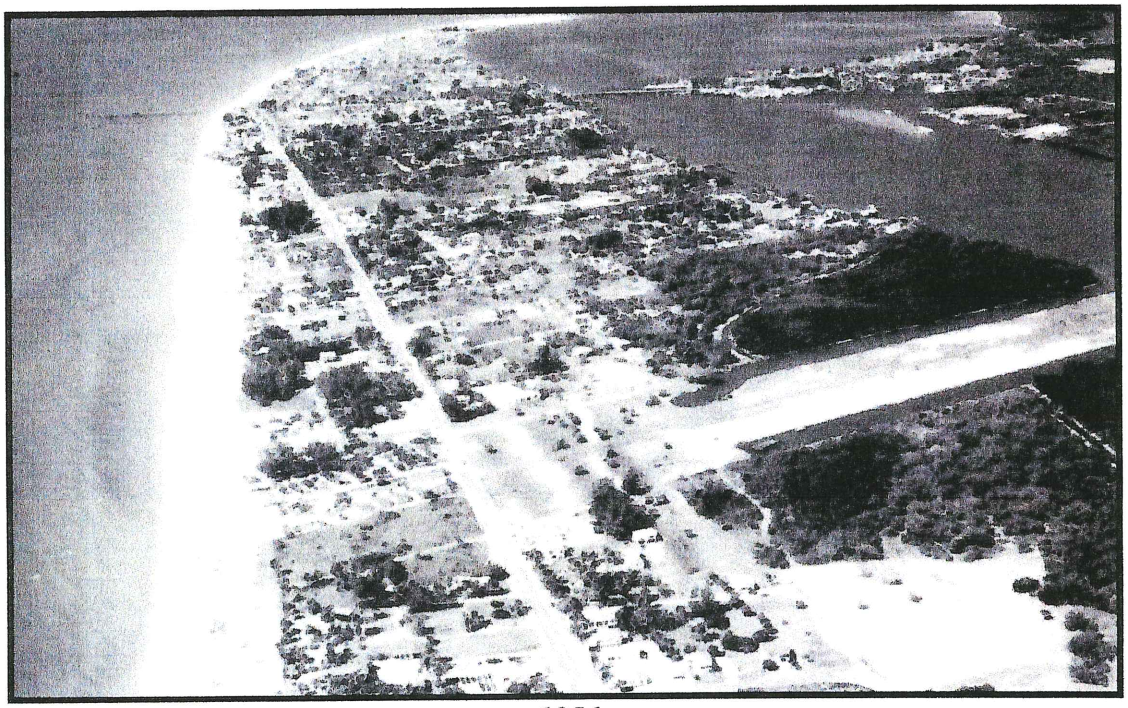
Many beach ridges and swales are apparent in the 1944 photographs

Interpreted beach and swale ridges on Estero Island



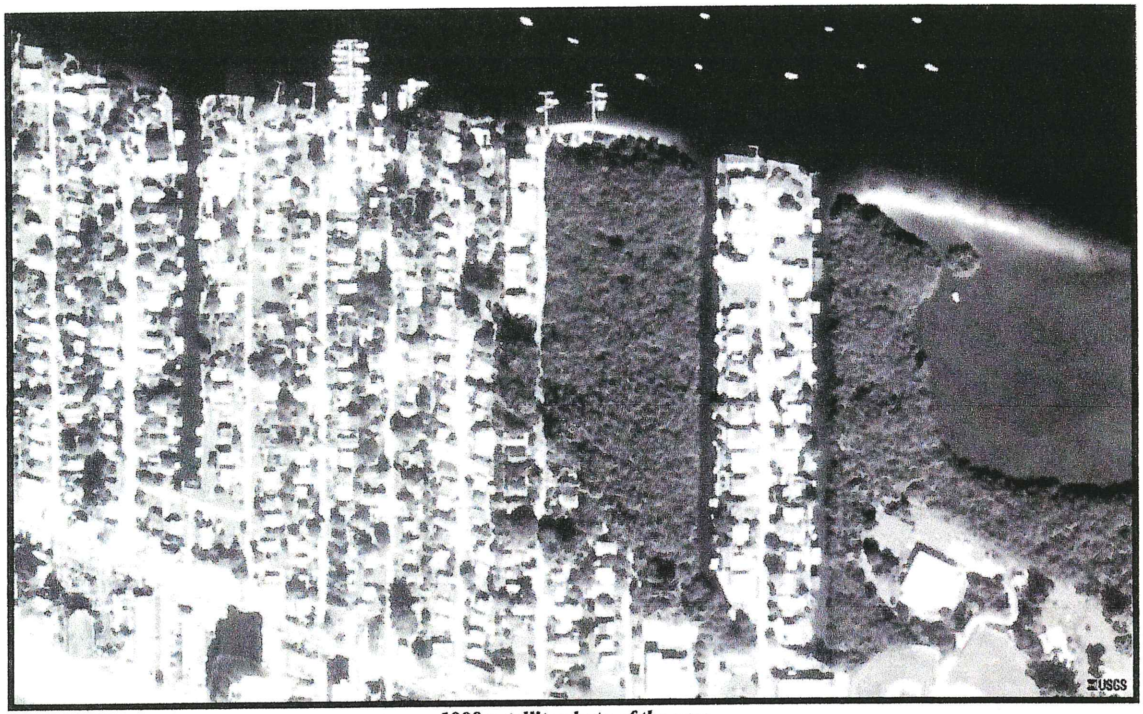
9th February 1953 aerial photo: The beach ridges are still apparent on both San Carlos and Estero islands in spite of some development.

In all the above historical photos the beach ridges are apparent on both San Carlos and Estero islands and show that at one time both islands were part of a beach ridge complex. In the 9th February 1953 aerial, a former inlet on Estero Island can be determined on the lower right-hand side of the photo.

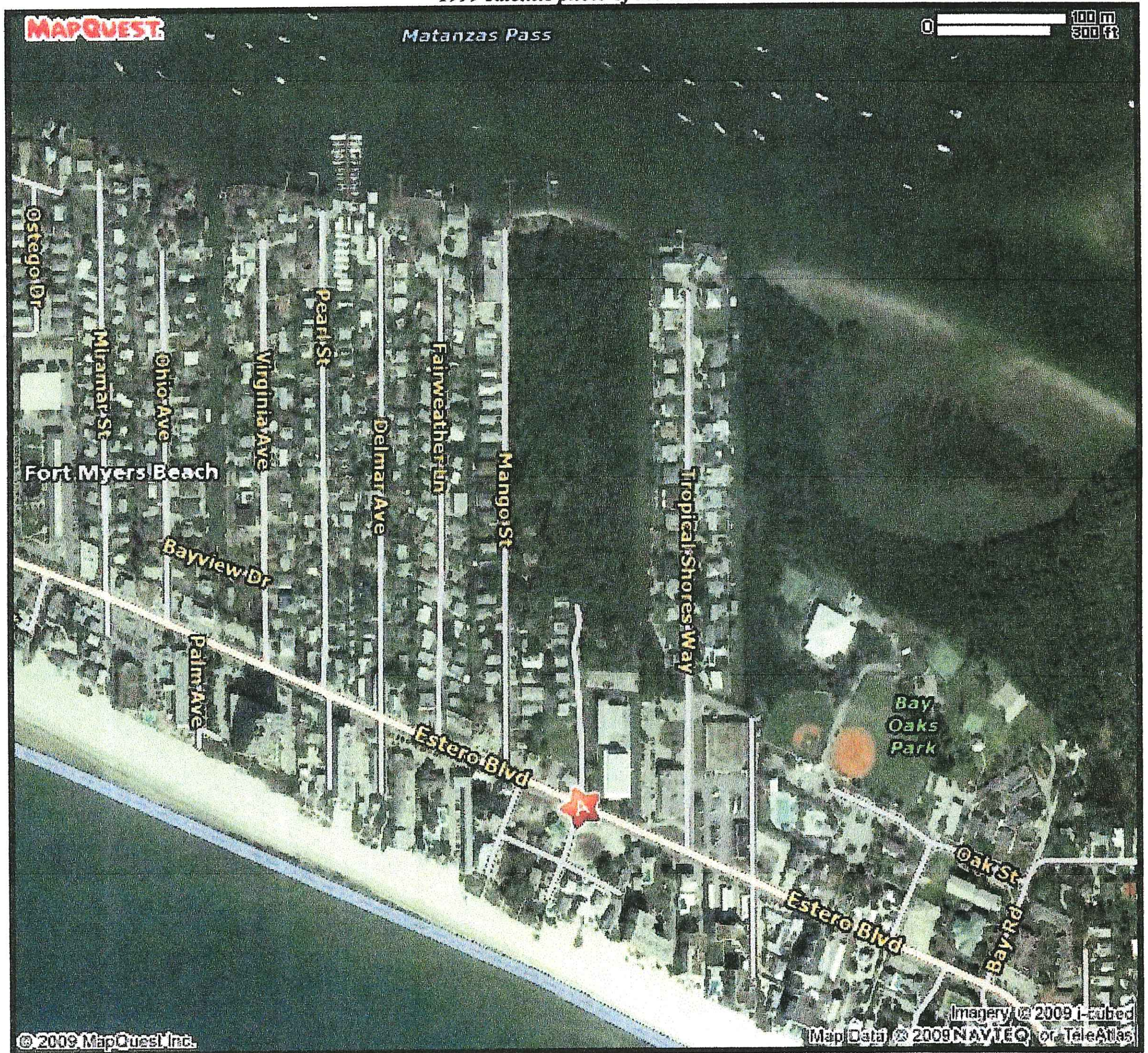


*1956*

*1966 aerial photograph showing the Mosquito Control Canals on the site.*

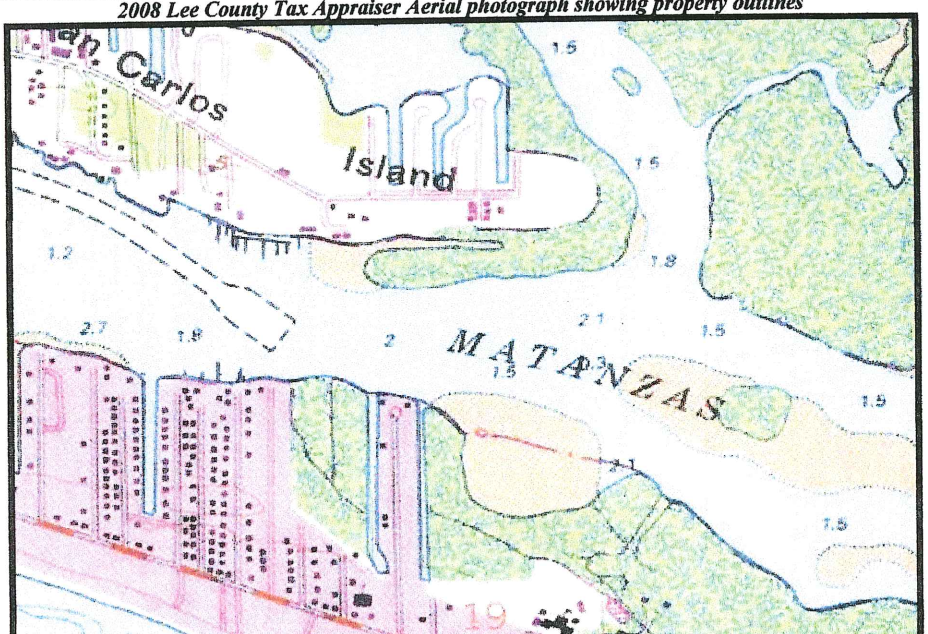



*1999 satellite photo of the area*

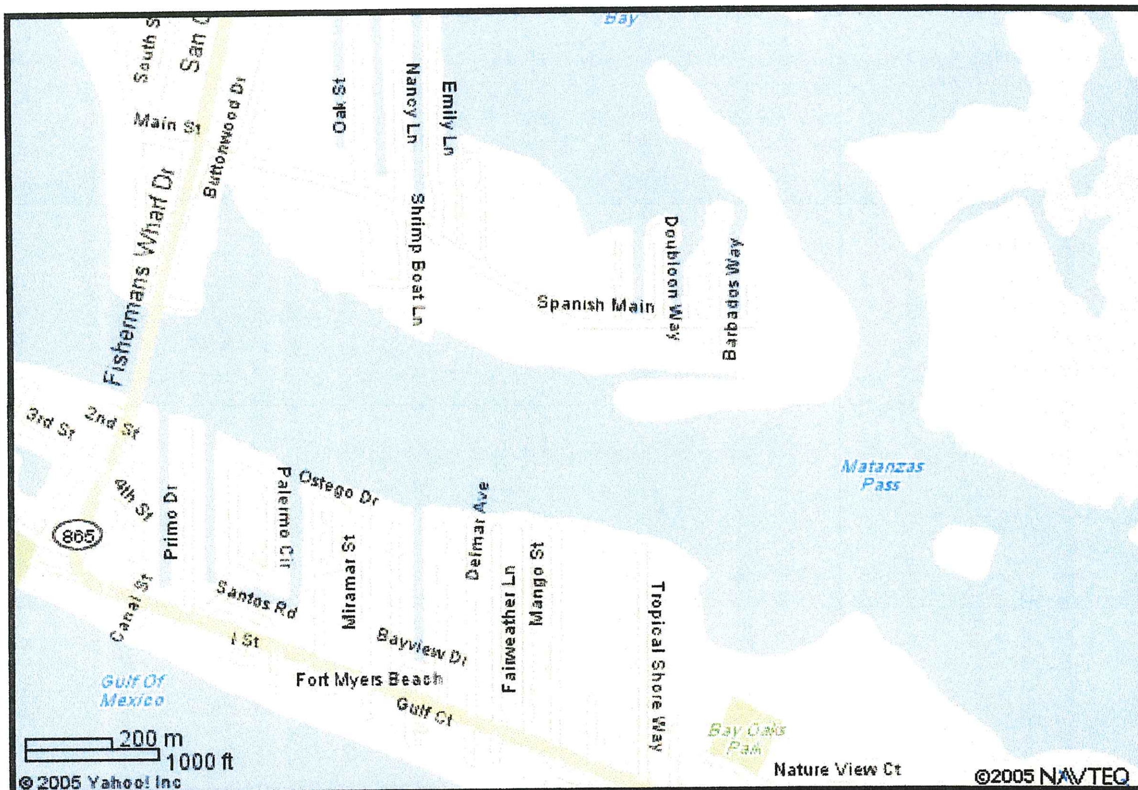



*2009 - beach ridges completely masked by development*

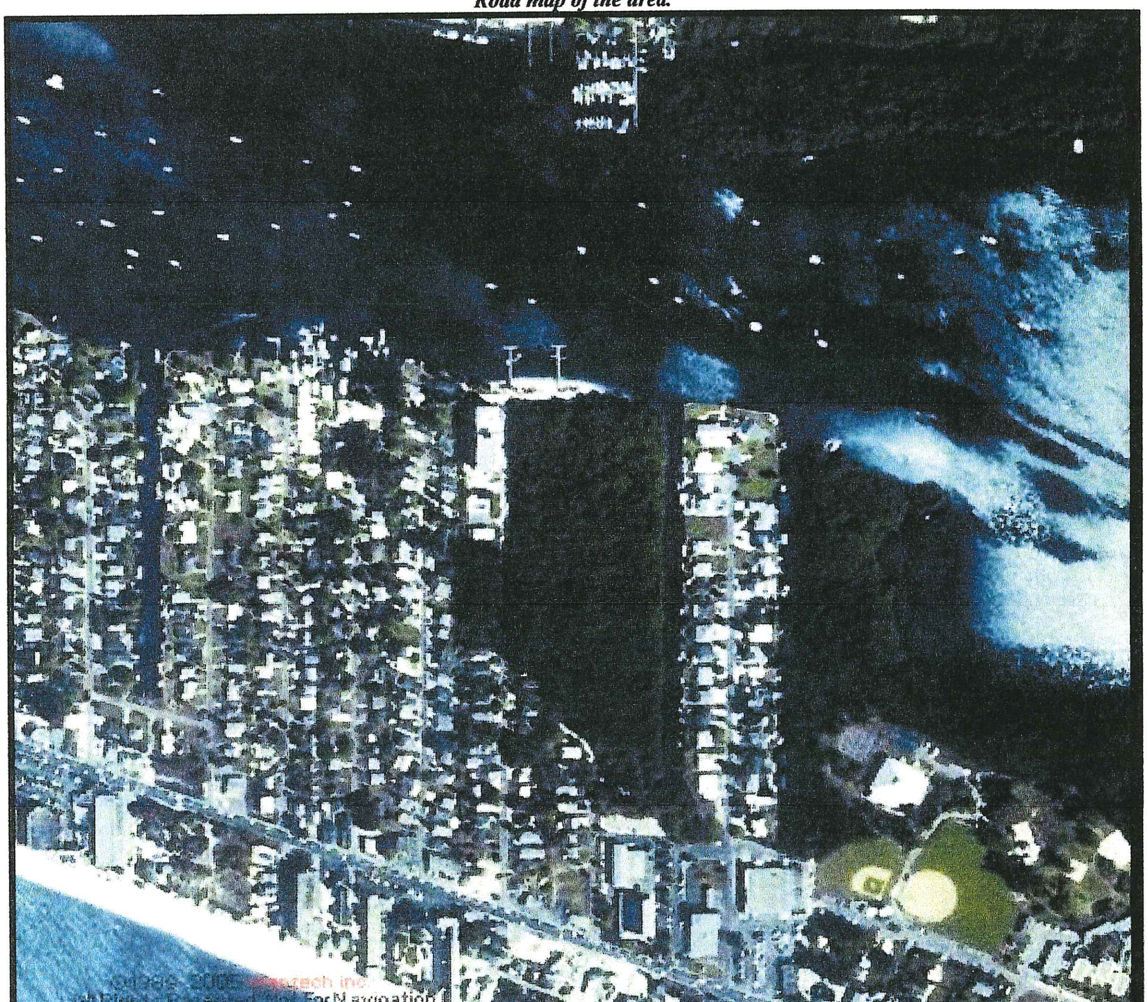

***2008 Lee County Tax Appraiser Aerial photograph showing property outlines***



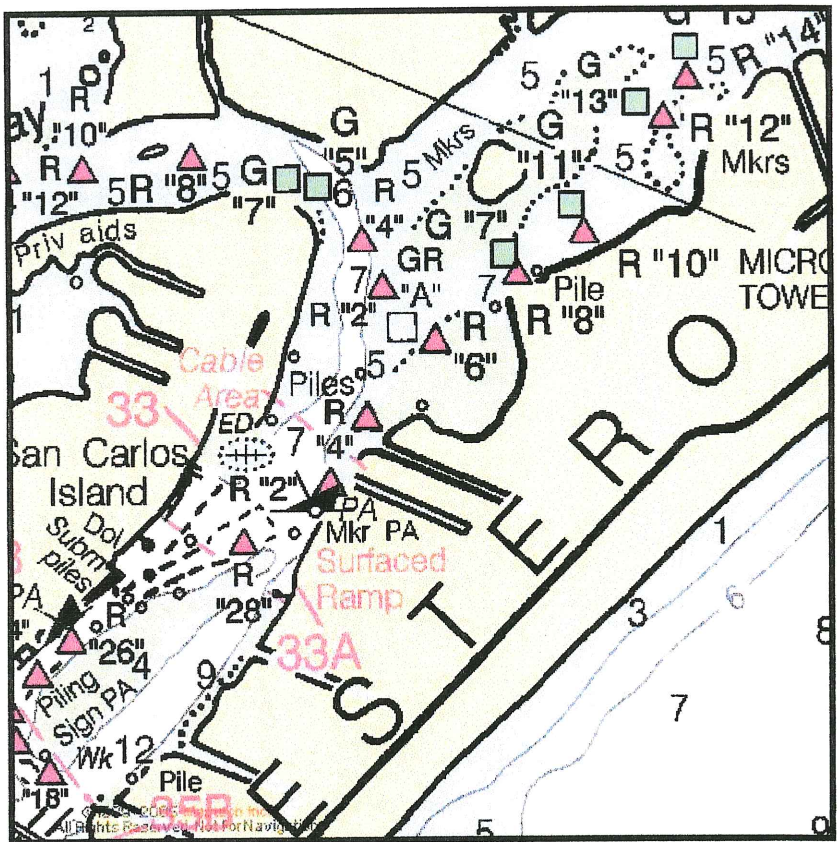

***USGS Topographic map of the area( depths in meters)***



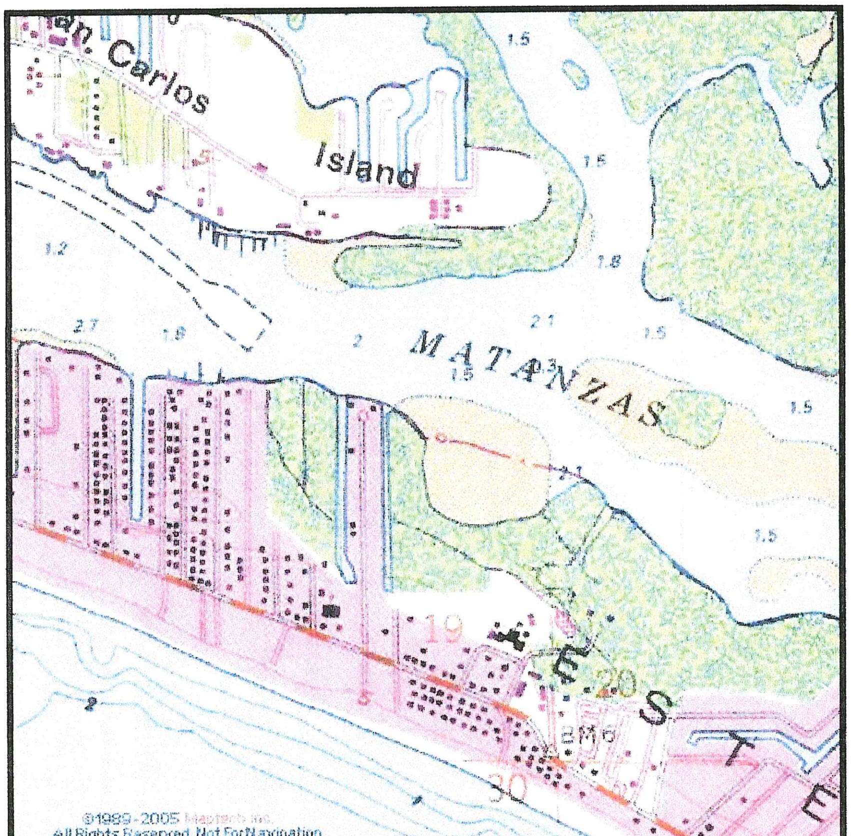

***Road map of the area.***



***Maptech satellite photo of the area***



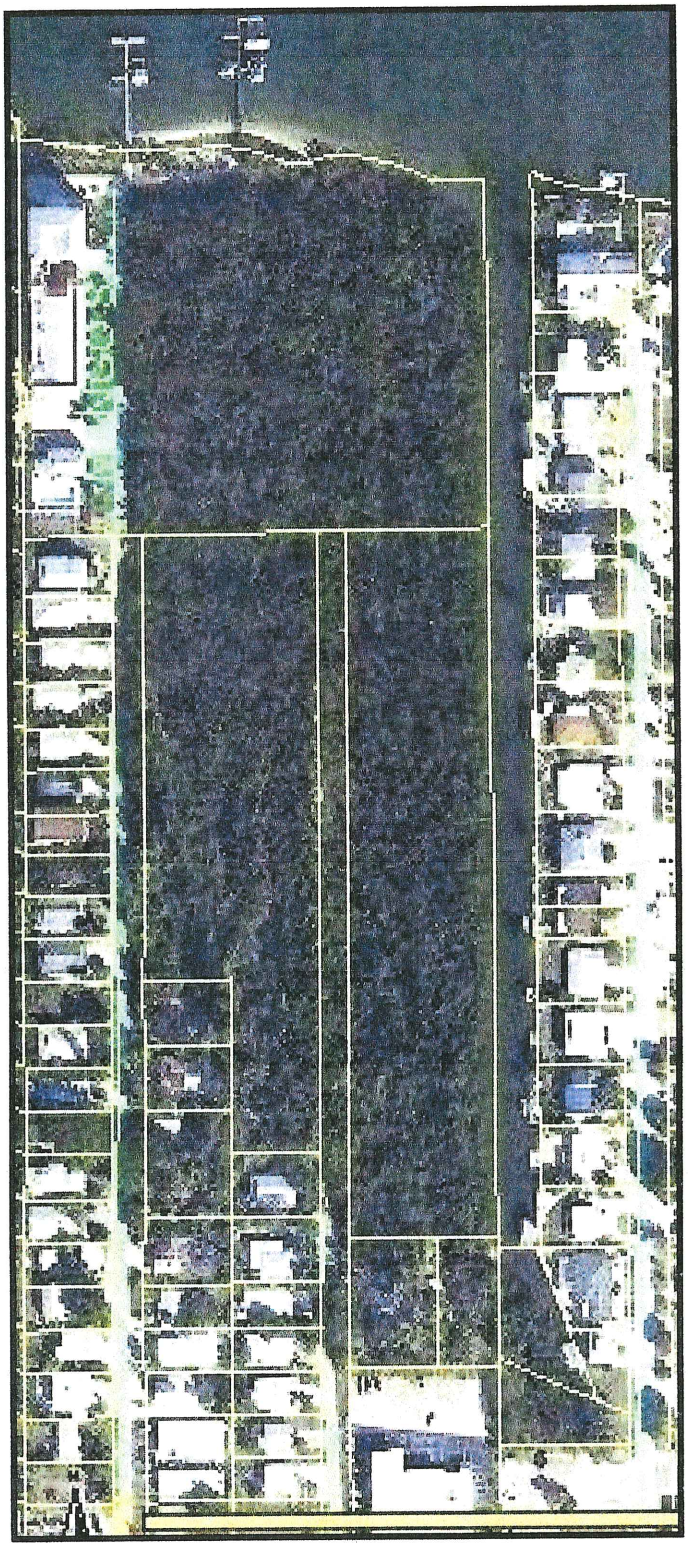

*Navigation chart of Matanzas Pass Basin showing an outline of the mudflat*

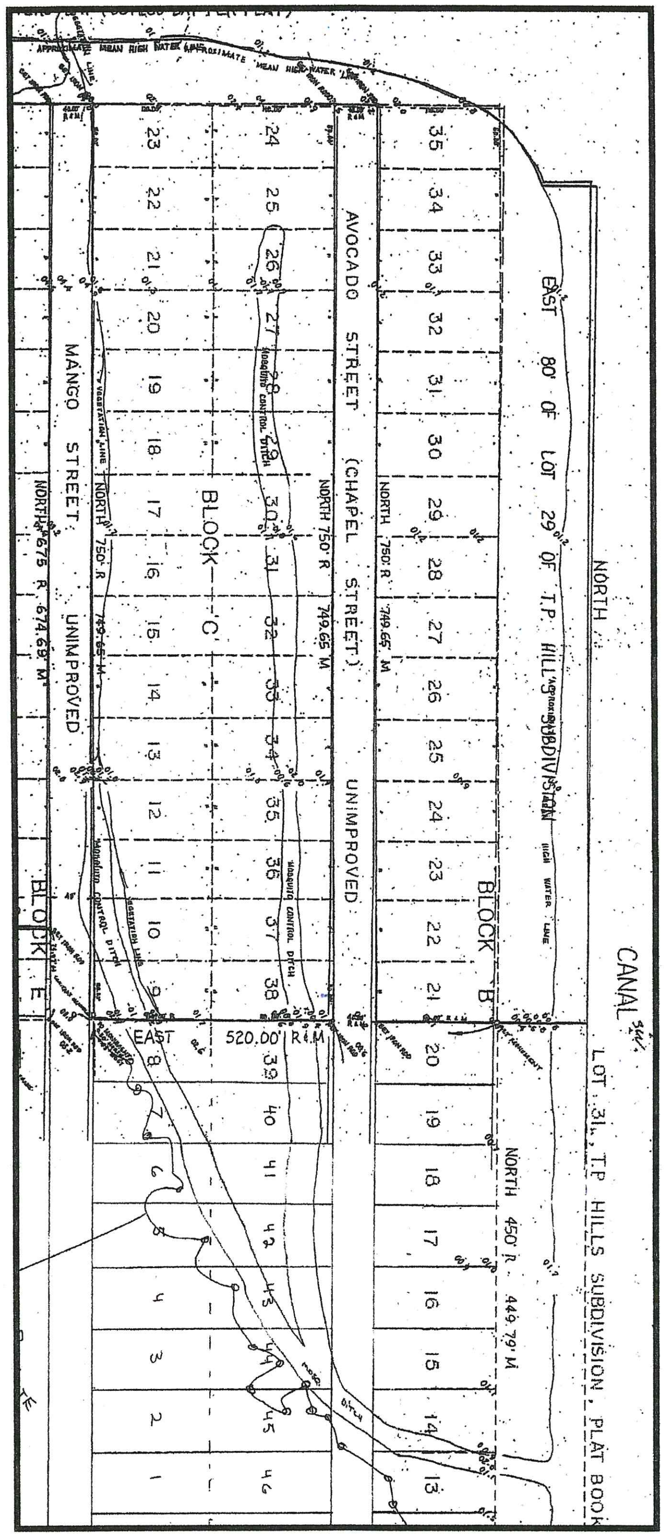


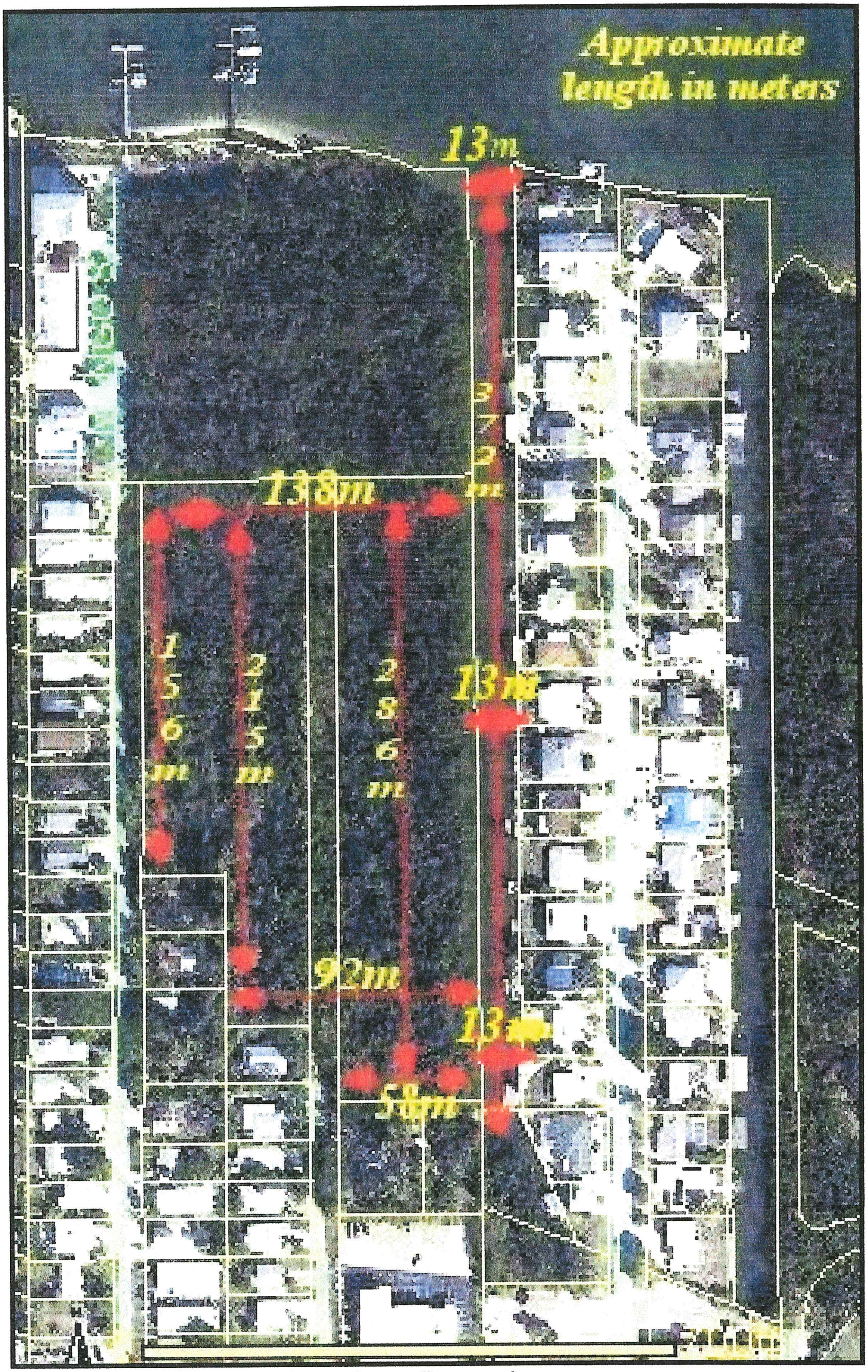

*Bathymetric map (meters) of Matanzas Pass area showing the outline of the dredged area and two Mosquito Control canals in place on the site*

There are no utilities or underground improvements on either of the parcels, only Mosquito Control canals are noted - built in the 1950's.

These canals have an adjacent berm of 2.9 ft NGVD in height, with some dredge spoil areas as high as 6 ft. A 1984 topographical survey shows the northern portion of the site is generally less than 1.4 ft NGVD, while parts of the southern portion are greater than 2ft NGVD.



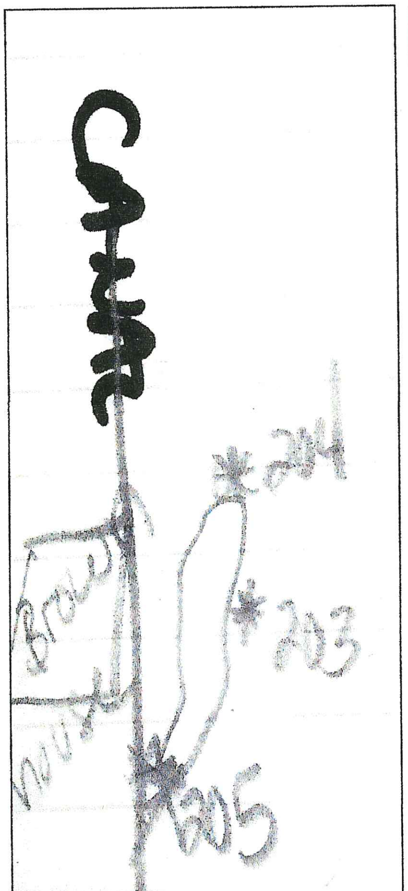





*Approximate distances in meters*


***Spoil mound (above)over 6ft high (some higher than 10ft), and canal berm (below)***

***A small canal - unrecorded cut in the main canal on property***




***Field map of the canal with GPS waypoints***

***Canal entrance opposite the brown roof house on main canal***

# MATANZAS PASS TIDAL CIRCULATION PATTERNS

Probably the classic definition of a coastal inlet is a short, narrow waterway connecting a bay, lagoon or similar body of water with the ocean; a tidal inlet is one in which a tide ebbs and flows. Pass is a regional term with no practical difference in meaning, and it will be used here interchangeably with inlet. These are deceptively simple definitions toward an understanding of the processes associated with inlets. Even in this most basic form, an inlet would be subject to complexities from water-height and velocity variations associated with the tides, including monthly, seasonal and epochal extremes, local wind effects, upland runoff and inflow, and tropical and extra-tropical storm surges.

The tidal passes are affected by the fact that they extend through, or are adjacent to, littoral drift barrier islands. Since most of the Gulf coast of Florida is generally thought of as a micro-tidal, wave- (or storm-) dominated regime, it is the changes in wave energy and resulting littoral sand transport that is of greater importance than the local tides. These two sources of energy, the tides and waves (with their associated effects), form a locally unique balance that determines the specific geometric and functional characteristics of each inlet. This balance is often referred to as a dynamic equilibrium, to emphasize the point that as tides, waves and sand transport vary in their cyclic patterns, or as a result of longer-term influences, the inlet's characteristics will change as well.

While no two inlets are identical, they frequently share common general geometric and hydraulic features related to their similar energetics. These features usually include the types and locations of sub-channels, current patterns, areas of sediment accumulation and the alignments of adjacent shorelines. However, inlets on sandy coasts under tidal influence essentially will always have a more complex system of multiple channels, due principally to the non-symmetrical distribution of tidal water velocities versus tidal heights. Maximum and minimum velocities typically do not coincide with the water-level extremes, nor are the patterns in such phase variations the same under ebb and flood conditions.

On a flood tide, the Gulf waters rise in relation to the bay, initially entering the inlet through one or two persistent marginal or "*swash*" channels running along the adjacent shorelines. As the water increases in depth, it flows through the pass into the Bay more evenly and uniformly, covering a large bottom area before maximum velocities are reached. The opposite occurs during ebb tides or falling water levels in the Bay. By the time water velocities peak, the water level may have dropped to a point where increasingly it flows out only through a network of more well-defined Bay-bottom courses terminating at the actual pass in a single, deeper main channel, termed the main ebb channel, or sometimes the *"gorge"* channel (Truit, 1992). These tides entering the Bay (flood) or exiting the Bay (ebb) may produce water velocities sufficient to transport sand. The source of the sand is a combination of littoral drift material carried into the general area by waves and the sediment scoured locally from the channel bottoms and sides. Because the water velocities vary considerably in strength (and direction) over a single tidal cycle and over longer periods, the sand entrained in the flows may be deposited, re-suspended and re-deposited in a continuous process, forming complex bedforms (Truit, 1992). Usually, however, two somewhat similar areas of net sediment deposition will form, one opposite the inlet on the Gulf side and one on the Bay side. The Gulf-side deposit is related to ebbing currents and is variously termed the ebb-tidal delta, the ebb shoals or the ebb fan. The bayside accumulation is more related to the action of flood-direction tidal currents and is, therefore, appropriately named flood-tidal delta, flood shoal, etc.

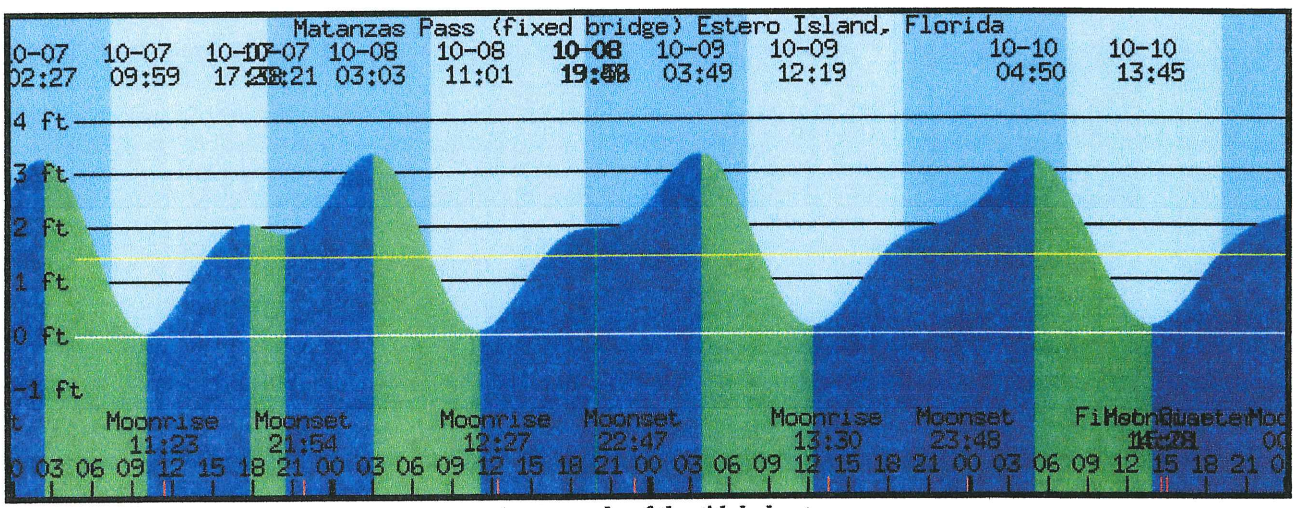
The size and geometry of these shoal areas are generally descriptive of the age and dynamic equilibrium of the particular inlet system, and also relate to its stability. Geologically-younger inlets may not have reached an equilibrium condition, and still may be accumulating sand in their shoals. Such passes will tend to have measurably smaller shoals with simpler geometries than older, more mature inlets exposed to otherwise similar wave and tide forces (Truit, 1992). Truit (1992) also makes the observation that inlets, where the wave energy dominates over the tide, will have ebb and flood shoals with roughly equal volumes, however, the open sea side deposits will tend to be more narrow, with complex, multi-lobed patterns.

One of the fundamental properties of interest is called the tidal prism, and represents the volume of water (usually in cubic feet or cubic meters) flowing into or out of an inlet in response to tidal fluctuations and other local forces. This volume is obviously a very important characteristic, since it can be related to salinity inputs, circulation in the Bay, flushing and inlet stability (Truit, 1992). The calculation or estimation of a tidal prism usually assumes that the only force driving the water is that the water-level rises uniformly, that is, the water surface has no slope. The tide is frequently assumed to be sinusoidal. The velocity imparted to the water is proportional to the amplitude of the tide, and in the simplest formulations is represented by the average over an entire ebb or flood phase. More detailed methods may use a maximum velocity, or mean maximum with various coefficients (Truit, 1992). Usually the averaged velocity is usually sufficient to look at the volumetric transport of the water, but the instantaneous bottom velocities and their perturbations are of greater influence in the entrainment and movement of any sediment.

***High Tide flooding the mudflat at Matanzas Pass basin with the bridge in the background***

The observed tide in Matanzas Pass has a tidal range of approximately 0.94 times the open coast range at Naples (based on calculations and a Suboceanic Consultants hydrographic tide observation study of the Hickory Pass area in February 1978). Suboceanic Consultants (1978) recorded tidal data obtained at sites at Naples Pier and Little Hickory Island from tide gage records, while the data were obtained from tide staffs observations at approximately 15-minute intervals at each location. The average bay tide range, during ebb on 8th February 1978, was 1.77 ft., while the Gulf open-ocean range was 1.87 ft (Suboceanic Consultants, 1978). Tides in the area are of the *mixed* type and have a period of 12.25 hours (Suboceanic Consultants, 1978). Tidal range (0.54 m or 1.77 ft) is approximately, that is, 0.94 times the open coastal range (0.57 m or 1.87 ft) (Suboceanic Consultants, 1978). Area of calculated tidal influence, which extends up rivers to US41, is $0.3 \times 10^8$ m$^2$ ($3.29 \times 10^8$ ft$^2$) (Suboceanic Consultants, 1978).

Calculated tide using a tidal calculation computer program called *Tide Master* and an internet web site shows the range of about 1 m from a NGVD datum, with mean high water about 0.5 m,




***An example of the tidal chart***

Tidal current circulation is of utmost importance in that it plays a dominant role in transporting, flushing, and diluting various contaminants from their sources to seaward locations. The understanding and quantifying of the circulation in an estuary is the first step toward developing a management plan for estuarine resources. In the past, little has been done to determine the zones and quantify the circulation of the bay system. Circulation and transport within the bay system are primarily driven by the interaction of tidal currents propagating through the multiple inlets connecting the bay with the Gulf of Mexico. Tidal current circulation and transport are also influenced by wind, stormwater input, groundwater drainage, as well as by density gradients associated with salinity and temperature variations.

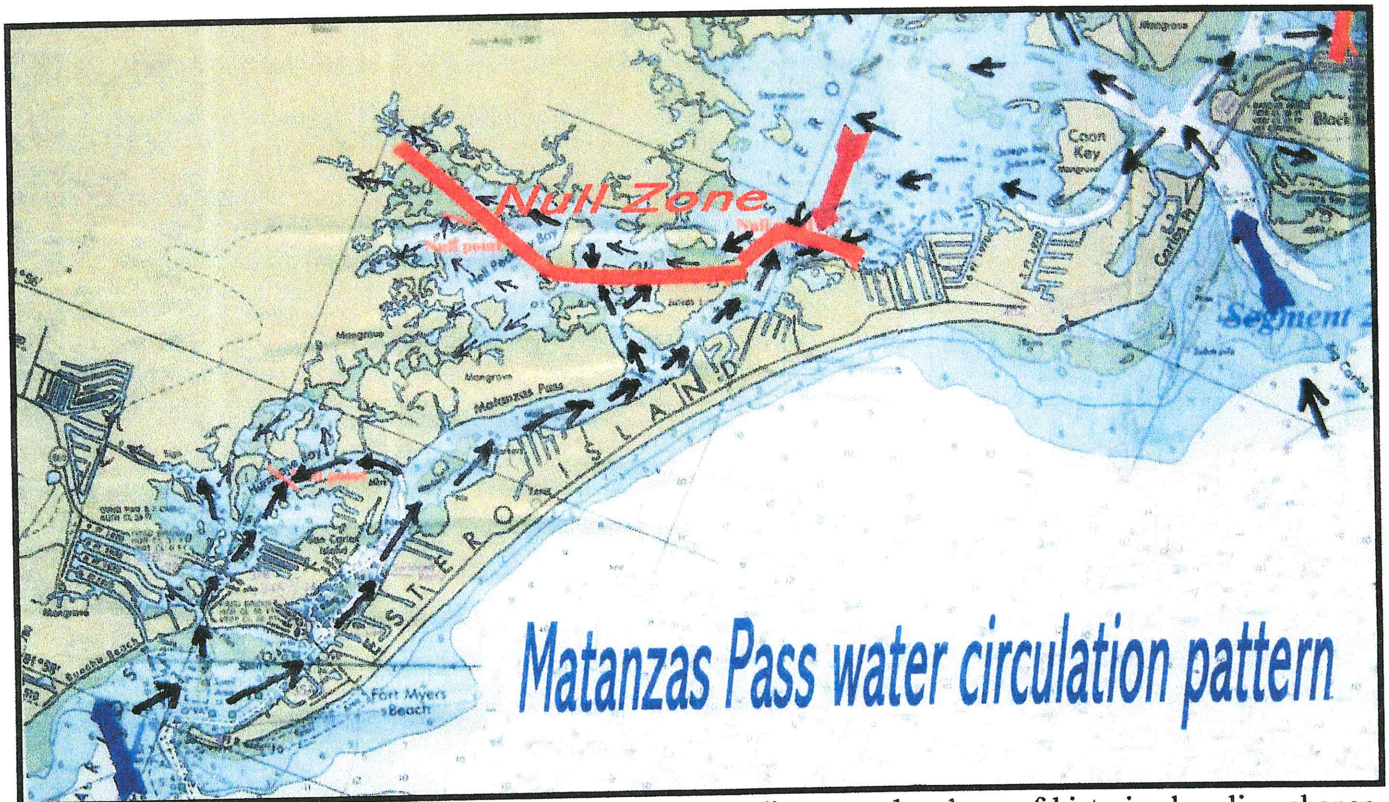
Estero Bay is characterized by areas of strong currents that are very pronounced in and around the passes, and by null zones, that is, areas of very low currents, located at dead-end zones or where two tidal waves propagating in from different inlets meet. An analysis of these currents show that the primary null flow-tide zone is located south of Hell Peckney Bay. The amount of water that flows through the various passes during each tidal cycle varies significantly, with Big Carlos and Matanzas Passes having the largest tidal prisms. The locations of the null zones within the system have a significant effect on the biota and the flushing characteristics of the different segments within the bay and therefore the water quality. Residual circulation patterns can have a significant effect on water quality within the bay through the transport of material to areas not necessarily near the point of input origin.

In order to improve our understanding of the bay, it is important to study the interaction between circulation and sediment and the relationship of water-quality dynamics. The circulation patterns within the bay system are highly dependent upon the cross-sectional areas and the locations of the inlets connecting the bay to the Gulf of Mexico. It is also important to recognize that any changes to bathymetry and inlet cross-sections through dredging (parts of Matanzas Pass near Bowditch Point were dredged in 1996) and therefore changes in water quality and sediment transportation patterns.

Tidal current circulation is forced by the tides at Matanzas Pass, Big Carlos Pass, New Pass and Big Hickory Pass. Tides at the open boundaries are composed of semi-diurnal and diurnal components with relatively low tidal amplitudes (40-80 cm) and slight shifts in the tidal phases. Tidal amplitudes and tidal phases do not vary significantly within the bay, however, tidal currents show significant spatial variation. The shallower depth and more constricted geometry of the bay result in more tidal dissipation. During flood and ebb tides, water enters and leaves the bay through all the passes including the Matanzas Pass Inlet, creating strong flood and ebb currents on both sides of the inlets.

Currents within the bay between the passes are generally much weaker than currents in the passes, due to the presence of null zones. The interaction between the tidal waves entering in the various bay inlets creates a complex circulation pattern characterized by areas of strong currents near the passes and null zones in the bay between inlets. The null zone is characterized by near-zero flow and direction. The location of the null zone depends significantly on the location and configuration of the passes, and may shift dramatically if a new pass is opened or an existing pass is closed, such as Big Hickory Pass. Changes in water-quality parameters are affected by residual flow and tidal flushing.

The Matanzas Pass basin is influenced by the circulation current pattern controlled by Matanzas Pass for tide ingress and egress. This segment controls the main drainage flow input areas from southwest and southern South Fort Myers, while each subdivision, although influenced by the same tidal currents, control the seasonal water quality changes that are due to different drainage runoff areas. There are two tidal current null points in Matanzas Pass waters, one in Hurricane Bay and and another at the meeting of Big Carlos Pass water. This latter tidal current null point stretches across the bay between Jules Island and Estero Island and into Hell Peckney Bay as far as Dog Key. Null points may vary and actually be a wider zone at certain times of the year due to changes in tidal height, stormwater runoff quantity, and opening and closing of inlets.



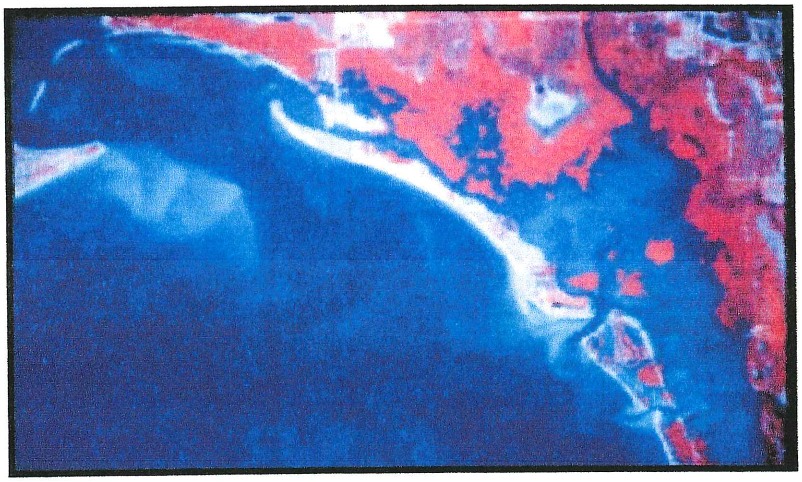

In order to better understand the movement of sediment, a data base of historic shoreline change information has been assembled by the Division of Beaches and Shores. In essence, all the historic coastal topographic survey maps by the U.S. Coast & Geodetic Survey (USC&GS), National Ocean Survey (NOS), and U.S. Geologic Survey (USGS), have been digitized and compared on standardized scale and coordinate systems. The coastal survey monument and beach profile set was used as a shoreline sampling pattern with approximate 1000 feet (300 meter) spacing. The result is a set of computer-generated composite maps showing all the digitized shorelines, and tabulated data sets of quantitative changes along profile bearings from the 1850's to the present. The shoreline changes are all relative to the location of the approximate Mean High Water (MHW) contour. DNR aerial photographs of 1974, 1982, 1983, and 1988 also exist for this area. All this information is available at the Florida Department of Natural Resources, Division of Beaches and Shores. Photographs of Landsat images (1986) are useful in examining the area and especially in viewing the shoal systems of the larger inlets and their relationship to shoreline shape.

San Carlos Bay area is a distinctly different region. The satellite imagery suggests that this area can best be considered as one very large and complex tidal inlet system. In the image it appears that there are two sets of shoals at the entrance: those extending from the eastern point of Sanibel, and those deposits building Estero Island. Waves appear to be only secondary modifying forces in this region due to limited fetch and shoaling in the relatively shallow waters. Tidal flows appear to be predominate, gradually moving and depositing large amounts of littoral material. Consistent with this theory, the sands in this area are generally very fine quartz, mixed with shell in various locations. The finest deposits are in those areas closest to the inlet mouth.

Over the last 100 years the most significant changes have occurred in the area. A succession of emergent shoals and reworked sandbars have been both added onto Estero and formed as new islands. Occasionally a major storm has rearranged the small islands and inlets in this area. The source and mechanism of sand supply in this area and southward is not obvious or resolved. This is due to conflicting indications as to the net direction of sand transport by waves, and an apparent imbalance in the gross sand budget if only waves are considered. Some mechanism of offshore sand supply, related to the tidal flows of the large San Carlos Bay inlet system, may be at work in carrying sand to the south. In Lee

County, coastal problems appear to result either from storm damage to structures simply located too far seaward, or where development intersects the large scale continuing evolution of the islands.

Estero Island appears to be dominated by sand moved by tidal flows rather than by wave action. The areas of concern are in those spots where structures have been built too close to the water line and are therefore vulnerable to storms. The data indicate that over the last 15 years there have been no significant erosion problems on the Gulf-fronting portions of the island. Erosion is conservatively estimated at -1 to -2 ft/yr in this area (U.S. Army Corps of Engineers, 1969). The placement of fill, from the occasional cutting and dredging of the north end of the island by the Army Corps of Engineers, onto the beaches in the vicinity of the pier and northward (R-179 to R-177), has helped keep that area stable.



*Infrared photo of the area showing the sandy areas*

The south end of the island (R-200 to R-207) is accreting as large shoals merge with the shoreline. The exception is the armored area along Big Carlos Pass (R-208 to R-210) which is likely to remain vulnerable to erosion from the adjacent inlet flood channel and exposure to southwesterly storm waves.

Surveys of the inlets in the area have been made infrequently, although the U. S. Coast and Geodetic Survey and the Corps of Engineers have made surveys of the offshore region since 1885. In a 1885 survey, the charted mean high water shoreline on the Gulf side of the islands indicated the 6 ft. and 12 ft depth contours (Corps of Engineers, 1969). A 1927 survey shows changes in the mean high water shoreline (Corps of Engineers, 1969). Beach profiles were taken by the Corps of Engineers, in conjunction with the Beach Erosion Control Study, on Estero Island in 1967. Profiles were also surveyed by the Florida Department of Natural Resource on the Gulf sides of Estero Island, Lovers Key and Little Hickory Island in 1974 prior to the determination of the recommended coastal setback line, presently referred to as *the coastal construction control line*.

## REFERENCES


Foster, E.R., and Savage, R.J., 1989. "Methods of Historical Shoreline Analysis", Coastal Zone '89, Vol. 5, Session 72, ASCE, New York, N.Y., pp. 4434-4448.

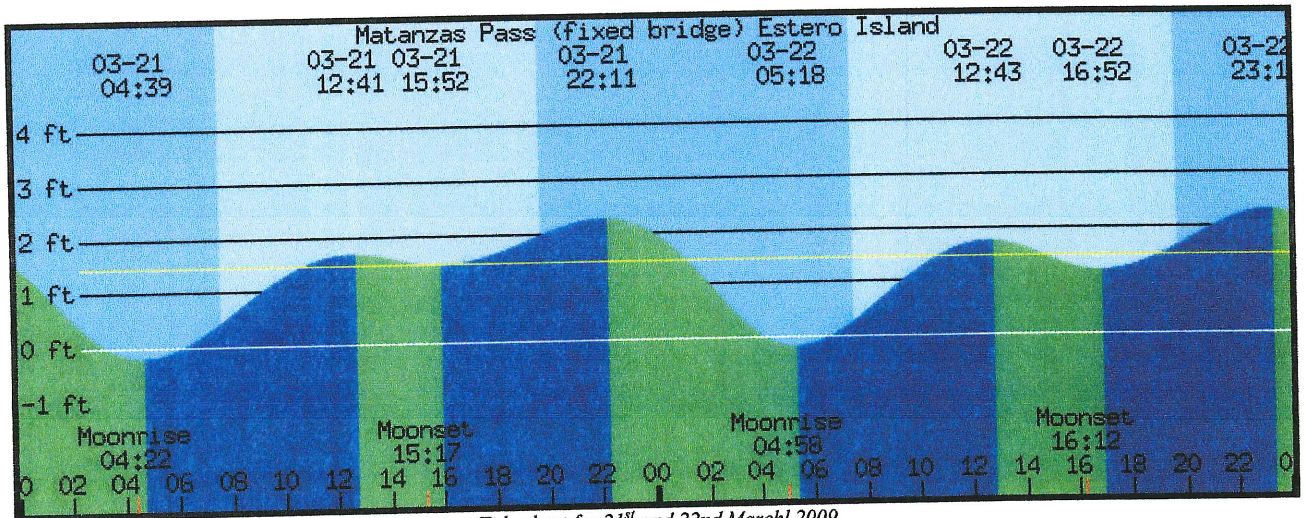
Foster, E.R., and Savage, R.J., 1989. "Historic Shoreline Changes in Southwest Florida", Coastal Zone '89, Vol. 5, Session 72, ASCE, New York, N.Y., pp. 4420-4433.

O'Brien, M.P., and Dean, R.G., 1972. "Hydraulics and Sedimentary Stability of Coastal Inlets", 13th Conference on Coastal Engineering, Vol. 2, ASCE, New York, N.Y., pp. 761-780.

U.S. Army Corps of Engineers, 1969. "Beach Erosion Control Study for Lee County", Jacksonville District, Jacksonville, FL.

# FIELD ENVIRONMENTAL SURVEY

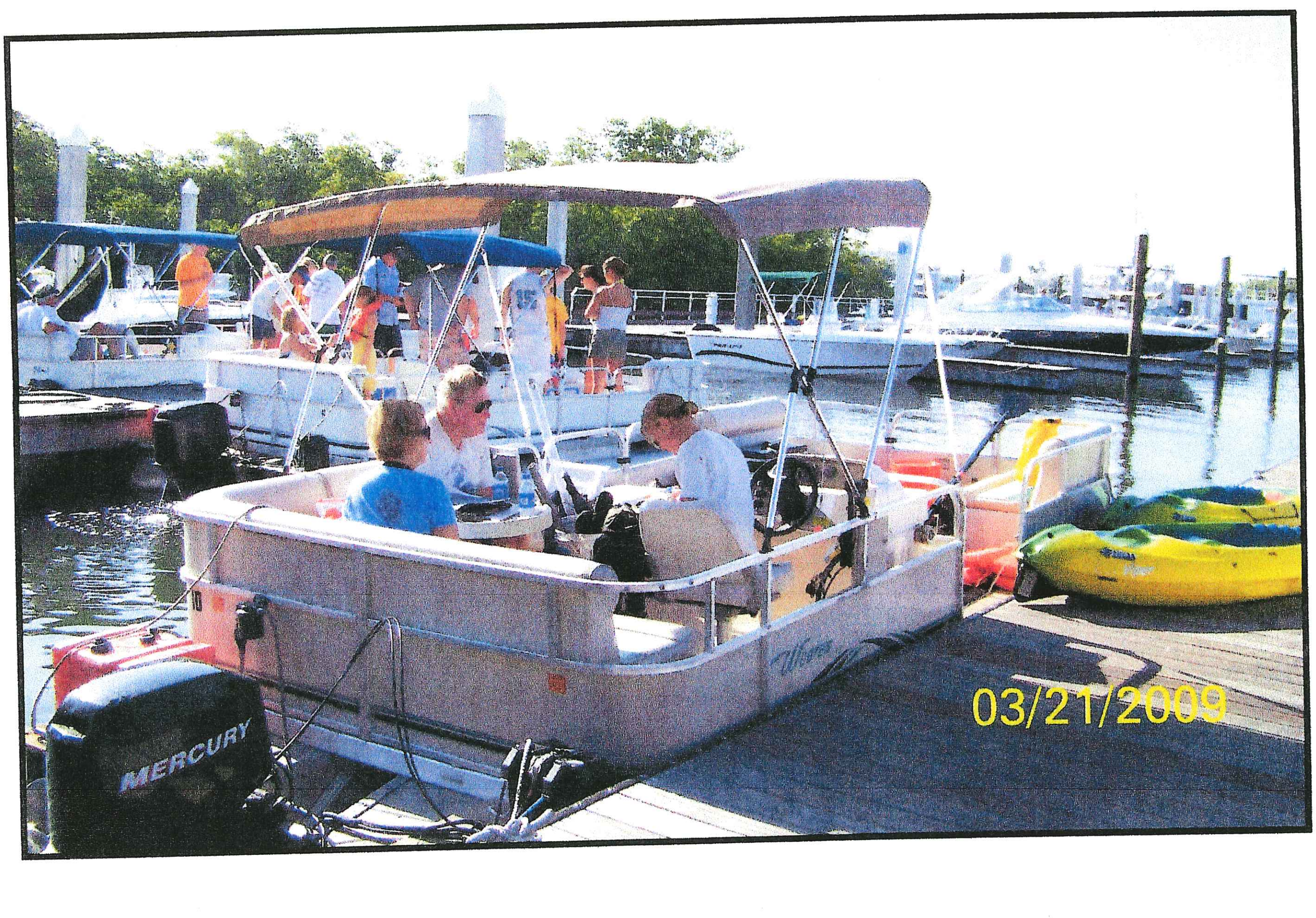
An environmental survey of the site was carried out on Saturday 21[st] March 2009 during a rising single tide for the day.




*Tide chart for 21[st] and 22nd Marchl 2009*

*Horizontal lines mark mean sea level(upper yellow line) and datum (usually mean lower low water).*
*Colors under the curve indicate rising and falling tide (not ebb and flood currents).*

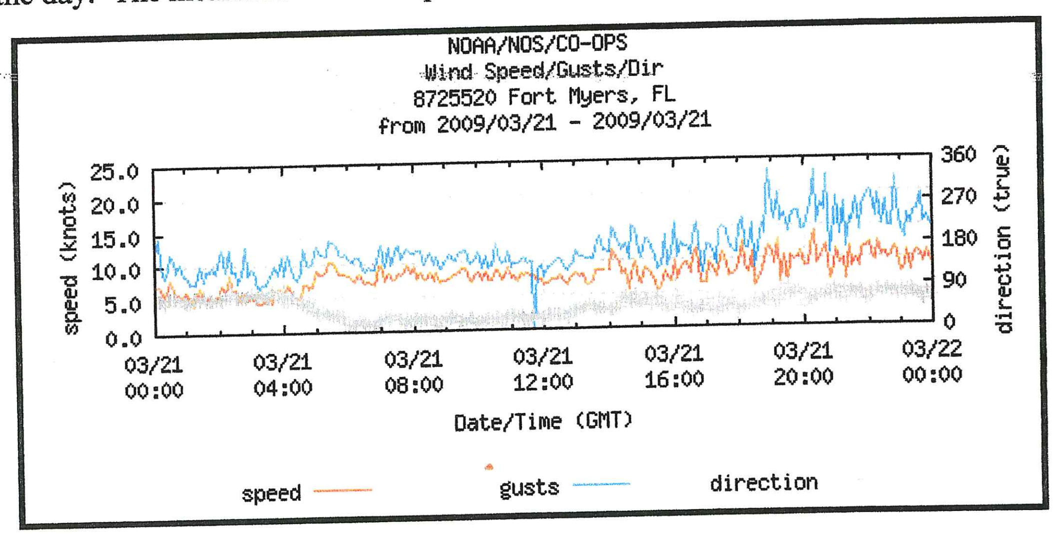
A pontoon boat, used as the main control center, was moored in the canal at the opening to the Mosquito Control canal near the southeasternmost point of the property.



Two kayaks were used to traverse the Mosquito Control Canals, to gain access to the site to obtain soil samples, during high tide.

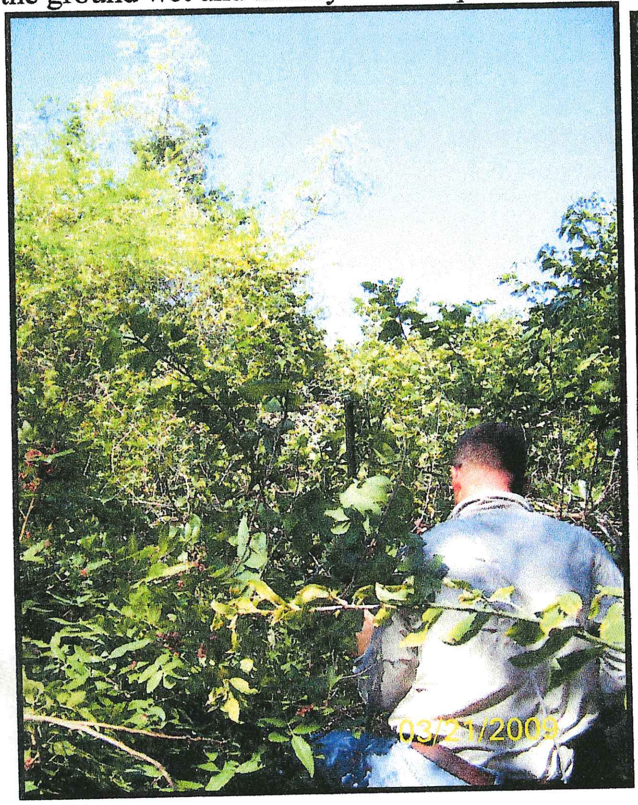

Specialized equipment used during the field environmental survey were a Tasco marine compass binoculars, handheld electronic depth-sounder & temperature-recorder, recording cameras, Bushnell Elite rangefinder, coring equipment, and two Garmin 60CS GPS WAAS handheld units that recorded track movement, core locations, as well as flag data points across the site.

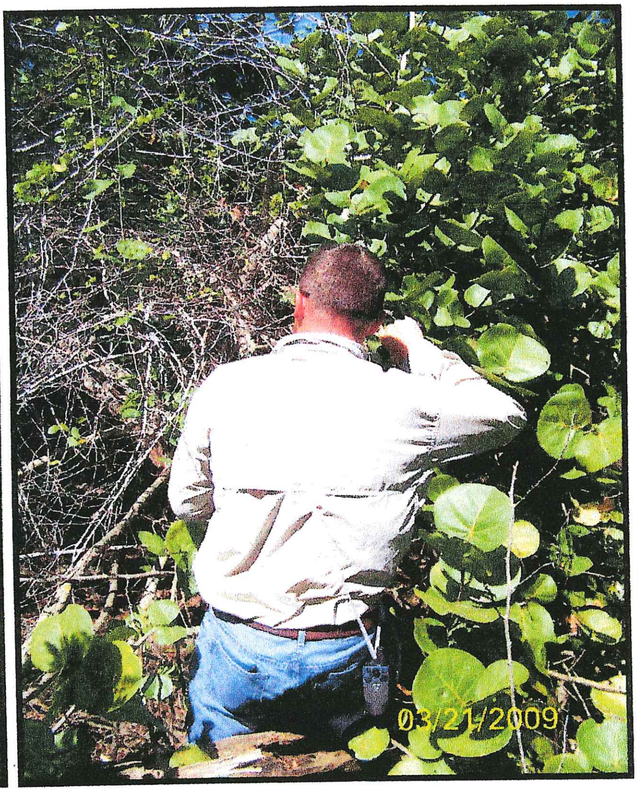
On the day of the environmental survey, the air temperature ranged from 61°F in the early morning to 86°F in the afternoon, with zero cloud cover at the start and 40% clouds later in the day, with no rain throughout the day. The measured water temperature in the main canal was 68°F.

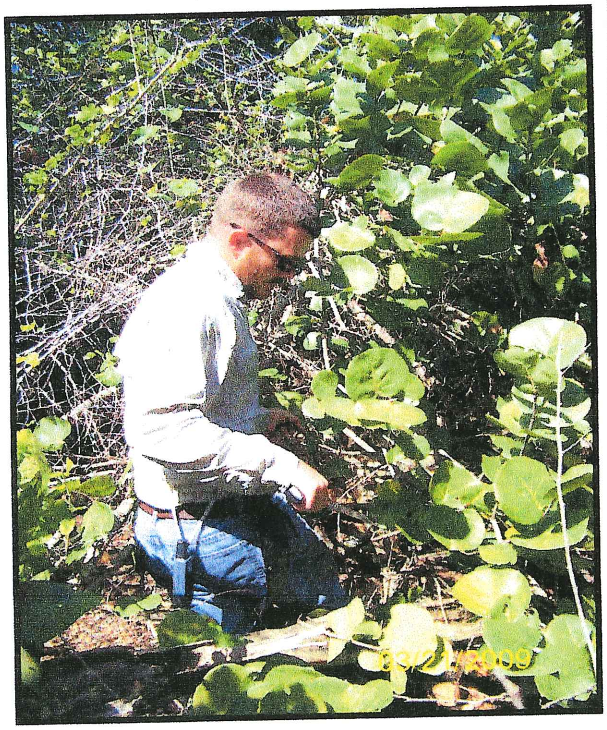


The survey plan was to use 4 persons to search the site and 2 base personnel to record data. The upland area to the South of the westernmost Mosquito Control canal was searched by two members taking cores as they went. Two further members kayaked along the two Mosquito Control canals as far as possible and the took cores in designated locations either side as they returned to the Mosquito Control canal entrance on the main canal. Two other persons stayed on the pontoon boat recording depth data and keeping in touch with the other two parties by hand-held radio contact for safety and to monitor progress.

Progress was difficult throughout the major portion of the survey as the vegetation was very thick and the ground wet and muddy in some places.



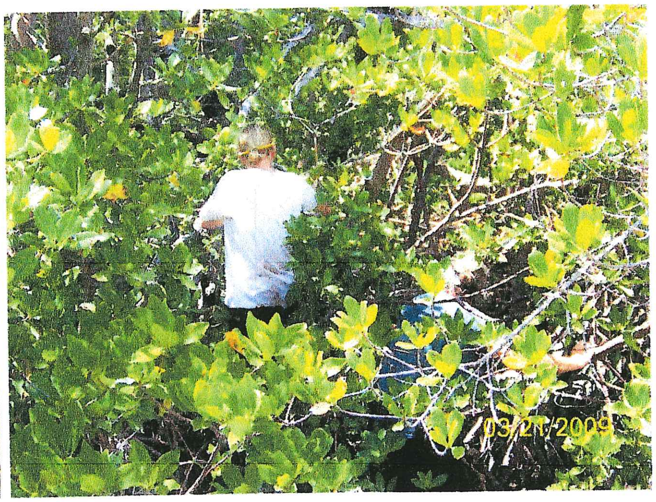




03/21/2009


03/21/2009

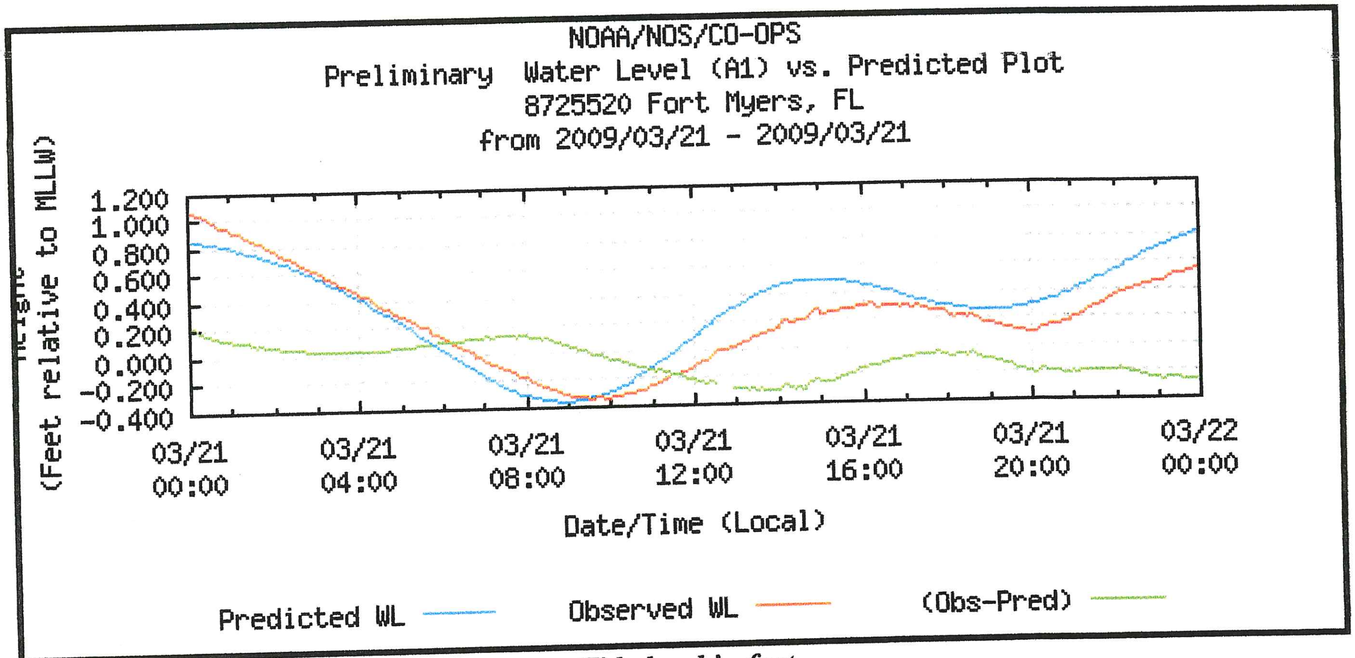

03/21/2009



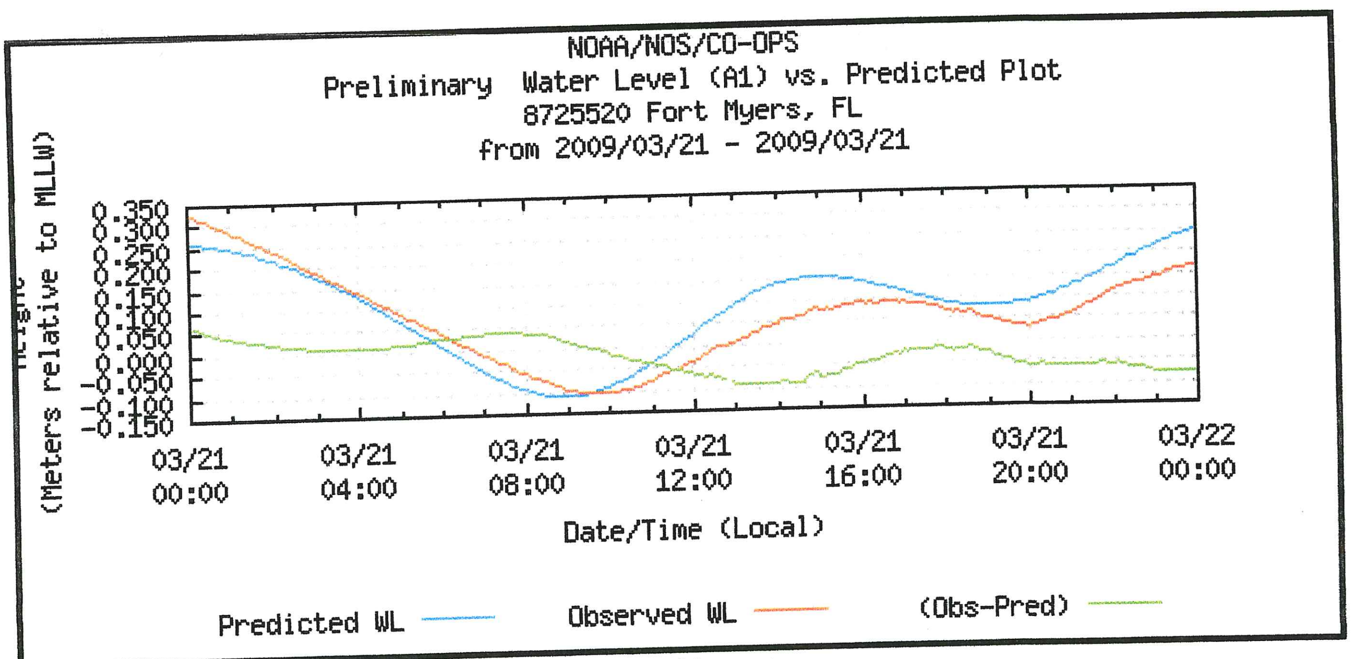
# MAIN CANAL DEPTH

The canal depth was measured, in both meters (for GPS accuracy) and feet & inches, at interval locations along its length, and these locations were recorded with GPS WAAS. The depth measurements were later adjusted for NGVD-sea level, for time adjustment, using tide tables.

The tide table for the day was

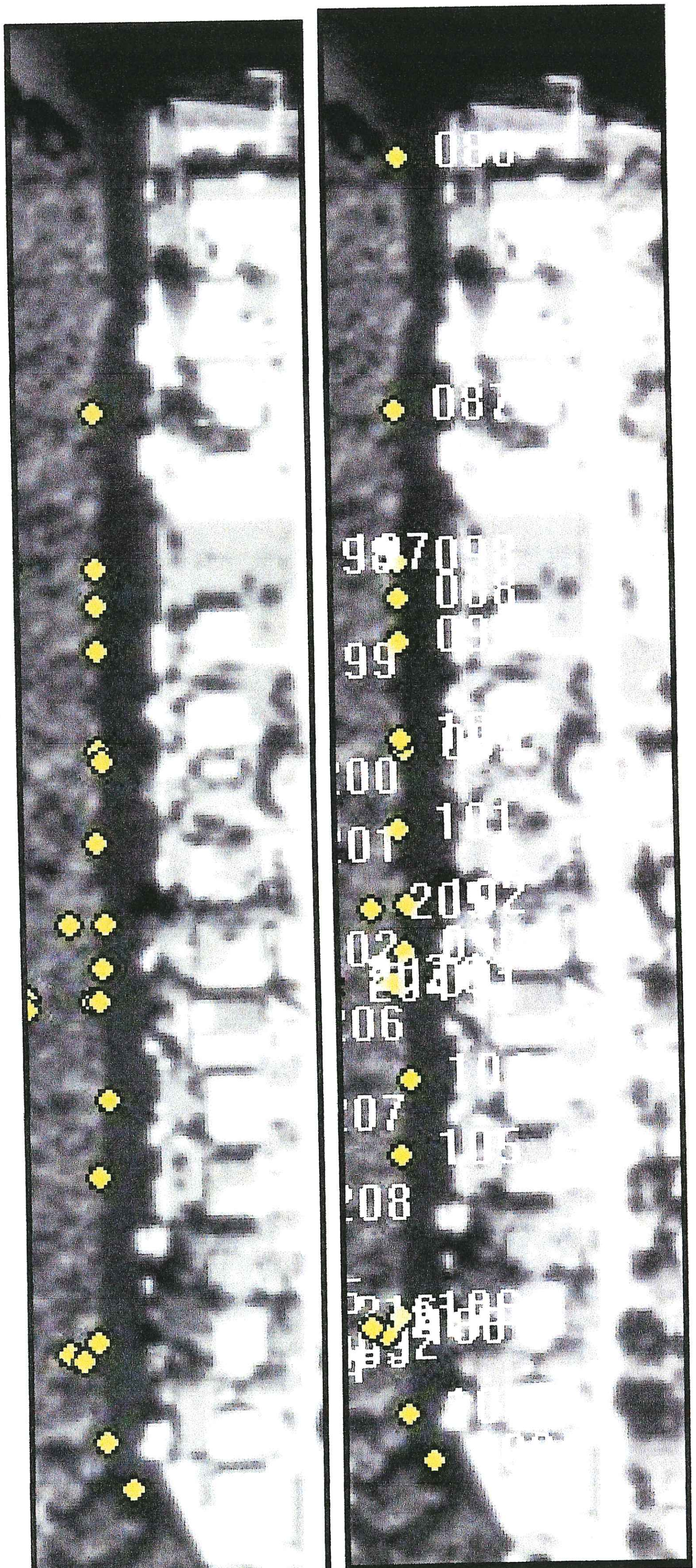



*Tide level in feet*




*Tide level in meters*


***Center of the canal depth (feet) NGVD adjacent to the property (the red line is the soil survey line)***

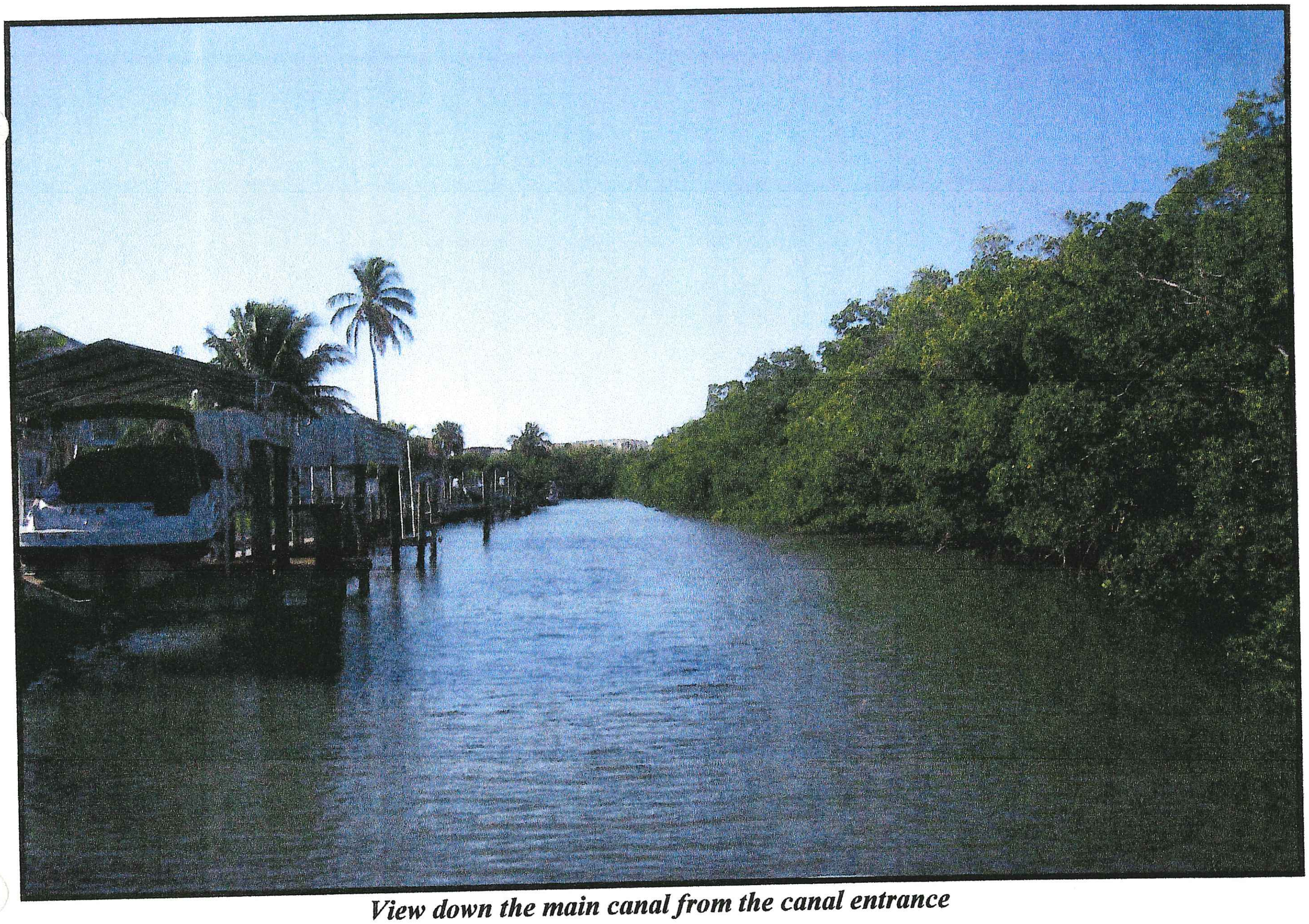


***Location of water depths measured close to edge of canal adjacent to the property***

| Header | Name | Description | Position | inches | inches NGVD |
|---|---|---|---|---|---|
| Waypoint | 86 | 21-MAR-09 8:00:12AM | N26 27.218 W81 56.564 | 29 | ***15.0*** |
| Waypoint | 87 | 21-MAR-09 8:03:37AM | N26 27.180 W81 56.565 | 30 | ***16.0*** |
| Waypoint | 88 | 21-MAR-09 8:05:40AM | N26 27.152 W81 56.565 | 30 | ***16.0*** |
| Waypoint | 89 | 21-MAR-09 8:08:13AM | N26 27.129 W81 56.564 | 30 | ***16.0*** |
| Waypoint | 98 | 21-MAR-09 12:10:36PM | N26 27.157 W81 56.565 | 30 | ***16.0*** |
| Waypoint | 99 | 21-MAR-09 12:12:11PM | N26 27.146 W81 56.565 | 30 | ***16.0*** |
| Waypoint | 100 | 21-MAR-09 12:13:37PM | N26 27.131 W81 56.565 | 26 | ***11.0*** |
| Waypoint | 101 | 21-MAR-09 12:15:12PM | N26 27.118 W81 56.565 | 23 | ***8.0*** |
| Waypoint | 102 | 21-MAR-09 12:18:28PM | N26 27.106 W81 56.564 | 24 | ***9.0*** |
| Waypoint | 103 | 21-MAR-09 12:19:53PM | N26 27.094 W81 56.566 | 16 | ***0.5*** |
| Waypoint | 104 | 21-MAR-09 12:21:22PM | N26 27.079 W81 56.564 | 30 | ***16.0*** |
| Waypoint | 105 | 21-MAR-09 12:22:55PM | N26 27.068 W81 56.565 | 29 | ***15.0*** |
| Waypoint | 106 | 21-MAR-09 12:24:38PM | N26 27.044 W81 56.566 | 33 | ***18.0*** |
| Waypoint | 107 | 21-MAR-09 12:26:09PM | N26 27.029 W81 56.564 | 35 | ***20.0*** |
| Waypoint | 108 | 21-MAR-09 12:27:19PM | N26 27.022 W81 56.560 | 38 | ***23.0*** |

***Raw data of canal depth measured close to the property***

***Entrance(approximately 13 m wide) to the main canal***

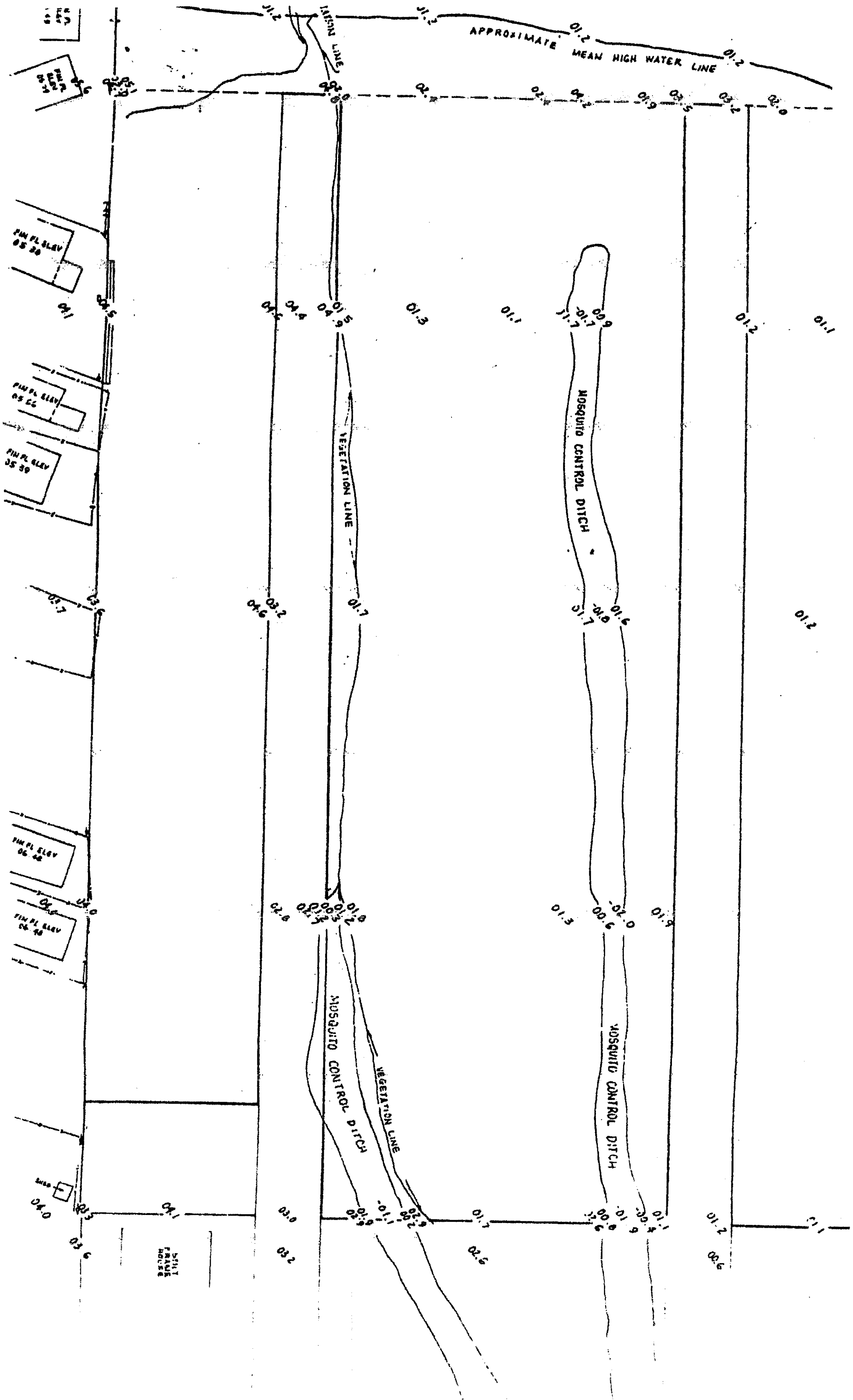


***View down the main canal from the canal entrance***

***Overhanging Red mangrove along property edge on main canal***

***Taking depth measurements and GPS location close to canal edge***

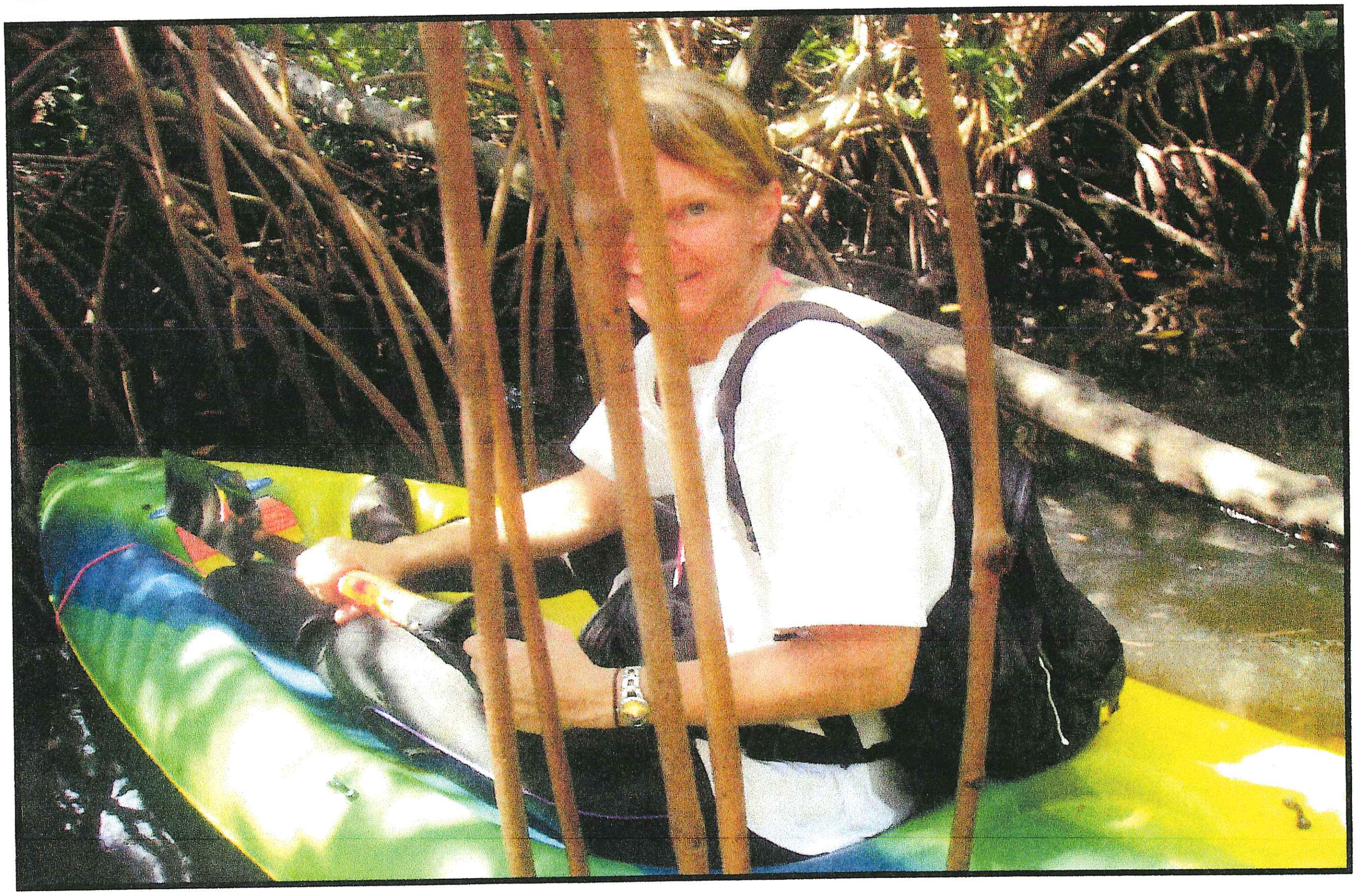
***On location at Mosquito Control canal opening into main canal***




***Map of the Mosquito Control canals with ground elevation (ft) data points ((Deni Associates 10thMay 1984)***

***Kayaking the Mosquito Control canals during high tide***

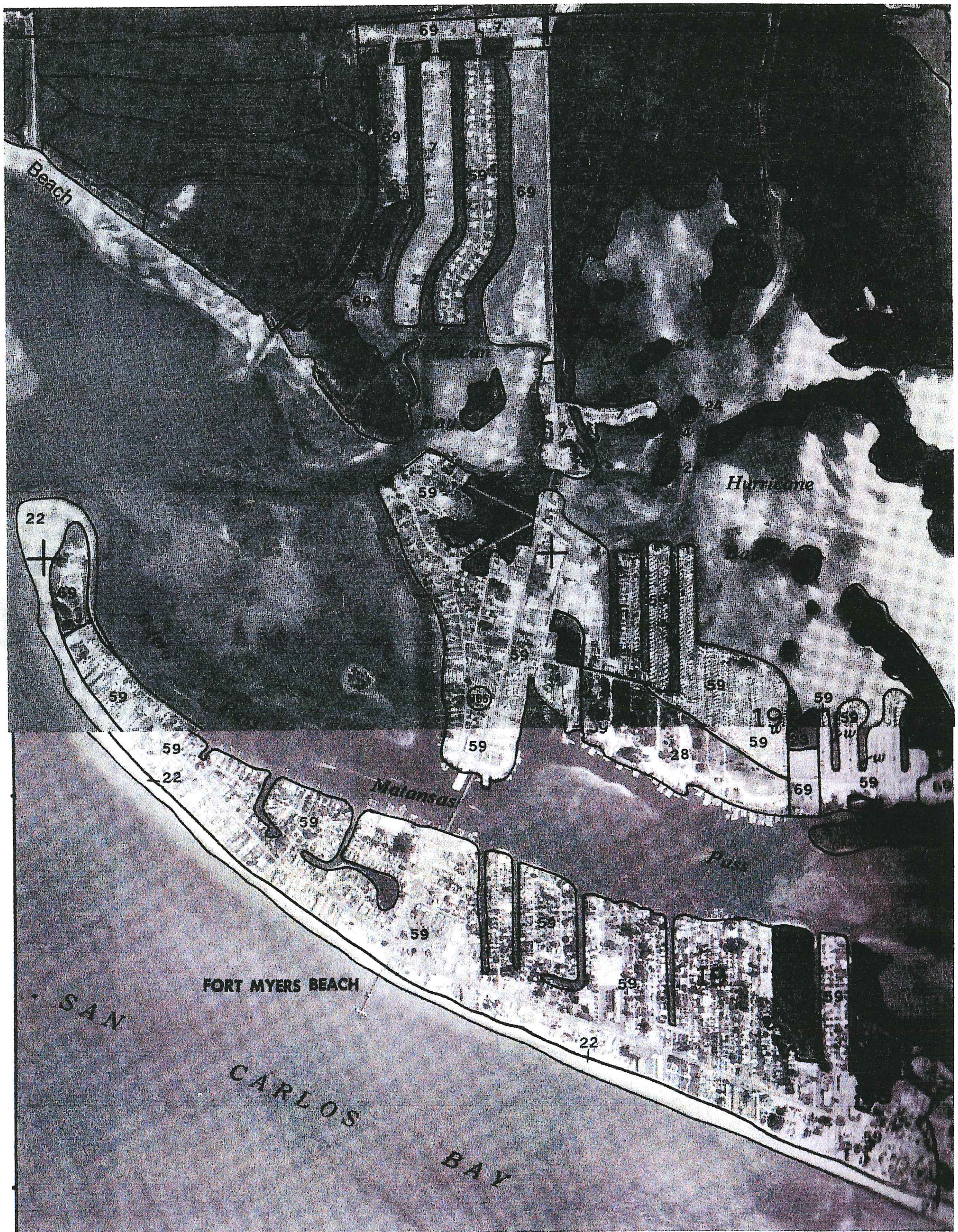

*Views of the site upland area*



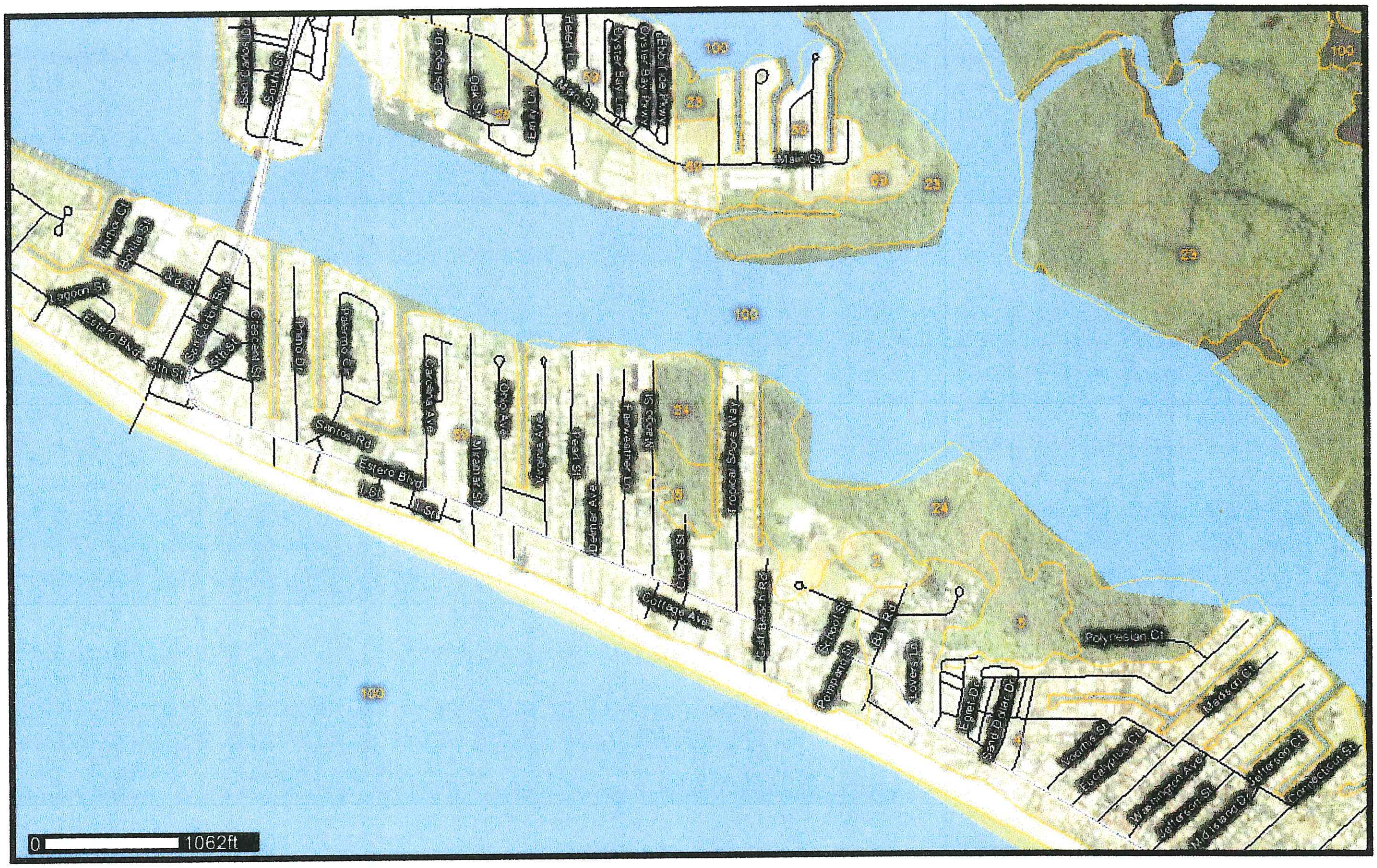

***Spoil piles and Mosquito Control canal***

# SCS SOIL SURVEY

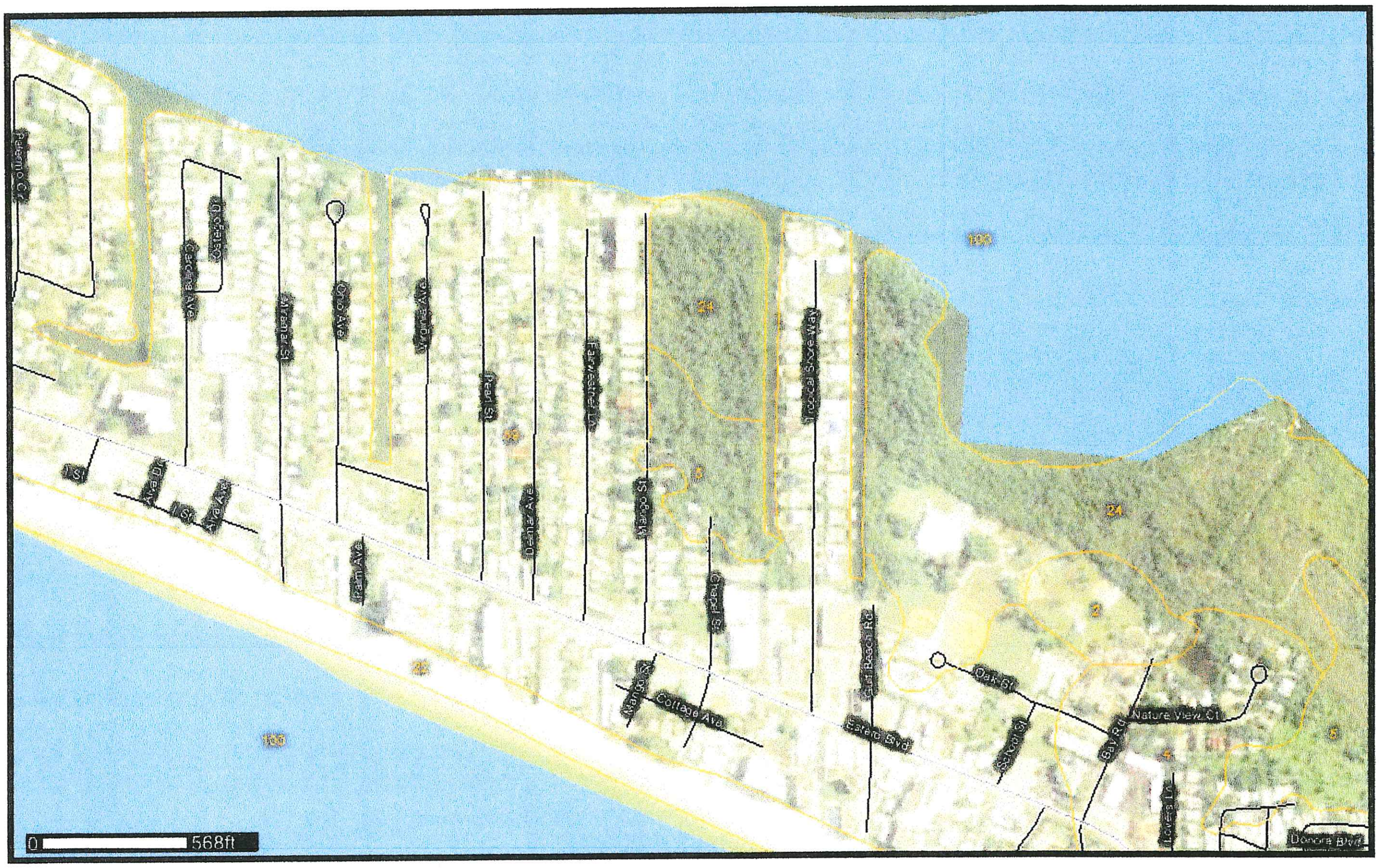
According to the SCS Soil Survey of Lee County (1984), the onshore soils adjacent to the site have been mapped as follows:-




*SCS soil map of the area (1981, published in 1984)*




***Soil Maps of the site***




***Property outlines in the area***


***Two soil types dominate the site, #24 and #5, while surrounding island areas are dominated by #59:***

# Urban, Lee County soil number 59; this type is the dominate soil type for the island

## 59—Urban land

### Map Unit Setting

*Elevation:* 0 to 40 feet
*Mean annual precipitation:* 46 to 54 inches
*Mean annual air temperature:* 70 to 77 degrees F
*Frost-free period:* 358 to 365 days

### Map Unit Composition

*Urban land:* 90 percent
*Minor components:* 10 percent

### Description of Urban Land

#### Setting

*Landform:* Marine terraces
*Landform position (three-dimensional):* Interfluve, talf
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* No parent material

### Minor Components

#### Matlacha

*Percent of map unit:* 2 percent
*Landform:* Flats on marine terraces
*Landform position (three-dimensional):* Talf
*Down-slope shape:* Convex
*Across-slope shape:* Linear

#### Myakka

*Percent of map unit:* 2 percent
*Landform:* Flatwoods on marine terraces
*Landform position (three-dimensional):* Talf
*Down-slope shape:* Convex
*Across-slope shape:* Linear
*Ecological site:* South Florida Flatwoods (R155XY003FL)

#### Immokalee

*Percent of map unit:* 2 percent
*Landform:* Flatwoods on marine terraces
*Landform position (three-dimensional):* Talf
*Down-slope shape:* Convex
*Across-slope shape:* Linear
*Ecological site:* South Florida Flatwoods (R155XY003FL)

#### Smyrna

*Percent of map unit:* 2 percent
*Landform:* Flatwoods on marine terraces
*Landform position (three-dimensional):* Talf
*Down-slope shape:* Convex

*Ecological site:* South Florida Flatwoods (R155XY003FL)

#### Hallandale

*Percent of map unit:* 1 percent
*Landform:* Flats on marine terraces
*Landform position (three-dimensional):* Talf
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Ecological site:* South Florida Flatwoods (R154XY003FL)

#### Boca

*Percent of map unit:* 1 percent
*Landform:* Flats on marine terraces
*Landform position (three-dimensional):* Talf
*Down-slope shape:* Convex
*Across-slope shape:* Linear
*Ecological site:* South Florida Flatwoods (R155XY003FL)

## Data Source Information

Soil Survey Area: Lee County, Florida
Survey Area Data: Version 6, Nov 29, 2006

# Keeson sand, Lee County soil number 24,

## 24—Kesson fine sand

### Map Unit Setting

*Mean annual precipitation:* 46 to 54 inches
*Mean annual air temperature:* 70 to 77 degrees F
*Frost-free period:* 358 to 365 days

### Map Unit Composition

*Kesson, tidal, and similar soils:* 88 percent
*Minor components:* 12 percent

### Description of Kesson, Tidal

#### Setting

*Landform:* Tidal marshes on marine terraces
*Landform position (three-dimensional):* Interfluve, talf
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Sandy marine deposits with shells

#### Properties and qualities

*Slope:* 0 to 1 percent
*Depth to restrictive feature:* More than 80 inches
*Drainage class:* Very poorly drained
*Capacity of the most limiting layer to transmit water (Ksat):* High to very high (1.98 to 19.98 in/hr)
*Depth to water table:* About 0 to 6 inches
*Frequency of flooding:* Very frequent
*Frequency of ponding:* None
*Calcium carbonate, maximum content:* 15 percent
*Maximum salinity:* Moderately saline to strongly saline (16.0 to 32.0 mmhos/cm)
*Sodium adsorption ratio, maximum:* 30.0
*Available water capacity:* Low (about 5.8 inches)

#### Interpretive groups

*Land capability (nonirrigated):* 8w

#### Typical profile

*0 to 6 inches:* Fine sand
*6 to 23 inches:* Fine sand
*23 to 38 inches:* Fine sand
*38 to 80 inches:* Fine sand

### Minor Components

#### Captiva

*Percent of map unit:* 6 percent
*Landform:* Drainageways on marine terraces
*Landform position (three-dimensional):* Dip
*Down-slope shape:* Linear
*Across-slope shape:* Concave

*Ecological site:* Slough (R155XY011FL)

#### Wulfert, tidal

*Percent of map unit:* 6 percent
*Landform:* Tidal marshes on marine terraces
*Landform position (three-dimensional):* Talf
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Ecological site:* Salt Marsh (R155XY009FL)

## Data Source Information

Soil Survey Area: Lee County, Florida
Survey Area Data: Version 6, Nov 29, 2006

# Captiva Fine sand, Lee County soil number 5.

## 5—Captiva fine sand

**Map Unit Setting**

*Elevation:* 10 to 20 feet
*Mean annual precipitation:* 46 to 54 inches
*Mean annual air temperature:* 70 to 77 degrees F
*Frost-free period:* 358 to 365 days

**Map Unit Composition**

*Captiva and similar soils:* 92 percent
*Minor components:* 8 percent

**Description of Captiva**

**Setting**

*Landform:* Drainageways on marine terraces
*Landform position (three-dimensional):* Dip
*Down-slope shape:* Linear
*Across-slope shape:* Concave
*Parent material:* Sandy marine deposits

**Properties and qualities**

*Slope:* 0 to 1 percent
*Depth to restrictive feature:* More than 80 inches
*Drainage class:* Poorly drained
*Capacity of the most limiting layer to transmit water (Ksat):* High to very high (5.95 to 19.98 in/hr)
*Depth to water table:* About 0 to 6 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Calcium carbonate, maximum content:* 15 percent
*Maximum salinity:* Nonsaline to slightly saline (2.0 to 8.0 mmhos/cm)
*Sodium adsorption ratio, maximum:* 25.0
*Available water capacity:* Low (about 3.1 inches)

**Interpretive groups**

*Land capability (nonirrigated):* 4w
*Ecological site:* Slough (R155XY011FL)

**Typical profile**

*0 to 6 inches:* Fine sand
*6 to 30 inches:* Fine sand
*30 to 80 inches:* Fine sand

**Minor Components**

**Canaveral**

*Percent of map unit:* 4 percent
*Landform:* Ridges on marine terraces, flats on marine terraces
*Landform position (three-dimensional):* Interfluve
*Down-slope shape:* Convex
*Across-slope shape:* Linear

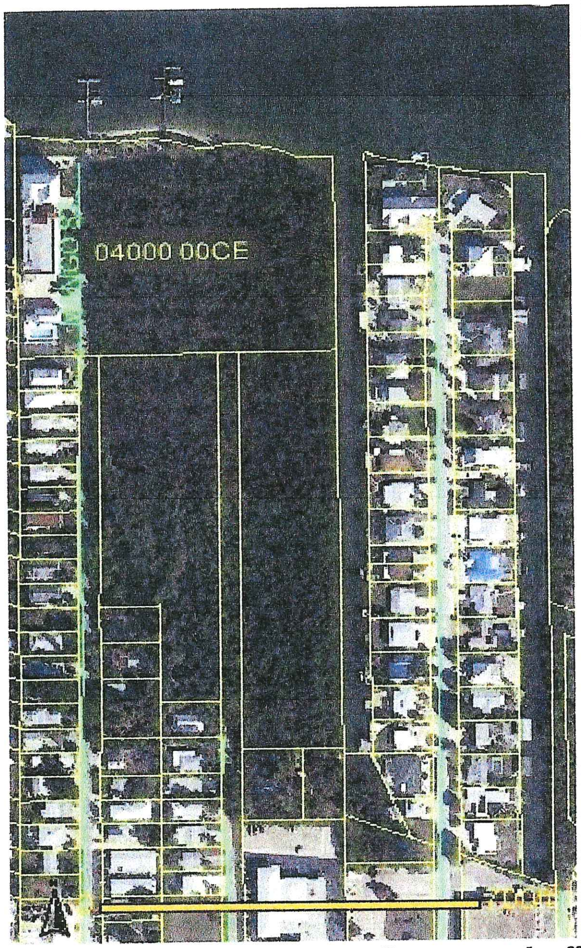
**Kesson, tidal**

*Percent of map unit:* 4 percent
*Landform:* Tidal marshes on marine terraces
*Landform position (three-dimensional):* Interfluve, talf
*Down-slope shape:* Linear
*Across-slope shape:* Linear

## Data Source Information

Soil Survey Area: Lee County, Florida
Survey Area Data: Version 6, Nov 29, 2006

# CORE LOCATIONS OVER THE SITE

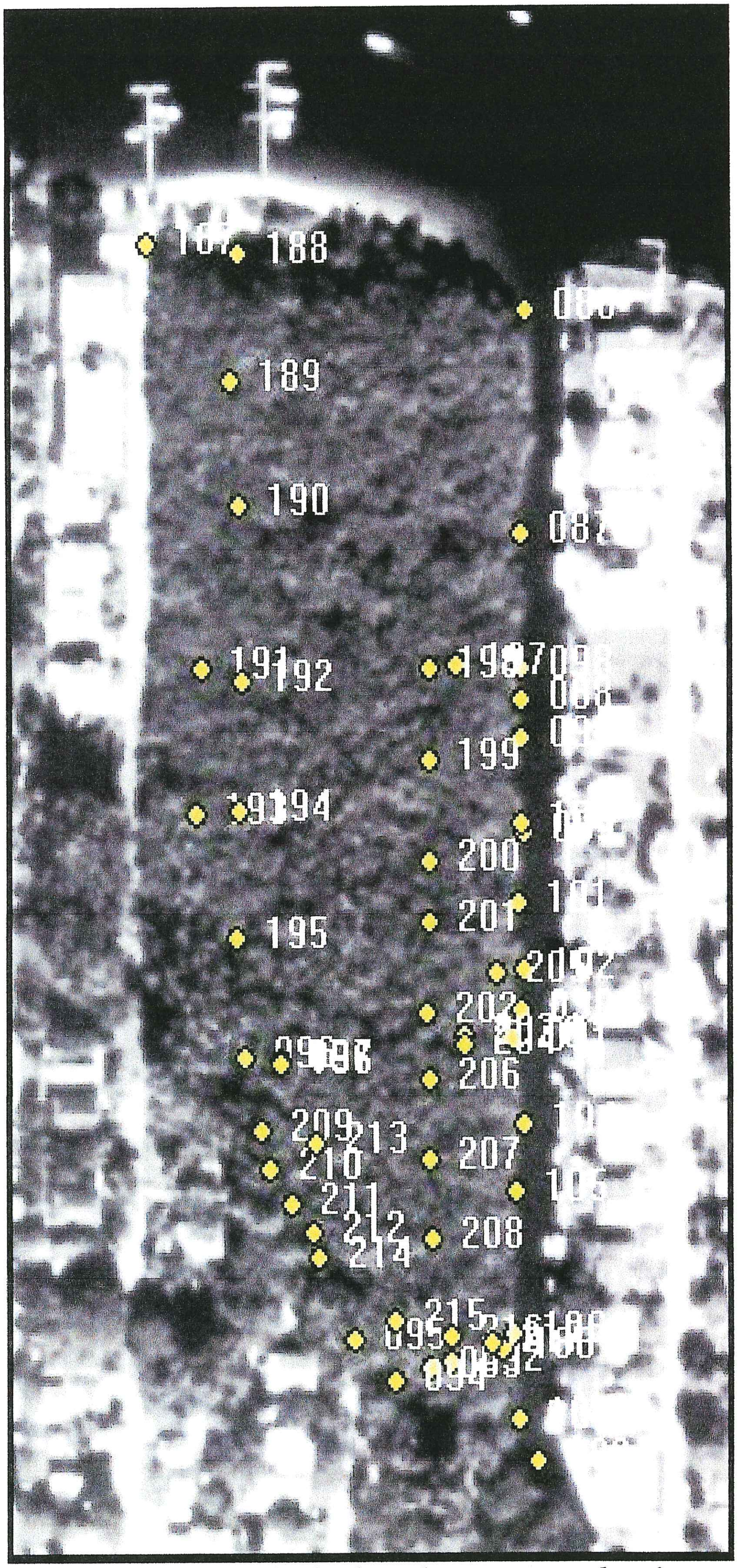



*Core sites – some sampling were made off the site to the North in order to compare adjacent area.*

## *Sample locations collected across site*

***Team 1***

| | | | | |
|---|---|---|---|---|
| Waypoint | 90 | 21-MAR-09 8:10:15AM | N26 27.099 W81 56.564 | 1 |
| Waypoint | 91 | 21-MAR-09 8:11:12AM | N26 27.094 W81 56.565 | 2 |
| Waypoint | 92 | 21-MAR-09 8:48:23AM | N26 27.039 W81 56.579 | 3 |
| Waypoint | 93 | 21-MAR-09 8:56:39AM | N26 27.037 W81 56.584 | 4 |
| Waypoint | 94 | 21-MAR-09 9:14:21AM | N26 27.036 W81 56.592 | 5 |
| Waypoint | 95 | 21-MAR-09 9:23:23AM | N26 27.042 W81 56.601 | 6 |
| Waypoint | 96 | 21-MAR-09 9:35:11AM | N26 27.090 W81 56.625 | 7 |
| Waypoint | 97 | 21-MAR-09 9:38:44AM | N26 27.090 W81 56.618 | 8 |

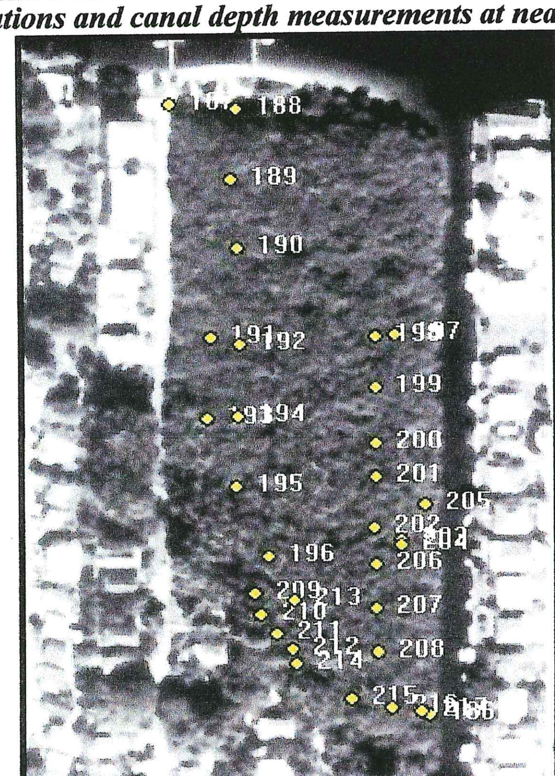



*Core location plus depth of canal measurement locations*

## *Team2*

| # | | | Depth inches | Core # | Red % | Black% | White % | Comments |
|---|---|---|---|---|---|---|---|---|
| 186 | 21-MAR-09 9:40:11AM | N26 27.041 W81 56.568 | | | 100 | | | |
| 187 | 21-MAR-09 10:14:59AM | N26 27.229 W81 56.649 | | | 100 | | | |
| 188 | 21-MAR-09 10:17:09AM | N26 27.227 W81 56.628 | | | 100 | | | MCC entrance |
| 189 | 21-MAR-09 10:22:14AM | N26 27.206 W81 56.630 | | A | 70 | 30 | | western canal |
| 190 | 21-MAR-09 10:35:30AM | N26 27.185 W81 56.628 | | B | 50 | 50 | | |
| 191 | 21-MAR-09 10:54:16AM | N26 27.157 W81 56.636 | | C | 20 | 60 | 20 | |
| 192 | 21-MAR-09 11:04:37AM | N26 27.155 W81 56.627 | | D | 80 | 20 | | Australian Pine |
| 193 | 21-MAR-09 11:15:43AM | N26 27.132 W81 56.637 | | E | 20 | 80 | | Australian Pine - disturbed |
| 194 | 21-MAR-09 11:24:23AM | N26 27.133 W81 56.627 | | F | 70 | 30 | | vine |
| 195 | 21-MAR-09 11:32:22AM | N26 27.111 W81 56.627 | | G | 85 | | 5 | 5%pine;5%oak |
| 196 | 21-MAR-09 11:47:21AM | N26 27.089 W81 56.618 | | H | 60 | 10 | | 30%pine; disturbed; camp |
| 197 | 21-MAR-09 12:53:08PM | N26 27.158 W81 56.579 | | I | 100 | | | eastern canal |
| 198 | 21-MAR-09 1:04:24PM | N26 27.157 W81 56.586 | | | | | | starting point |
| 199 | 21-MAR-09 1:11:06PM | N26 27.141 W81 56.585 | | J | 60 | 30 | 10 | |
| 200 | 21-MAR-09 1:27:15PM | N26 27.124 W81 56.585 | | K | 80 | | 20 | osprey seen |
| 201 | 21-MAR-09 1:35:50PM | N26 27.114 W81 56.585 | | L | 40 | 50 | 10 | |
| 202 | 21-MAR-09 1:47:45PM | N26 27.098 W81 56.585 | | M | 60 | 20 | 20 | |
| 203 | 21-MAR-09 1:54:19PM | N26 27.095 W81 56.577 | | | 100 | | | 8m small canal off main |
| 204 | 21-MAR-09 1:55:50PM | N26 27.093 W81 56.577 | | | 100 | | | 8m small canal off main |
| 205 | 21-MAR-09 1:58:32PM | N26 27.105 W81 56.570 | | | 100 | | | 8m small canal off main |
| 206 | 21-MAR-09 2:02:48PM | N26 27.087 W81 56.585 | | | 100 | | | 8m small canal off main |
| 207 | 21-MAR-09 2:12:44PM | N26 27.073 W81 56.585 | | N | 70 | 30 | | |
| 208 | 21-MAR-09 2:21:08PM | N26 27.060 W81 56.584 | | O | 80 | 10 | 10 | |
| 209 | 21-MAR-09 2:39:52PM | N26 27.078 W81 56.622 | 18 | P | 80 | 20 | | |
| 210 | 21-MAR-09 2:40:48PM | N26 27.071 W81 56.620 | 18 | Q | | | | |
| 211 | 21-MAR-09 2:41:45PM | N26 27.066 W81 56.616 | 20 | | | | | |
| 212 | 21-MAR-09 2:42:38PM | N26 27.061 W81 56.610 | 23 | | | | | |
| 213 | 21-MAR-09 2:43:52PM | N26 27.076 W81 56.610 | 18 | | | | | |
| 214 | 21-MAR-09 2:45:25PM | N26 27.056 W81 56.609 | 23 | | | | | |
| 215 | 21-MAR-09 2:46:35PM | N26 27.046 W81 56.592 | 22 | | | | | |
| 216 | 21-MAR-09 2:48:17PM | N26 27.043 W81 56.579 | 25 | | | | | |
| 217 | 21-MAR-09 2:49:31PM | N26 27.042 W81 56.570 | 33 | | | | | |

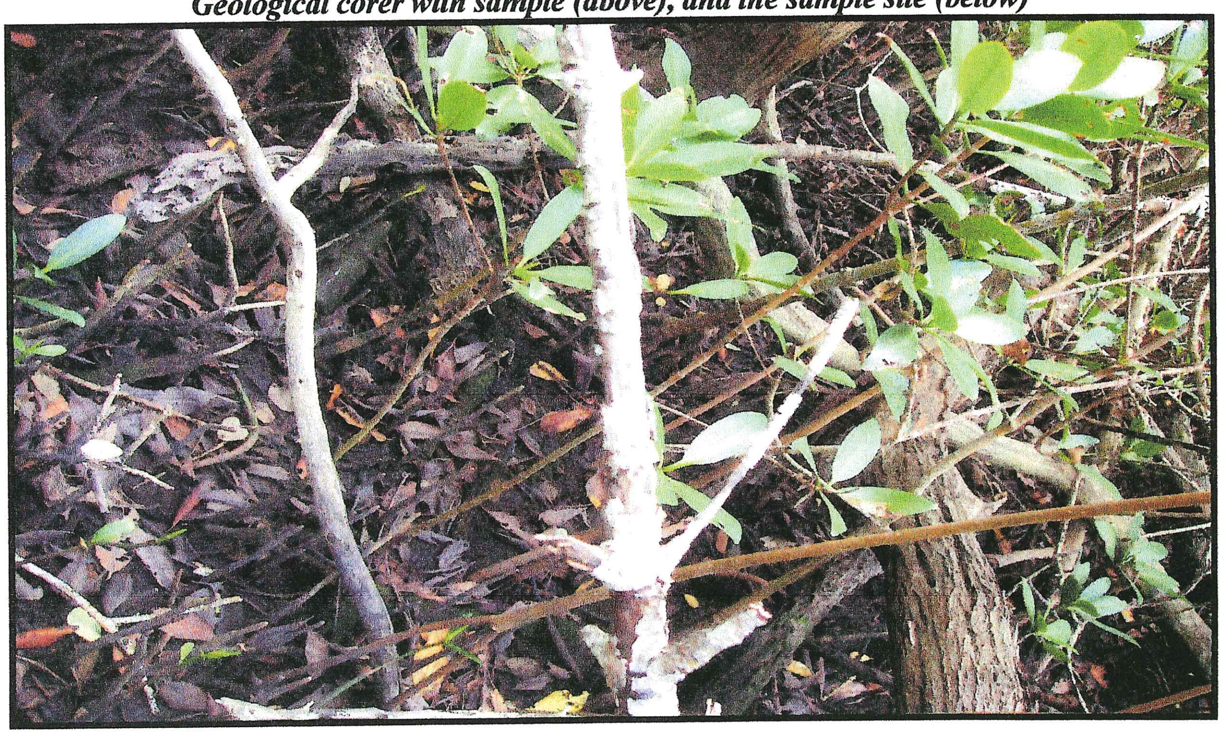
***Core locations and canal depth measurements at near high tide***



# SEDIMENT CORE ANALYSIS

On the Saturday 21st March 2009, cores were taken at various points in a north-south line, between the canal shoreline bulkhead to the Mango Street road, adjacent to the property. A 4ft steel sediment corer was found to be impractical to use under the conditions, so a geological corer was used as it was easier and lighter to transport throughout the site. At some locations, a spade was used to recover samples.

***Geological corer with sample (above), and the sample site (below)***



***Geological corer with sample (above), and the sample site (below)***

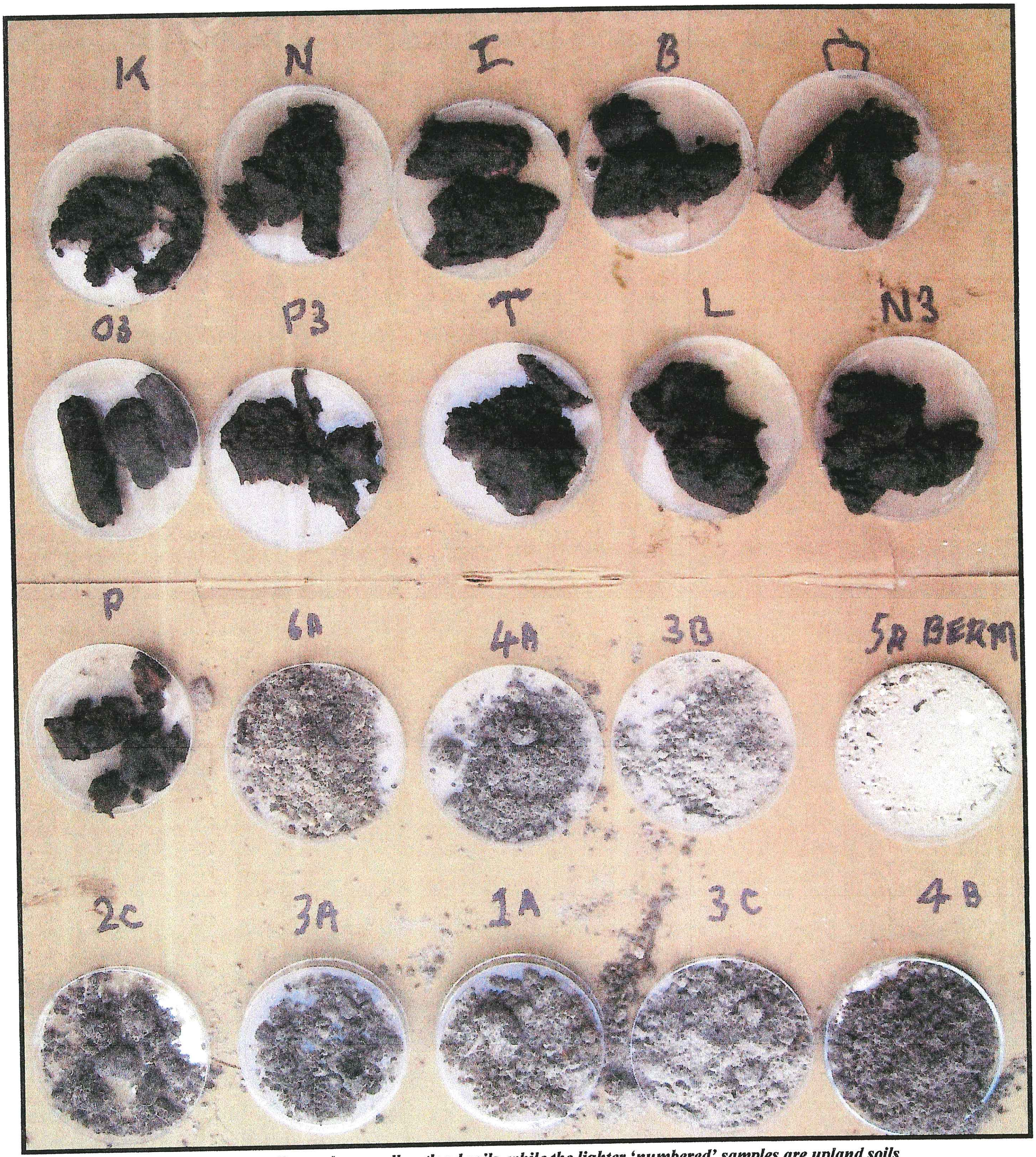
*Geological corer with sample (above), and the sample site (below)*

***Geological corer with sample (below), and the sample site (above)***

***Geological corer with sample (below), and the sample site (above)***

*Geological corer with sample)*

# SOIL SAMPLES


***The dark 'lettered' samples are all wetland soils, while the lighter 'numbered' samples are upland soils***

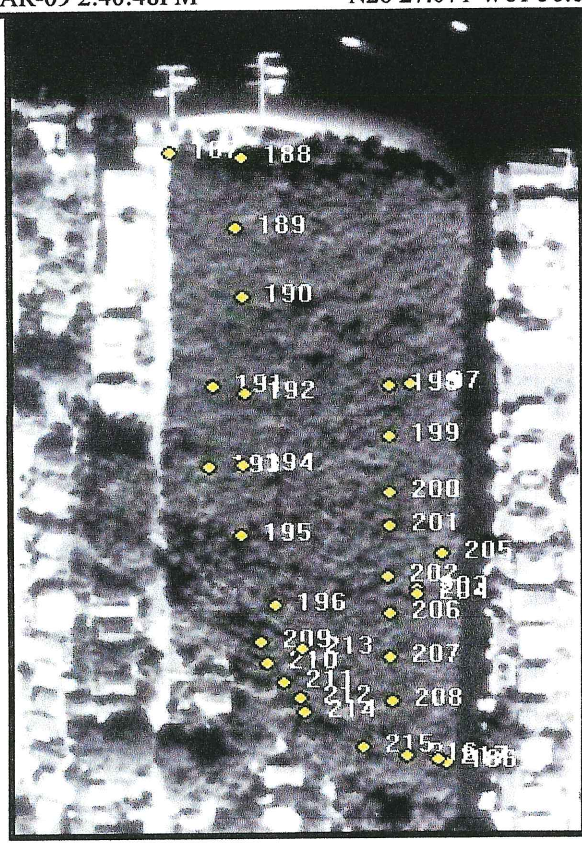
# *CORE LOCATIONS*

## *Team 1*

| # | *Date/Time (actual +1hour)* | *Location* | *Core #* |
|---|---|---|---|
| 90 | 21-MAR-09 8:10:15AM | N26 27.099 W81 56.564 | 1 |
| 91 | 21-MAR-09 8:11:12AM | N26 27.094 W81 56.565 | 2 |
| 92 | 21-MAR-09 8:48:23AM | N26 27.039 W81 56.579 | 3 |
| 93 | 21-MAR-09 8:56:39AM | N26 27.037 W81 56.584 | 4 |
| 94 | 21-MAR-09 9:14:21AM | N26 27.036 W81 56.592 | 5 |
| 95 | 21-MAR-09 9:23:23AM | N26 27.042 W81 56.601 | 6 |
| 96 | 21-MAR-09 9:35:11AM | N26 27.090 W81 56.625 | 7 |
| 97 | 21-MAR-09 9:38:44AM | N26 27.090 W81 56.618 | 8 |

## *Team 2*

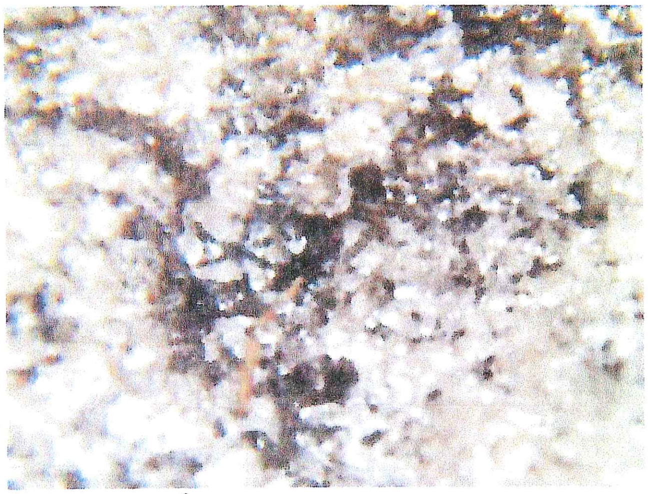
| # | *Date/Time (actual +1hour)* | *Location* | *Core #* |
|---|---|---|---|
| 189 | 21-MAR-09 10:22:14AM | N26 27.206 W81 56.630 | A |
| 190 | 21-MAR-09 10:35:30AM | N26 27.185 W81 56.628 | B |
| 191 | 21-MAR-09 10:54:16AM | N26 27.157 W81 56.636 | C |
| 192 | 21-MAR-09 11:04:37AM | N26 27.155 W81 56.627 | D |
| 193 | 21-MAR-09 11:15:43AM | N26 27.132 W81 56.637 | E |
| 194 | 21-MAR-09 11:24:23AM | N26 27.133 W81 56.627 | F |
| 195 | 21-MAR-09 11:32:22AM | N26 27.111 W81 56.627 | G |
| 196 | 21-MAR-09 11:47:21AM | N26 27.089 W81 56.618 | H |
| 197 | 21-MAR-09 12:53:08PM | N26 27.158 W81 56.579 | I |
| 199 | 21-MAR-09 1:11:06PM | N26 27.141 W81 56.585 | J |
| 200 | 21-MAR-09 1:27:15PM | N26 27.124 W81 56.585 | K |
| 201 | 21-MAR-09 1:35:50PM | N26 27.114 W81 56.585 | L |
| 202 | 21-MAR-09 1:47:45PM | N26 27.098 W81 56.585 | M |
| 207 | 21-MAR-09 2:12:44PM | N26 27.073 W81 56.585 | N |
| 208 | 21-MAR-09 2:21:08PM | N26 27.060 W81 56.584 | O |
| 209 | 21-MAR-09 2:39:52PM | N26 27.078 W81 56.622 | P |
| 210 | 21-MAR-09 2:40:48PM | N26 27.071 W81 56.620 | Q |



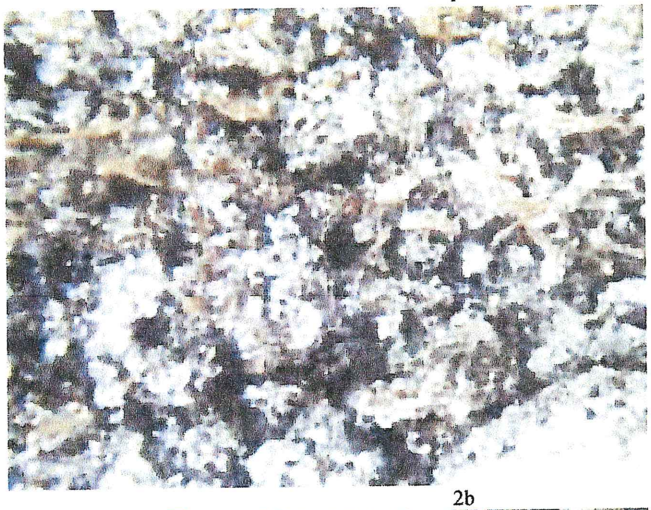
# MICROSCOPICAL SEDIMENT EXAMINATION

A microscopical analysis was made of all the samples. They were examined at about x160 magnification. Each micrograph measures 1cm in width. The analysis of each core was first from the top, or surface, then downward in depth, with approximately 5 inches apart between aliquot samples.

1



2a



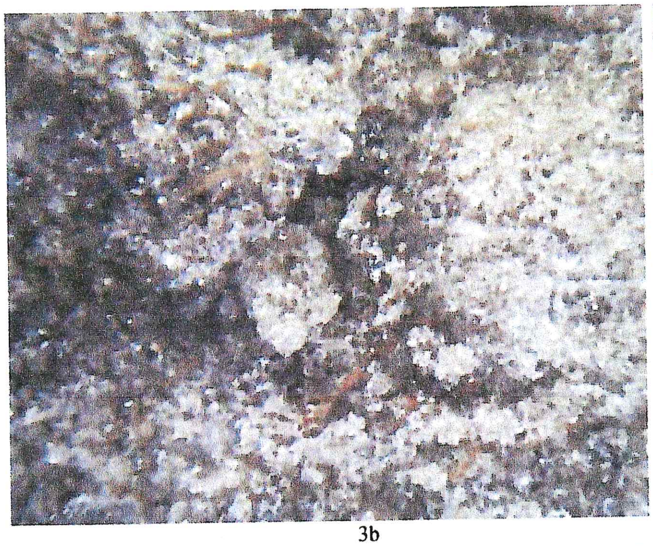
2b

2c

3a

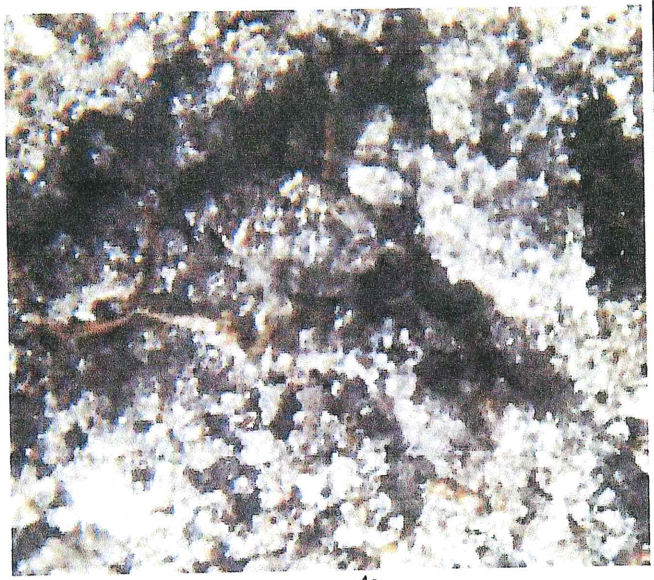
3d deepest sample at this location

All these very fine-grained sands are upland Captiva soils

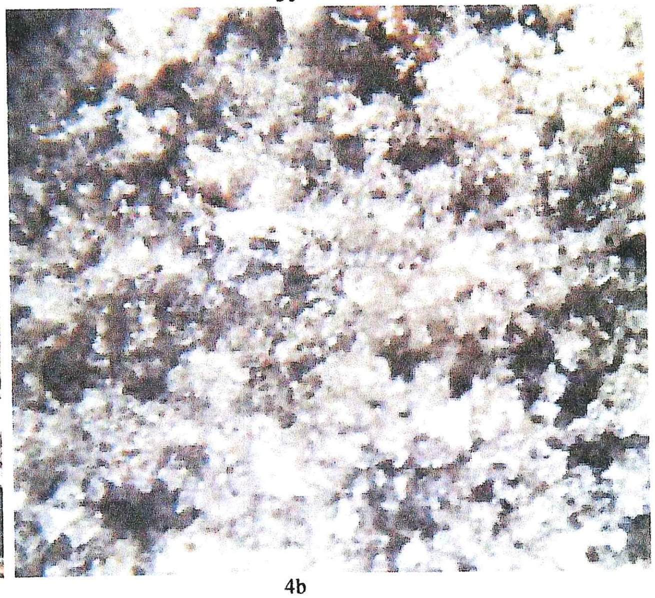


3b

3c



4a



4b

4c

5a

All these very fine-grained sands are upland Captiva soils

5b

6a

Above - all these very fine-grained sands are upland Captiva soils – beach ridge sediment

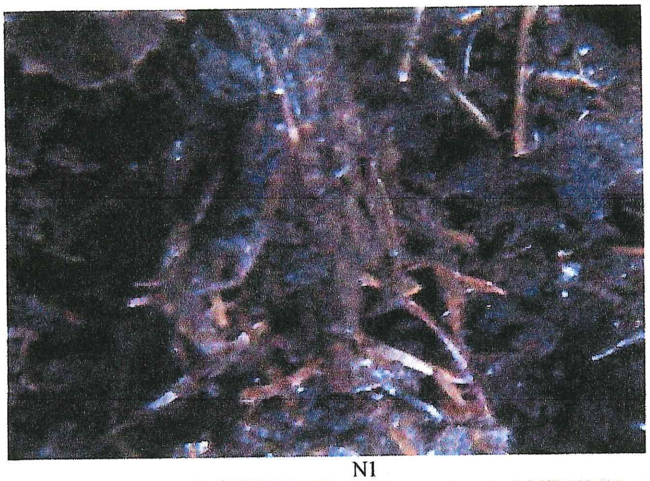
Below - very fine-grained sands are wetland Keeson soils – ***with abundant terrestrial organics*** of vegetation and rootlets – poswsibly a swale area

B1

I1

K1

L1

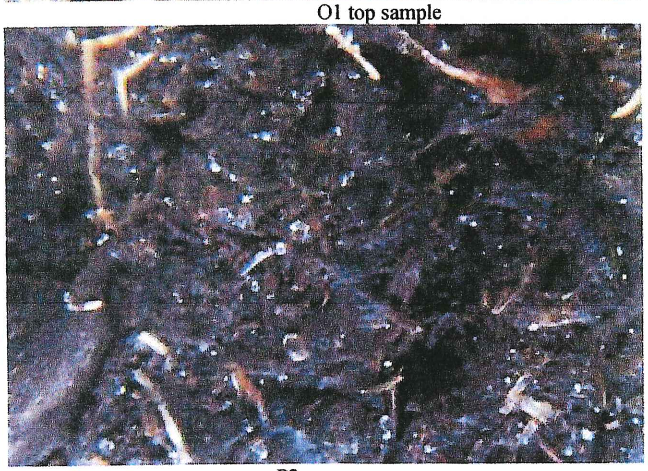

N1


N2


O3 deep bottom sample (very fine sand)

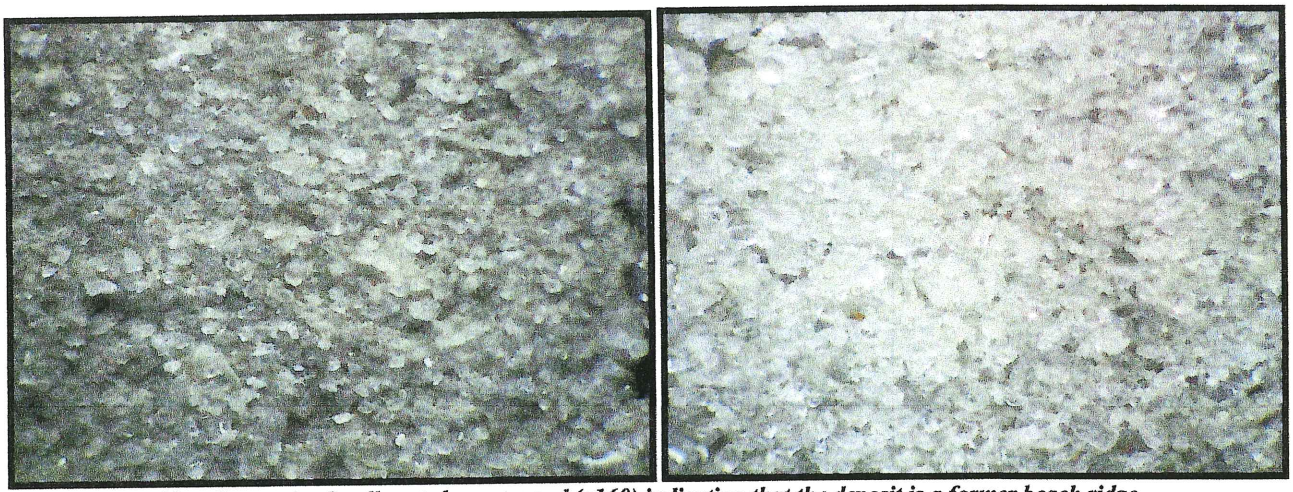

O1 top sample


P1


P2


Q1


T1



*Very fine grained well-sorted quartz sand (x160) indicating that the deposit is a former beach ridge*

***A comparison of two wetland cores (dark colored with rootlets)-Keeson FS, and an upland berm (light colored)-Captiva FS***

***The berm sample is indicative of sediment from a beach ridge - swale area that existed in the past in this area.***

## 24—Kesson fine sand

**Map Unit Setting**

*Mean annual precipitation:* 46 to 54 inches
*Mean annual air temperature:* 70 to 77 degrees F
*Frost-free period:* 358 to 365 days

**Map Unit Composition**

*Kesson, tidal, and similar soils:* 88 percent
*Minor components:* 12 percent

**Description of Kesson, Tidal**

**Setting**

*Landform:* Tidal marshes on marine terraces
*Landform position (three-dimensional):* Interfluve, talf
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Sandy marine deposits with shells

**Properties and qualities**

*Slope:* 0 to 1 percent
*Depth to restrictive feature:* More than 80 inches
*Drainage class:* Very poorly drained
*Capacity of the most limiting layer to transmit water (Ksat):* High to very high (1.98 to 19.98 in/hr)
*Depth to water table:* About 0 to 6 inches
*Frequency of flooding:* Very frequent
*Frequency of ponding:* None
*Calcium carbonate, maximum content:* 15 percent
*Maximum salinity:* Moderately saline to strongly saline (16.0 to 32.0 mmhos/cm)
*Sodium adsorption ratio, maximum:* 30.0
*Available water capacity:* Low (about 5.8 inches)

**Interpretive groups**

*Land capability (nonirrigated):* 8w

**Typical profile**

*0 to 6 inches:* Fine sand
*6 to 23 inches:* Fine sand
*23 to 38 inches:* Fine sand
*38 to 80 inches:* Fine sand

## 5—Captiva fine sand

**Map Unit Setting**

*Elevation:* 10 to 20 feet
*Mean annual precipitation:* 46 to 54 inches
*Mean annual air temperature:* 70 to 77 degrees F
*Frost-free period:* 358 to 365 days

**Map Unit Composition**

*Captiva and similar soils:* 92 percent
*Minor components:* 8 percent

**Description of Captiva**

**Setting**

*Landform:* Drainageways on marine terraces
*Landform position (three-dimensional):* Dip
*Down-slope shape:* Linear
*Across-slope shape:* Concave
*Parent material:* Sandy marine deposits

**Properties and qualities**

*Slope:* 0 to 1 percent
*Depth to restrictive feature:* More than 80 inches
*Drainage class:* Poorly drained
*Capacity of the most limiting layer to transmit water (Ksat):* High to very high (5.95 to 19.98 in/hr)
*Depth to water table:* About 0 to 6 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Calcium carbonate, maximum content:* 15 percent
*Maximum salinity:* Nonsaline to slightly saline (2.0 to 8.0 mmhos/cm)
*Sodium adsorption ratio, maximum:* 25.0
*Available water capacity:* Low (about 3.1 inches)

**Interpretive groups**

*Land capability (nonirrigated):* 4w
*Ecological site:* Slough (R155XY011FL)

**Typical profile**

*0 to 6 inches:* Fine sand
*6 to 30 inches:* Fine sand
*30 to 80 inches:* Fine sand


***5 Captiva fine sand 24 Keeson fine sand***

# SITE VEGETATION

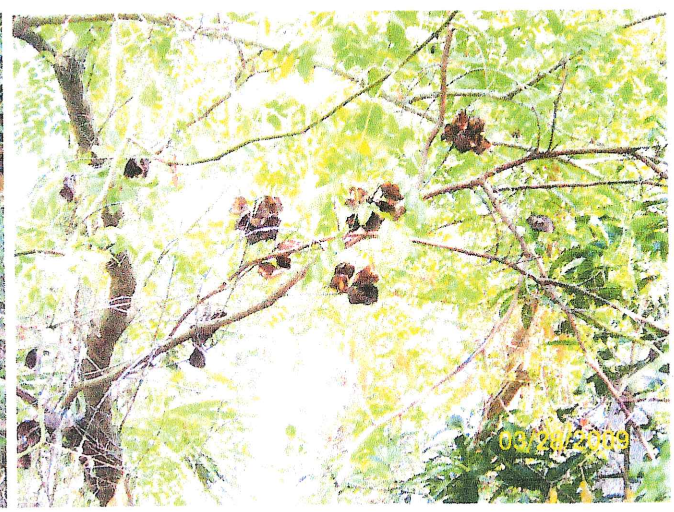
The vegetation was recorded by the two teams as they progressed over the site.

| | | | Mangoves | Red % | Black% | White % | Comments |
|---|---|---|---|---|---|---|---|
| Waypoint | 186 | 21-MAR-09 9:40:11AM | N26 27.041 W81 56.568 | 100 | | | |
| Waypoint | 187 | 21-MAR-09 10:14:59AM | N26 27.229 W81 56.649 | 100 | | | |
| Waypoint | 188 | 21-MAR-09 10:17:09AM | N26 27.227 W81 56.628 | 100 | | | MCC entrance |
| Waypoint | 189 | 21-MAR-09 10:22:14AM | N26 27.206 W81 56.630 | 70 | 30 | | western canal |
| Waypoint | 190 | 21-MAR-09 10:35:30AM | N26 27.185 W81 56.628 | 50 | 50 | | |
| Waypoint | 191 | 21-MAR-09 10:54:16AM | N26 27.157 W81 56.636 | 20 | 60 | 20 | |
| Waypoint | 192 | 21-MAR-09 11:04:37AM | N26 27.155 W81 56.627 | 80 | 20 | | Australian Pine |
| Waypoint | 193 | 21-MAR-09 11:15:43AM | N26 27.132 W81 56.637 | 20 | 80 | | Australian Pine - disturbed |
| Waypoint | 194 | 21-MAR-09 11:24:23AM | N26 27.133 W81 56.627 | 70 | 30 | | vine |
| Waypoint | 195 | 21-MAR-09 11:32:22AM | N26 27.111 W81 56.627 | 85 | | 5 | 5%pine;5%oak |
| Waypoint | 196 | 21-MAR-09 11:47:21AM | N26 27.089 W81 56.618 | 60 | 10 | | 30%pine; disturbed; camp |
| Waypoint | 197 | 21-MAR-09 12:53:08PM | N26 27.158 W81 56.579 | 100 | | | eastern canal |
| Waypoint | 199 | 21-MAR-09 1:11:06PM | N26 27.141 W81 56.585 | 60 | 30 | 10 | |
| Waypoint | 200 | 21-MAR-09 1:27:15PM | N26 27.124 W81 56.585 | 80 | | 20 | osprey seen |
| Waypoint | 201 | 21-MAR-09 1:35:50PM | N26 27.114 W81 56.585 | 40 | 50 | 10 | |
| Waypoint | 202 | 21-MAR-09 1:47:45PM | N26 27.098 W81 56.585 | 60 | 20 | 20 | |
| Waypoint | 203 | 21-MAR-09 1:54:19PM | N26 27.095 W81 56.577 | 100 | | | 8m small canal off main |
| Waypoint | 204 | 21-MAR-09 1:55:50PM | N26 27.093 W81 56.577 | 100 | | | 8m small canal off main |
| Waypoint | 205 | 21-MAR-09 1:58:32PM | N26 27.105 W81 56.570 | 100 | | | 8m small canal off main |
| Waypoint | 206 | 21-MAR-09 2:02:48PM | N26 27.087 W81 56.585 | 100 | | | 8m small canal off main |
| Waypoint | 207 | 21-MAR-09 2:12:44PM | N26 27.073 W81 56.585 | 70 | 30 | | |
| Waypoint | 208 | 21-MAR-09 2:21:08PM | N26 27.060 W81 56.584 | 80 | 10 | 10 | |
| Waypoint | 209 | 21-MAR-09 2:39:52PM | N26 27.078 W81 56.622 | 80 | 20 | | |


# Saturday 29 March 2009 wetland delineation vegetation observations

| Waypoint | Description | Position WGS84 | Vegetation |
|---|---|---|---|
| 219 | 28-MAR-09 9:03:14AM | N26 27.113 W81 56.649 | carrot wood; black mangrove; virginia creeper |
| 220 | 28-MAR-09 9:05:28AM | N26 27.109 W81 56.647 | phyladendrom; bamboo; pine; morning glory; hibiscus; sable palm |
| 221 | 28-MAR-09 9:08:49AM | N26 27.103 W81 56.644 | black &red mangrove; |
| 222 | 28-MAR-09 9:10:40AM | N26 27.100 W81 56.640 | nikker beau |
| 224 | 28-MAR-09 9:16:01AM | N26 27.091 W81 56.639 | spanish moss; coin vine; australian pine; virginia creepy |
| 226 | 28-MAR-09 9:20:33AM | N26 27.085 W81 56.633 | carrot wood; gumbo limbo; australian pine |
| 227 | 28-MAR-09 9:24:30AM | N26 27.084 W81 56.632 | white & black mangrove; buttonwood; phylodendrom; wandering jew |
| 229 | 28-MAR-09 9:33:50AM | N26 27.064 W81 56.620 | australian pine; buttonwood |
| 230 | 28-MAR-09 9:37:03AM | N26 27.059 W81 56.614 | gumbo limbo; pepper; live oak; seagrape; |
| 231 | 28-MAR-09 9:39:33AM | N26 27.053 W81 56.608 | australian pine |
| 232 | 28-MAR-09 9:42:35AM | N26 27.047 W81 56.605 | seagrape; australian pine; mother-in-law toungue |
| 233 | 28-MAR-09 9:45:26AM | N26 27.045 W81 56.598 | red mangrove |
| 234 | 28-MAR-09 9:48:46AM | N26 27.040 W81 56.597 | coin vine; large brazillian pepper |
| 235 | 28-MAR-09 9:51:29AM | N26 27.035 W81 56.593 | thick seagrape; thorn bush; brazillian pepper |
| 236 | 28-MAR-09 9:57:18AM | N26 27.034 W81 56.588 | coin vine; pepper |
| 237 | 28-MAR-09 10:01:58AM | N26 27.033 W81 56.587 | coin vine; pepper |




03/28/2009


03/28/2009


03/28/2009


03/28/2009


03/28/2009

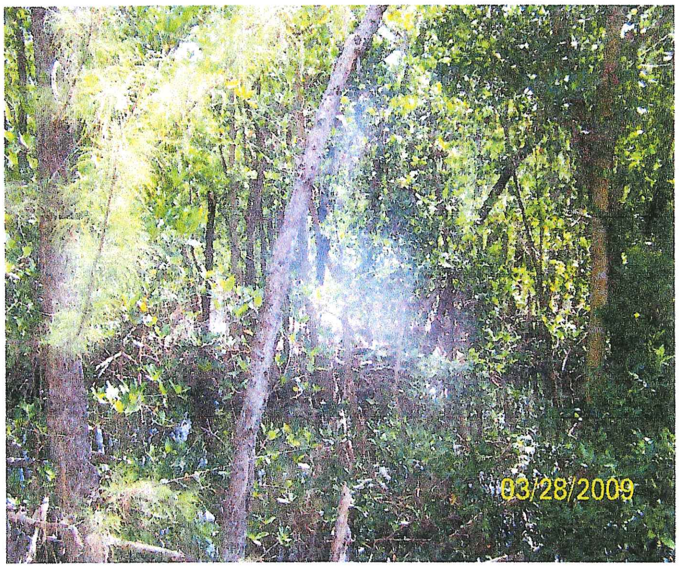

03/28/2009


03/28/2009

03/28/2009

03/28/2009

03/28/2009

03/28/2009

03/28/2009

# WETLAND DELINEATION

A wetland is defined as an area of land whose ***soil*** is ***saturated*** with ***moisture*** either permanently or seasonally. Such areas may also be covered partially or completely by shallow pools of water. Wetlands include ***swamps***, ***marshes***, and ***bogs***, among others. The water found in wetlands can be ***saltwater***, ***freshwater***, or ***brackish***.

Wetlands are considered the most biologically diverse of all ***ecosystems***.

Plant life found in wetlands includes ***mangrove***, ***water lilies***, ***cattails***, ***sedges***, ***tamarack***, ***black spruce***, ***cypress***, ***gum***, and many others.

To be classified as a wetland, an area of land must have water on the ground's surface or in the root zone for at least a portion of the growing season. This seasonal fluctuation of the water period (known as a hydroperiod), is continually affected by the weather, the season, water feeding into and draining from nearby streams, the surrounding watershed and other nearby bodies of water.

However, an area can still be a wetland, even if it doesn't appear to be 'wet.' Because of the changing hydroperiods, water is the most transient part of a wetland ecosystem. Often, when ecologists suspect an area is a wetland, they focus on the last 2 characteristics, because these are less likely to fluctuate seasonally.

Soils found in wetlands are called hydric soils. Hydric soils exist when an area is saturated, flooded, or ponded for so long during the growing season that the upper soil level is without oxygen. There are two types of hydric soils: those with decomposed organic material, and those without. Each has unique characteristics.

Wetlands support a wide diversity of life. Many organisms depend on wetlands completely for their survival, but even those who live in primarily aquatic or terrestrial habitats may rely on the ecotone border for a portion of the year, or for a portion of their life cycle.

Fluctuating water levels and variable salt concentrations create a harsh environment for wetland plants and animals, so in order to survive these harsh conditions, vegetation and wildlife develop special adaptations.

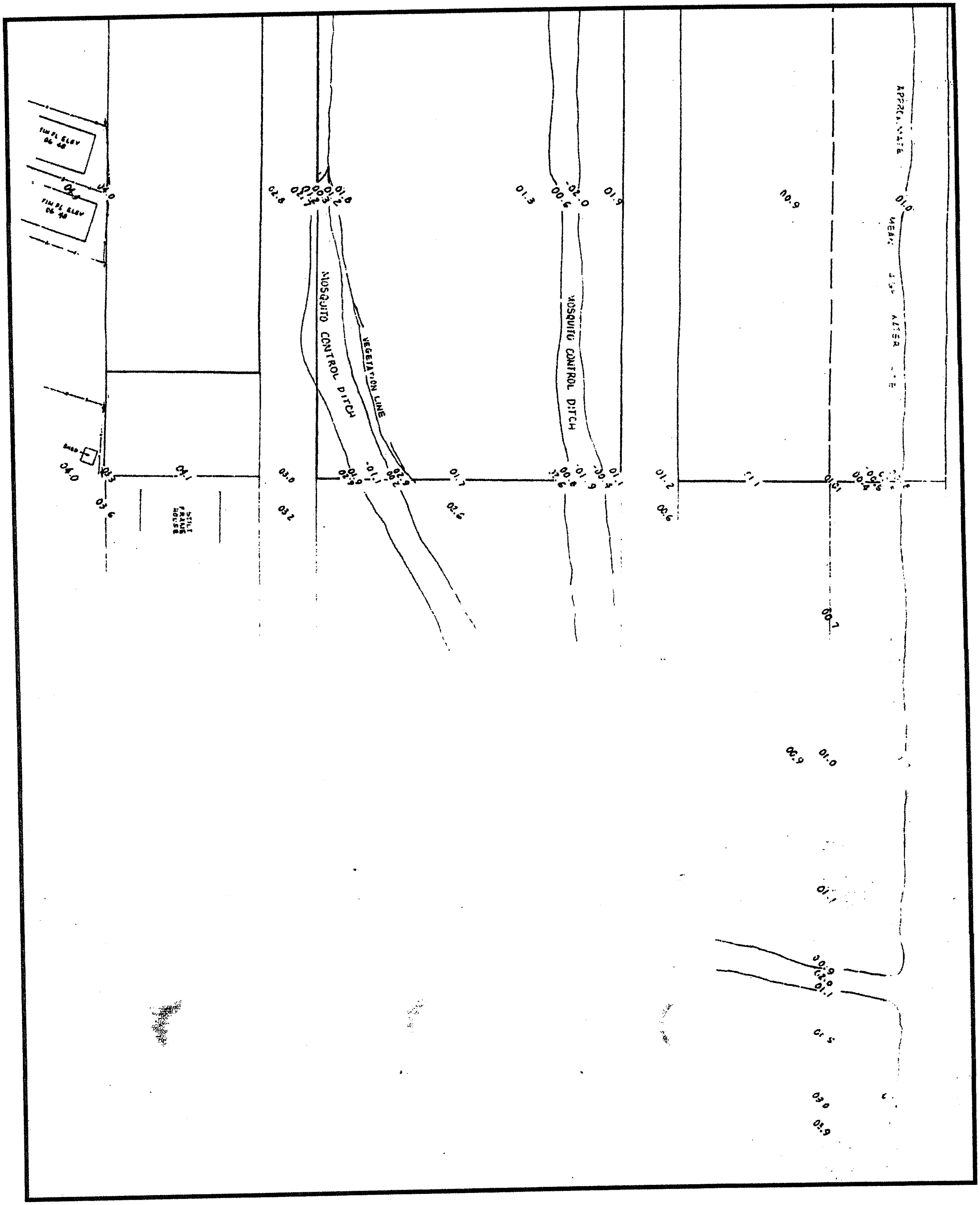
Soils found it wetlands are called hydric soils. Hydric soils exist when an area is saturated, flooded, or ponded for so long during the growing season that the upper soil level is without oxygen.

There are two types of wetlands soils:

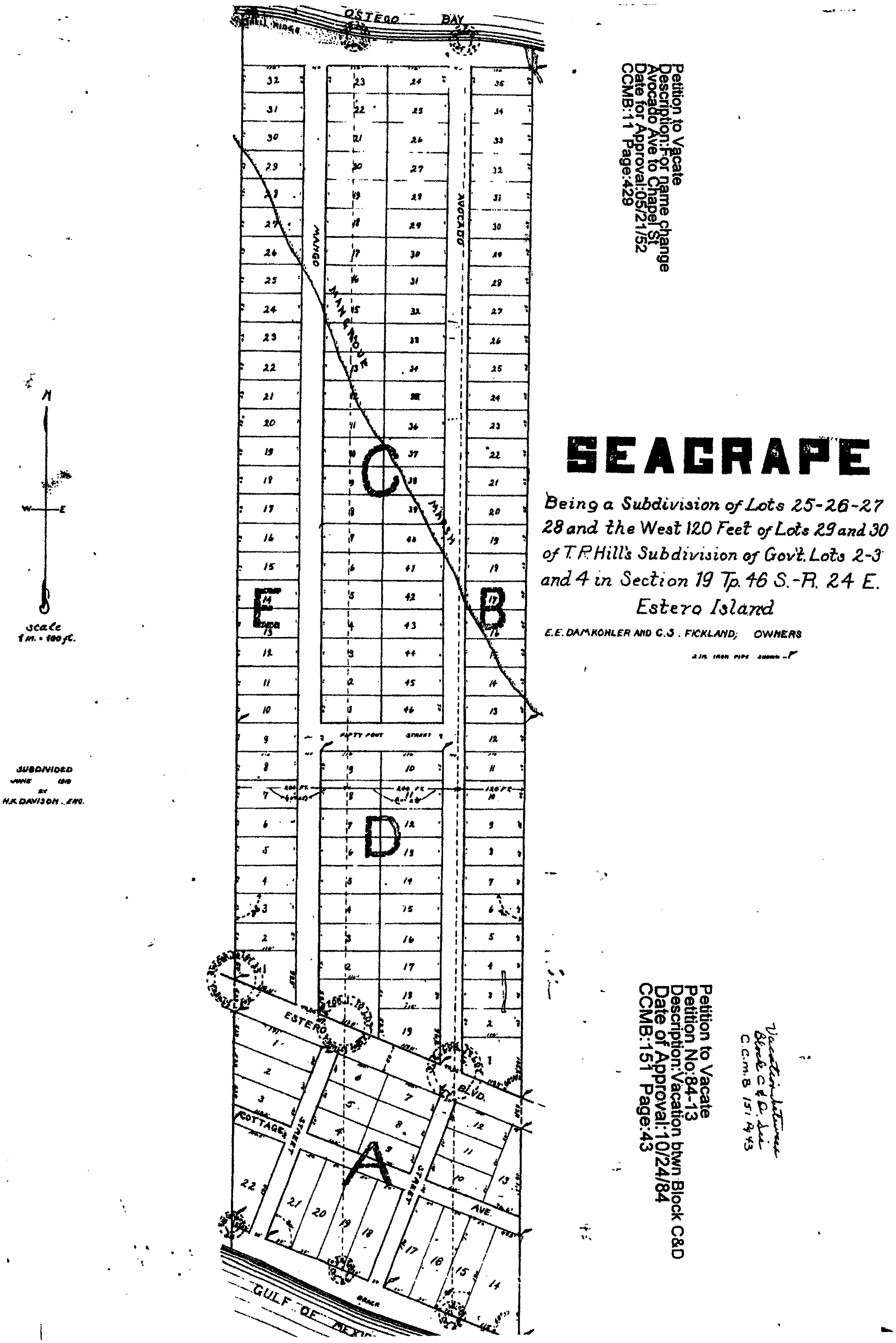
| Organic Soils | Mineral Soils |
|---|---|
| defined by depth and content of organic matter dark, oozy, consisting of plant remains also called **peat** (brown to black soil containing still recognizable decomposed plants) and **muck** (greasy and black when moist and almost liquid when wet containing decomposed plants beyond recognition) | contain less than 20% organic matter 2 major characteristics: **gleying** -- results from prolonged saturated green or blue-gray in color; **redoximorphic features** -- small spots of various shapes and colors that indicate the presence of iron oxide or maganese oxide (dependent on the length of the saturation period) |

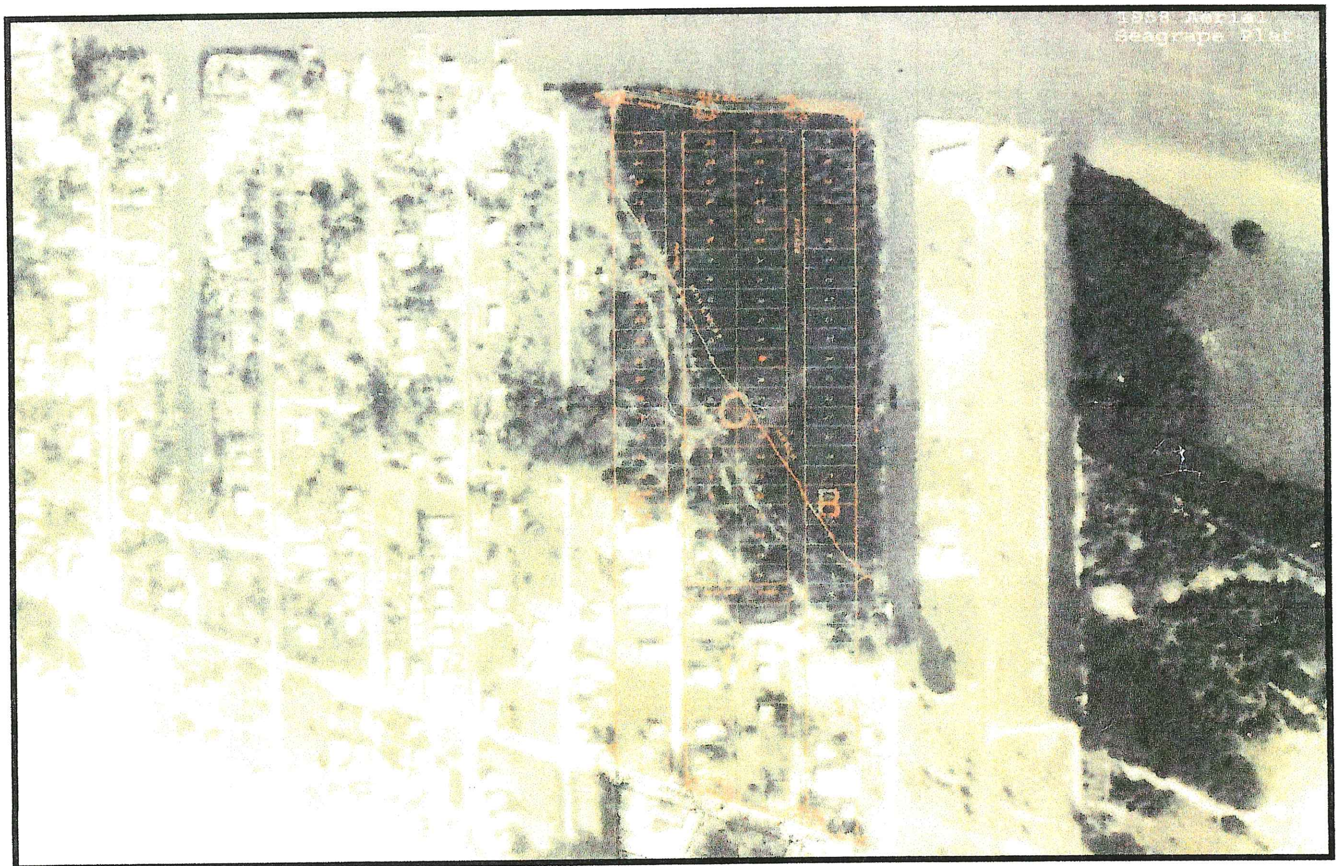
The wetland delineation for this field survey was performed on Saturday 28th March 2009 and the delineation was physically outlined with wooden stakes and each location recorded by the use of GPS units. The weather was sunny with 50% cloud, no rain, and 37 mph wind gusts. The day's air temperature ranged from 61oF to 87oF.

A prior rough delineation, called “vegetation line” in a map, of the Mosquito Control canals with ground elevation data points, was made by Deni Associates (10th May 1984)

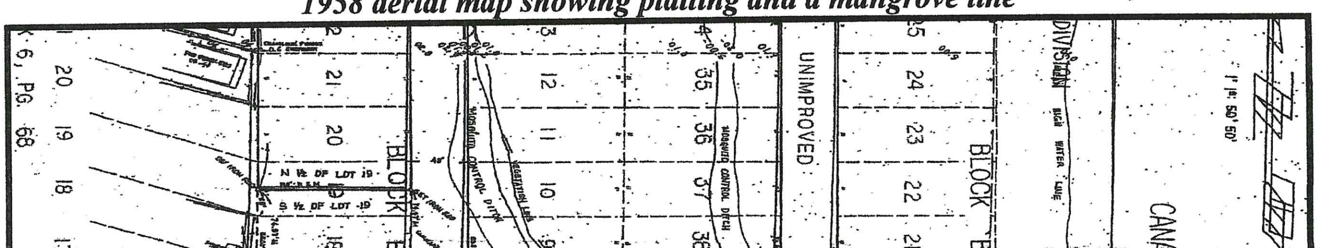


Another rough delineation was made when the property was platted for development.



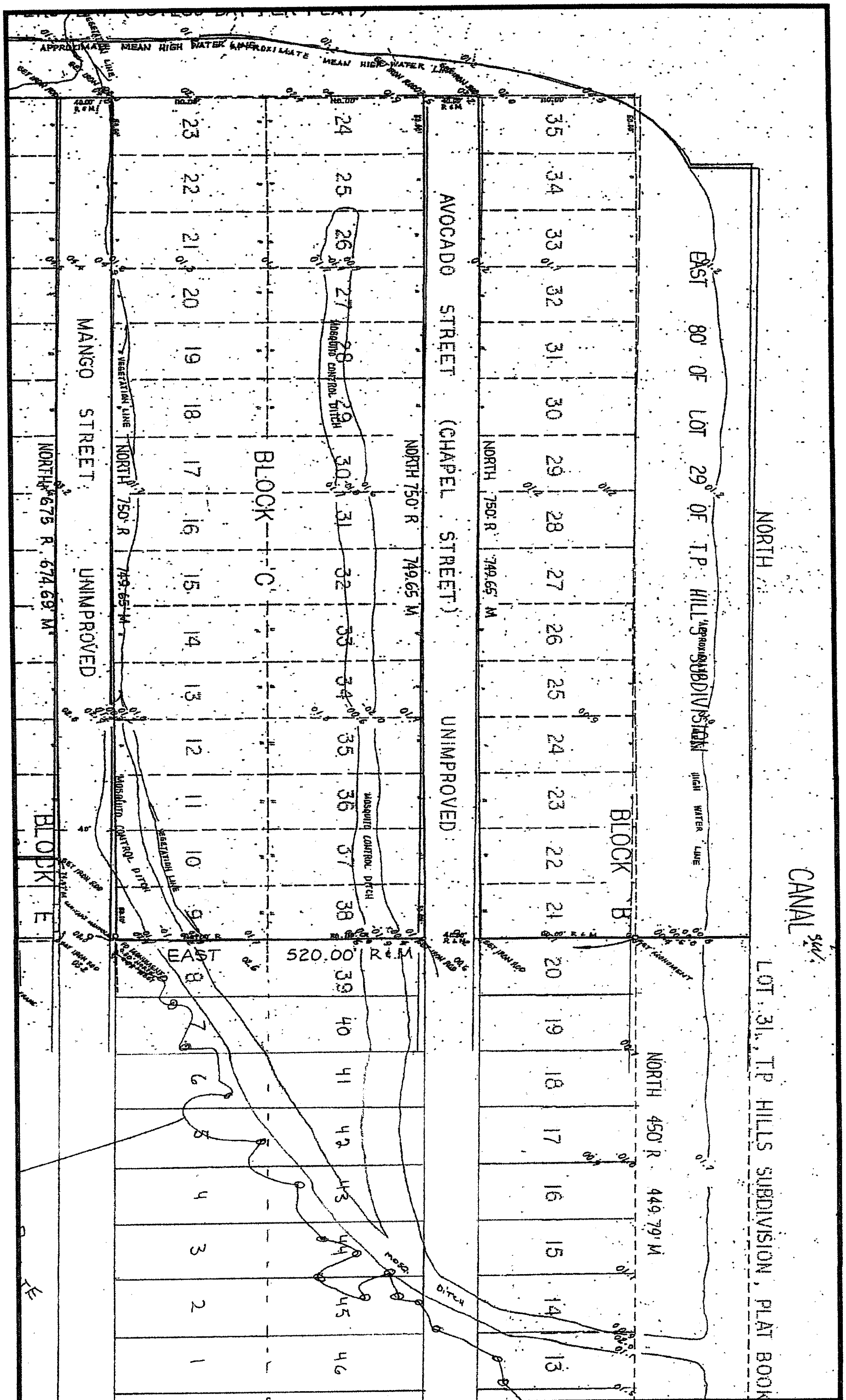



*1958 aerial map showing platting and a mangrove line*




*Close-up of the wetland line on the following map*

A more definitive map was made in 1984, showing the Mosquito Control canals and platted parcels



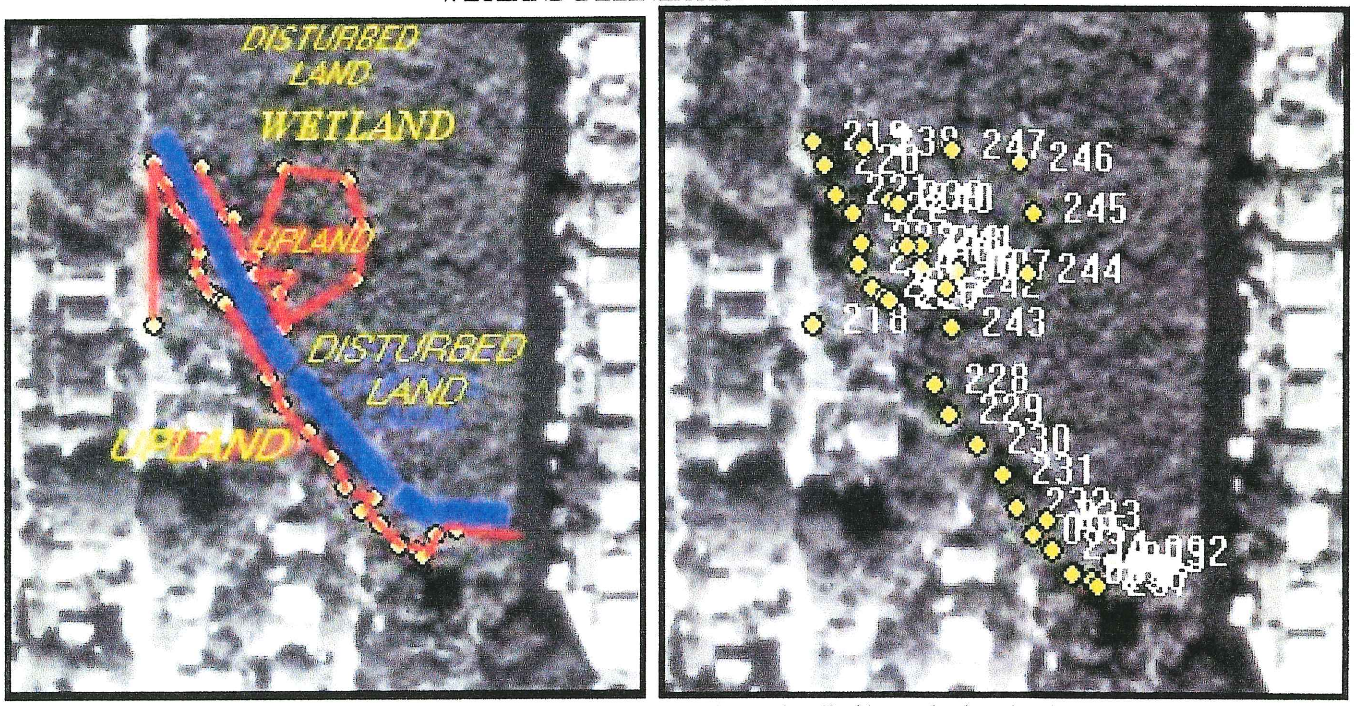

***The wetland delineation is mapped at the lower left side of map (curving line)***

| Waypoint | Description | Position WGS84 | Eastings 17R | Northings | Comments | Stake # | Berm width (ft) | Ditch width (ft) |
|---|---|---|---|---|---|---|---|---|
| 218 | 28-MAR-09 8:34:36AM | N26 27.080 W81 56.649 | start | | sw corner btwn lots 5 & 6 (35m btwn lot lines) | Ref | | |
| 219 | 28-MAR-09 9:03:14AM | N26 27.113 W81 56.649 | 405871 | 2926070 | uplands; dead racoon | 1 | | |
| 220 | 28-MAR-09 9:05:28AM | N26 27.109 W81 56.647 | 405878 | 2926066 | yellow flower marsh | 2 | | |
| 221 | 28-MAR-09 9:08:49AM | N26 27.103 W81 56.644 | 405882 | 2926056 | spoil pile | 3 | | |
| 222 | 28-MAR-09 9:10:40AM | N26 27.100 W81 56.640 | 405888 | 2926050 | | | | |
| 223 | 28-MAR-09 9:13:34AM | N26 27.095 W81 56.638 | 405892 | 2926040 | berm & ditch | 4 | | |
| 224 | 28-MAR-09 9:16:01AM | N26 27.091 W81 56.639 | 405890 | 2926033 | | | | |
| 225 | 28-MAR-09 9:19:22AM | N26 27.087 W81 56.636 | 405894 | 2926025 | | | | |
| 226 | 28-MAR-09 9:20:33AM | N26 27.085 W81 56.633 | 405899 | 2926022 | | | | |
| 227 | 28-MAR-09 9:24:30AM | N26 27.084 W81 56.632 | 405901 | 2926021 | | | | |
| 228 | 28-MAR-09 9:31:21AM | N26 27.069 W81 56.622 | 405917 | 2925993 | ditch on east; dead racoon burnt upland on west; | 5 | | |
| 229 | 28-MAR-09 9:33:50AM | N26 27.064 W81 56.620 | 405922 | 2925983 | ditch on northern side | 6 | | |
| 230 | 28-MAR-09 9:37:03AM | N26 27.059 W81 56.614 | 405932 | 2925973 | ditches divide | 7 | | |
| 231 | 28-MAR-09 9:39:33AM | N26 27.053 W81 56.608 | 405942 | 2925963 | dead racoon | 8 | | |
| 232 | 28-MAR-09 9:42:35AM | N26 27.047 W81 56.605 | 405950 | 2925960 | ditch | 9 | | |
| 233 | 28-MAR-09 9:45:26AM | N26 27.045 W81 56.598 | 405956 | 2925948 | ditch | 10 | | |
| 234 | 28-MAR-09 9:48:46AM | N26 27.040 W81 56.597 | 405958 | 2925938 | storm drain from end of chapel street | 11 | | |
| 235 | 28-MAR-09 9:51:29AM | N26 27.035 W81 56.593 | 405966 | 2925930 | ditch | 12 | | |
| 236 | 28-MAR-09 9:57:18AM | N26 27.034 W81 56.588 | 405973 | 2925928 | ditch | 13 | | |
| 237 | 28-MAR-09 10:01:58AM | N26 27.033 W81 56.587 | 405975 | 2925926 | | | | |
| 238 | 28-MAR-09 10:21:51AM | N26 27.112 W81 56.638 | | | measuring berm and canal | 2 | 50 | |
| 239 | 28-MAR-09 10:26:08AM | N26 27.102 W81 56.632 | | | measuring berm and canal | 3 | 68 | |
| 240 | 28-MAR-09 10:27:19AM | N26 27.102 W81 56.631 | | | measuring berm and canal | 4 | 50 | |
| 241 | 28-MAR-09 10:34:03AM | N26 27.094 W81 56.626 | | | measuring berm and canal | 5 | 68 | 88 |
| 242 | 28-MAR-09 10:40:25AM | N26 27.087 W81 56.620 | | | measuring berm and canal | | 61 | 75 |
| 243 | 28-MAR-09 10:42:25AM | N26 27.080 W81 56.619 | | | disturbed uplands - interior south | | | |
| 244 | 28-MAR-09 10:46:21AM | N26 27.089 W81 56.603 | | | disturbed uplands - interior south | | | |
| 245 | 28-MAR-09 10:48:13AM | N26 27.100 W81 56.602 | | | disturbed uplands - interior south | | | |
| 246 | 28-MAR-09 10:49:39AM | N26 27.109 W81 56.605 | | | disturbed uplands - interior south | | | |
| 247 | 28-MAR-09 10:51:42AM | N26 27.111 W81 56.619 | | | disturbed uplands - interior south | | | |
| 248 | 28-MAR-09 10:53:47AM | N26 27.094 W81 56.629 | | | disturbed uplands - interior south | | | |

***Thirteen stakes were used to outline the wetland from the upland areas***

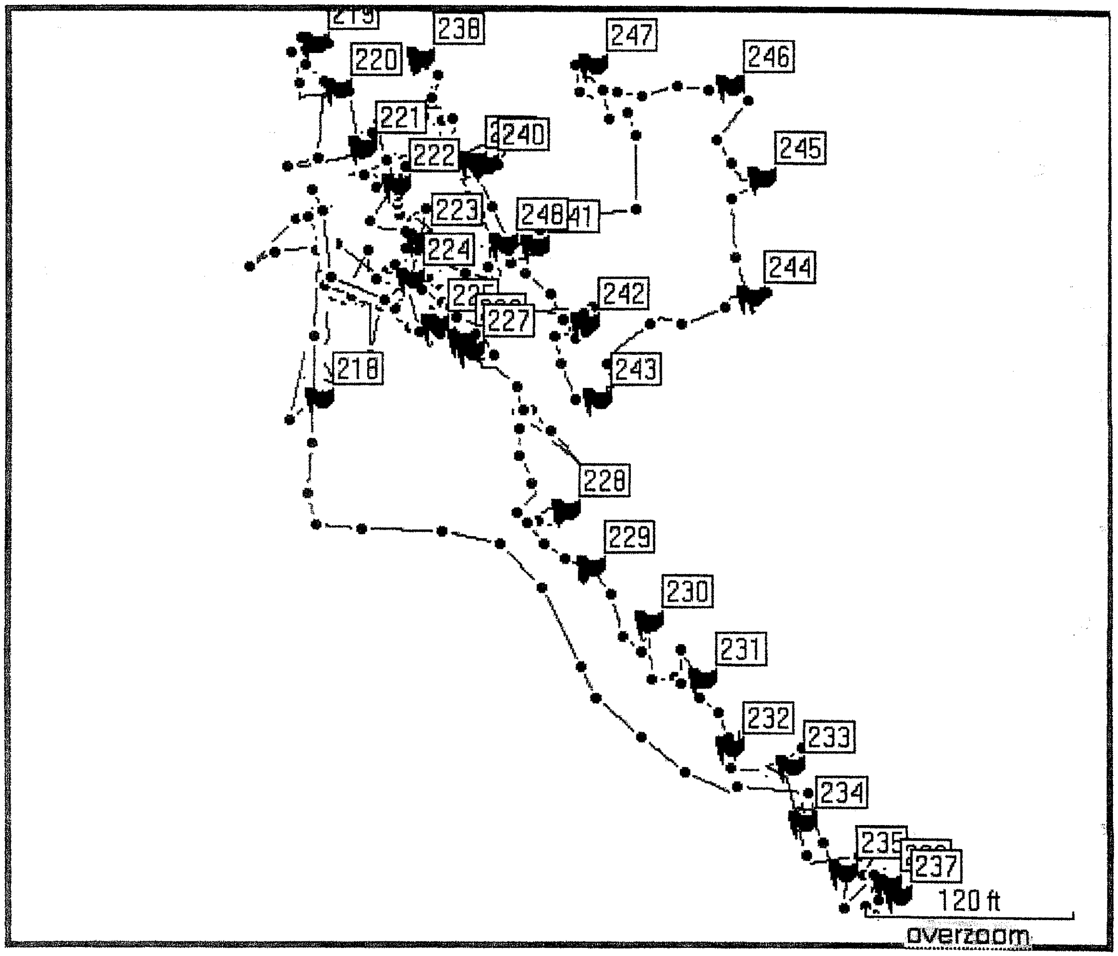

***Drain from Chapel Street***

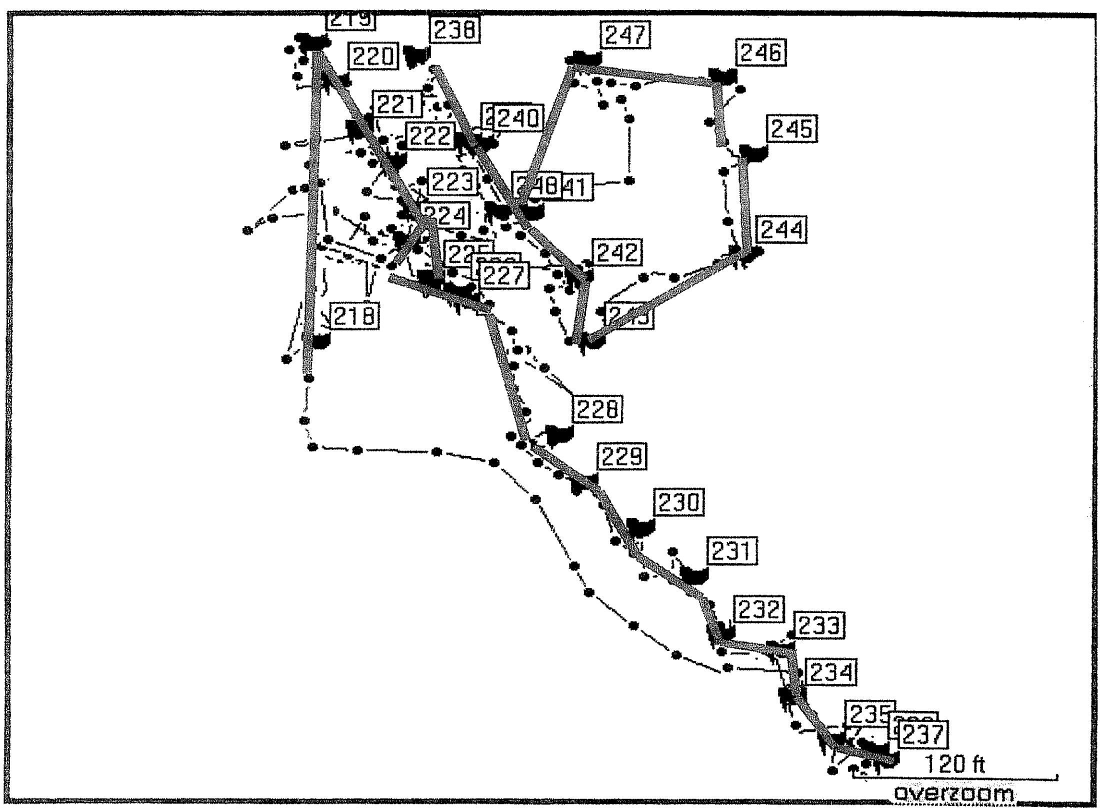
***WETLAND DELINEATION LOCATIONS***



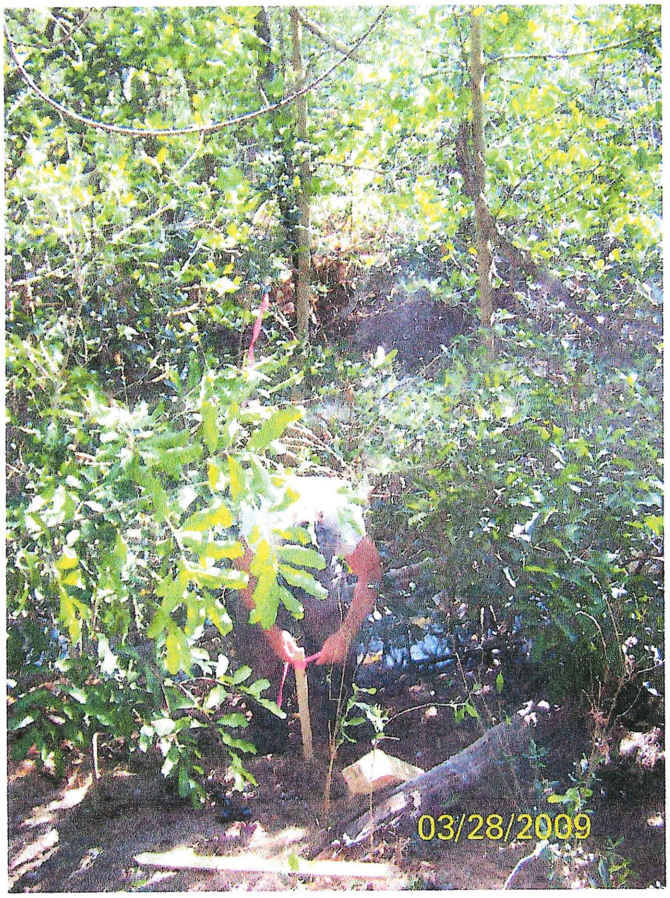

***Wetland delineation showing GPS waypoints and tracks (left) and plot (red) and canal (blue)***

## *TRACKS AND WAYPOINTS*




***Wetland delineation***

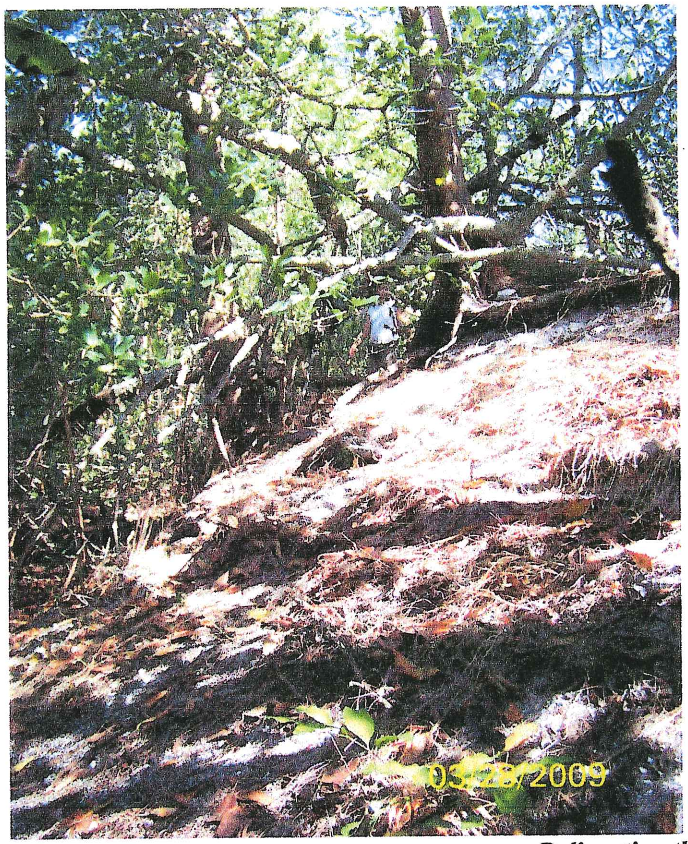




***Marking the outline of the wetland with stakes and recording the GPS location***

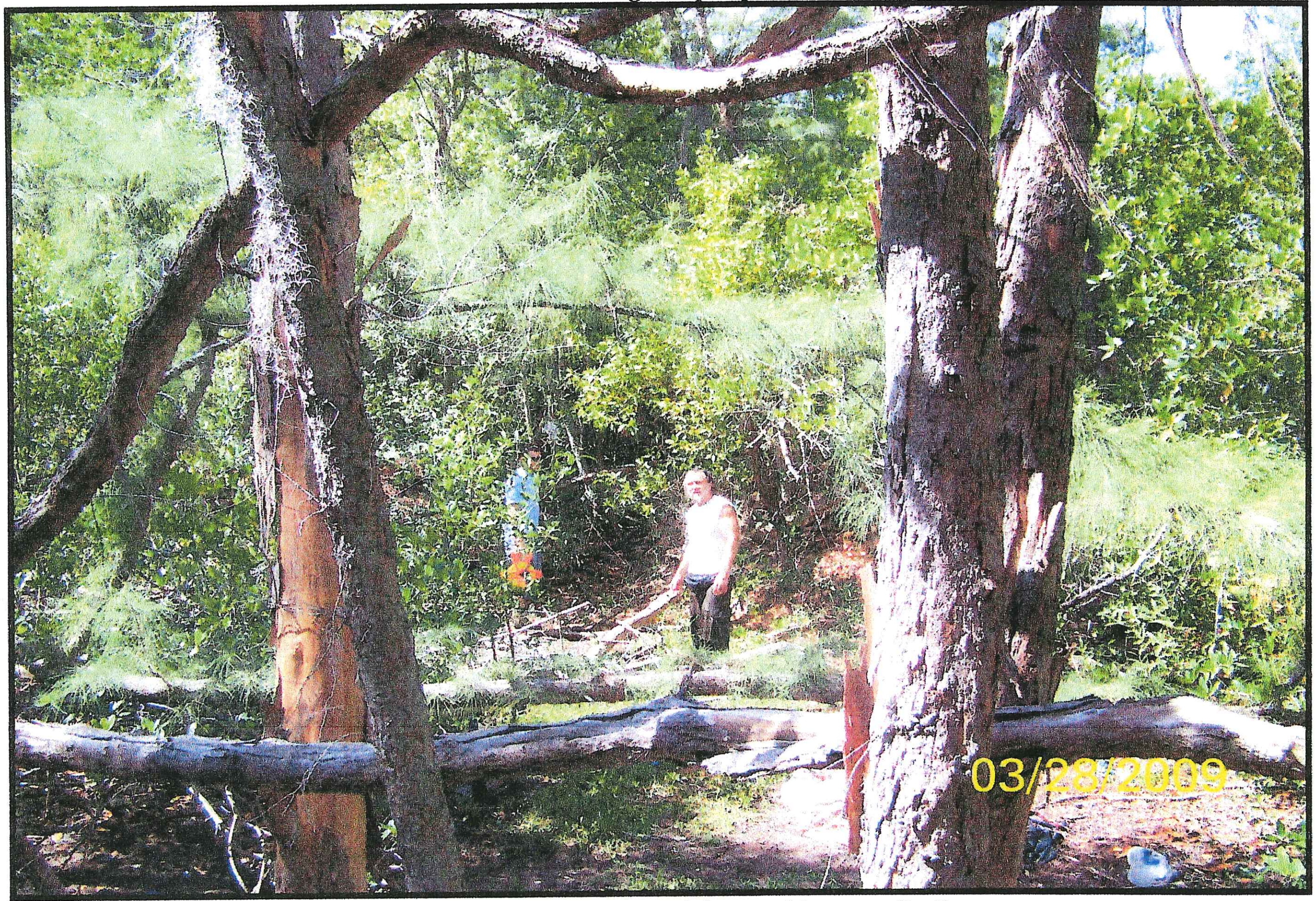


***Staking out the wetland delineation***





***Delineating the spoil piles***




***Looking down from the top of the canal-berm spoil-pile***



***Photographs illustrate the height of the spoil piles***

*Canal measurements*



# CRITTER SURVEY

Another objective of the environmental survey was also to assess the possible presence of endangered species on the parcels. It was observed that there were no endangered species and there was some nesting of bird-life on the site during the time of the environmental survey. The fauna observed or heard during the survey were mangrove crab, fiddler crab, white Ibis, Florida curlew, yellow-crowned night heron, osprey and abundant crab-like spiny orb-weaver spiders.


Red Mangrove crab

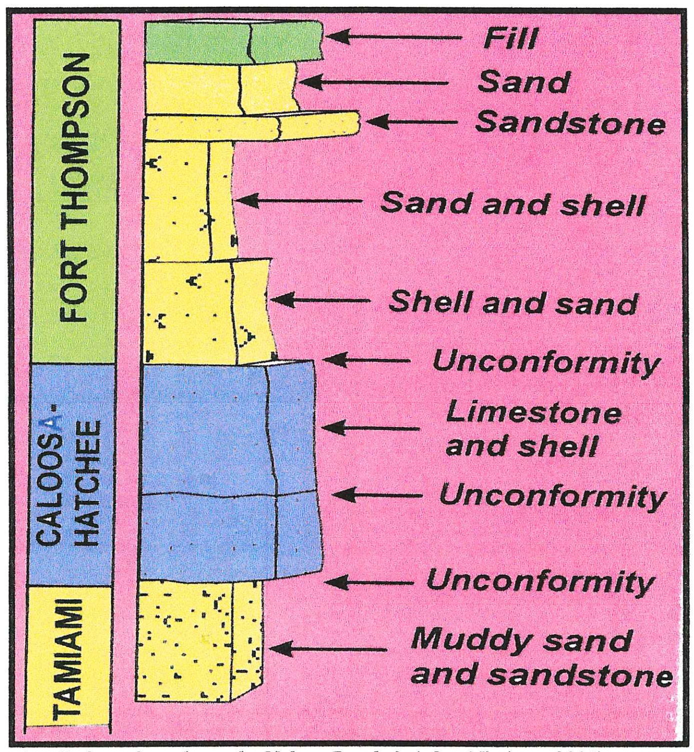
# NEOGENE GEOLOGY OF LEE COUNTY

The majority of the geological data on Lee County was obtained from an 2001 article by T. Missimer in *Geology and hydrology of Lee County, Florida: Florida Geological Survey Special Publication No. 49, 2001.* During the past 24 years, the Neogene geology of Lee County has been studied in numerous dewatered, shell pits. The thickness of the stratigraphic section studied is about 30 feet and contains three formations; the Tamiami, the Caloosahatchee, and the Fort Thompson. The Tamiami Formation is a predominantly siliciclastic unit, equivalent to the Sand Facies of Missimer (1992) with one occurrence of the Pinecrest Member (predominantly aragonitic mollusk shell) at Acline (Charlotte County). The Caloosahatchee Formation is a mixed carbonate and siliciclastic unit that is divided into three separate units by two intraformational unconformities. The Fort Thompson Formation is a shell and quartz sand unit that contains two or three stratigraphic units. From the base to the top of the formation, the relative percentage of quartz sand increases from about 20 to 100% by volume (Missimer 2001).

The lithostratigraphy of the shallow Neogene sediments shows that numerous transgressive and regressive sea level events produced a series of depositional environment changes over the last 4 million years. The region was blanketed with a sheet of quartz sand similar to the West Florida Shelf of today during the Pliocene as the Tamiami Formation was deposited. During deposition of the Caloosahatchee Formation, the region was subtropical with predominantly carbonate deposition and a coastal influx of quartz sand. Tropical and subtropical mollusks and corals were abundant in the region producing an environment similar to the present area between Cape Sable and Florida Bay. Deposition of the Fort Thompson Formation brought a substantial change to the environment with an evolution to barrier island and shallow nearshore deposition patterns similar to those observed today (Missimer 2001).

| Age | Formation | Member |
|---|---|---|
| Pleistocene | Fort Thompson | Upper |
| | | Lower |
| | Caloosahatchee | F |
| | | E |
| Pliocene | | D |
| | | C |
| | | B |
| | | A |
| | Tamiami | Pinecrest |
| | | Sand |

*Neogene stratigraphy of Lee County*




*Detailed stratigraphy at the Nelson Road pit (after Missimer 2001)*

A number of shell and sand pits have been excavated adjacent to the southeastern margin of Charlotte Harbor in Charlotte and Lee counties and in the Cape Coral area of Lee County over the past 40 years. Many of these excavations were dewatered to facilitate sediment removal, which allowed detailed descriptions of the sediments to be made. Three Neogene stratigraphic units were penetrated in most of the excavations, which include the Tamiami, Caloosahatchee, and the Fort Thompson formations. Neogene time includes the Miocene to the end of the Pleistocene or 23.8 to 0.01 Ma (million years before present) (Berggren et al. 1995). A general stratigraphic column is the stratigraphic terminology is proposed by Missimer (1992) for the Tamiami Formation and the terminology of DuBar (1962) for the Caloosahatchee and Fort Thompson formations.

***Tamiami Formation***

The Tamiami Formation is a Pliocene unit that contains a wide variety of members or facies dependant upon the specific location studied. Missimer (1992) presented a stratigraphic correlation of the various lithologic units found within the Tamiami Formation in Southwest Flodda. In the northern part of the study area, the exposures of the Tamiami Formation in Alligator Creek are a sandy, calcareous clay with some phosphate and a few calcitic fossil fragments (DuBar, 1958). The calcareous clay facies correlates to the tan clay and sand facies, which occurs near the base of the formation. At all other locations, with the exception of the Acline Pit, the section of the Tamiami Formation penetrated was either a sand and partially indurated sandstone (Burnt Store Road North Pit), an unlithified quartz sand with solely calcitic fossils interbedded with some limestone (Nelson Road Pit), or a partially indurated sand and barnacle hash (Chiquita Sand Pit). All of these predominantly quartz sand units correlate lithostratigraphically with the sand facies of Missimer (1992). The only exposure of the classical Pinecrest Member containing a wide diversity of molluscan species with preserved aragonitic shell is at the Acline Pit site. The Pinecrest Member of the Tamiami Formation is the youngest member of the formation and does not occur as a continuous stratigraphic unit in the area of Charlotte Harbor (Missimer 2001).

***Caloosahatchee Formation***

DuBar (1962) recognized five stratigraphic subdivisions of the Caloosahatchee Formation in the Charlotte Harbor area. Although these subdivisions of the formation do occur, they are rarely if ever all present at a single location or in the same stratigraphic position Stratigraphic sections are commonly described in terms of sequence stratigraphy, in which a sequence is defined as an unconformity-bounded stratal unit (Van Wagoner et al. 1990). A sequence is subdivided into parasequences, which are the building blocks of the sequence. A parasequence is defined as relatively conformable successions of genetically related beds or bedsets bounded by marine-flooding surfaces or their correlative surfaces (Van Wagoner et al., 1990). Based on modern concepts of sequence stratigraphy, the Caloosahatchee Formation can probably be broken down into three different sequences or perhaps parasequences when viewed on a regional basis. There are at least two distinctive breaks in the Caloosahatchee stratigraphic section marked by the occurrence of either a laminated crust and disconformity or the occurrence of a freshwater limestone. These breaks correspond to either marine-flooding surfaces or to terrestrial discontinuities as in the case of freshwater limestones. In the general stratigraphic column, the unconformities dividing the section occur at the top of Units C and E. It is not possible to correlate regionally individual lithologic units within the formation, because of spatial variability caused by depositional environment changes. However, the correlation of the unconformities in stratigraphic order does allow correlation of time lines, which was the method used by Perkins (1977) for correlating these stratigraphic units along the Florida East Coast. The Caloosahatchee Formation at the Burnt Store Road North Pit contained four different lithic units. At this location there are only two stmtigraphic breaks in the section instead of the three found in the DuBar (1962) general section. A basal sequence or parasequence contains two lithic units with an unlithified shell and sandy mud at the base and an indurated limestone containing abundant shell at the top. The occurrence of freshwater fossils at the base of the section could indicate the occurrence of another stratigraphic break, but the remaining section does not occur. The uppermost unit consists of a basal, unlithified shell unit overlain by an indurated limestone containing abundant aragonitic mollusk shells. The top of the limestone contains a laminated crust at some locations in the pit. Without some absolute time control, it is not possible to correlate this section with the general DuBar typical section (Missimer 2001).

To the southeast of Charlotte Harbor, the occurrence of the Caloosahatchee Formation is limited to only a few locations, because the formation has been removed by erosion or was not deposited. The southernmost known occurrence of the formation on the Florida West Coast is at the Nelson Road Pit, but only in the northeast comer of the pit. Despite the relatively thin section of the formation at about 8 feet, nine different lithologies were found in three sequences or parasequences. The basal unit is bounded with a disconformity at the base and a freshwater limestone at the top. The lowest lithologic unit is an unlithified quartz sand and shell. An indurated sandy limestone with shell lies conformably above the lowest unit and the sequenca is capped by a freshwater limestone. The middle sequence contains three different lithologic units beginning at the base with a partially indurated limestone containing well-preserved aragonitic mollusk shells. This lithic unit is underlain by a coralline boundstone, containing about ten different species of corals. The sequence is capped by a highly altered limestone containing predominanfiy sparite and no preserved aragonitic fossils. The top of the limestone contains some solution depressions partially infilled with indurated laminated muds. The uppermost sequence also contains three different lithologies. The base is an unlithified quartz sand and shell. It is topped by a hard, indurated limestone containing preserved aragonitic shell. The sequence is capped with a freshwater limestone with some preserved laminations at the surface. The Nelson Road Pit is the only known location in the region that contains all three sequences described by DuBar (1962). No Caloosahatchee Formation sediments were found in the Chiquita Sand Pit located east of the Nelson Road Pit. Specifically defined Caloosahatchee Formation sediments have not been identified at any other location to the south in Lee or Collier counties (Missimer 2001).

***Fort Thompson Formation***

The Fort Thompson Formation was originally described as a predominantly carbonate unit based on outcrops located along the Caloosahatchee River and the carbonate shell deposits found in a number of pits in South Florida (Dali, 1890-1903; DuBar, 1958). After DuBar (1962) studied the stratigraphy of the Fort Thompson Formation in the Charlotte Harbor area and north-westem Lee County, the definition of the Fort Thompson Formation was forced to include predominantly siliciclastic and mixed carbonate and siliciclastic sediments. DuBar (1962) recognized two separate quartz sand units within the formation in the Charlotte Harbor area, but did not formally separate them. Based on the stratigraphic sections described in the pits along Charlotte Harbor, there are two or three different stratigraphic units within the Fort Thompson Formation in this region. These units may represent individual sequences related to two separate sea level events or may be a single sequence containing a discontinuity. The uppermost unit, above a laminated crust representing an unconformity is problematical and may represent a very late sea-level deposit or may be an erosional deposit related to soil development. At the Burnt Store Road North Pit, the Fort Thompson Formation is clearly divided into three different stratigraphic units. At the base of the formation, there is a shell bed averaging about 12 inches in thickness. This unit is predominantly aragonitic shell with a minor amount of quartz sand. The overlying unit consists of a shell and sand bed about 5 feet thick capped by a laminated sandstone. The uppermost unit is quartz sand containing little on no carbonate and is sometimes laminated. The Fort Thompson Formation section at the Nelson Road Pit is quite similar to the Burnt Store Road North Pit. The section consists of three stratigraphic units. The lowest unit is a shell and sand bed containing aragonitic shell, quartz sand, and some mud. The middle unit is a sand and shell bed capped by a laminated sandstone. Quartz sand is the predominant component of the middle unit with up to 70% by volume. About 60 cm of quartz sand overlies the laminated crust. The uppermost quartz sand unit contains little or no carbonate. There is again a clear similarity between the Fort Thompson Formation stratigraphy at the Chiquita Sand Pit and the pits described. There are three stratigraphic units with the lowest unit being a shell and quartz sand with a minor quantity of mud. The middle unit is predominantly quartz send with 10 to 20% shell and no mud and is capped by a laminated sandstone crust. About 2.5 feet of sand occurs as the uppermost unit, which contains a typical soil profile (Missimer 2001).

## REFERENCES


Berggren, W. A., D. V. Kent, C. C. Swisher, III, and M. P. Aubry. 1995. A revised Cenozoic geochronology and chronostratigraphy. Pp. 129-212 in: Berggren, W. A., D. V. Kent, M. P. Aubry, and J. Hardenbol, editors, Geochronology, time scales and global stratigraphic correlation, Soc. Econ. Paleont. Mineral. Spec. Pub. No. 54.

Dali, W. H. 1890-1903. Contributions to the Tertiary fauna of Florida with special reference to the Miocene Silex beds of Tampa and the Pliocene beds of the Caloosahatchee River. Wagner Free Institute Science Trans., v. 3, 6 parts, 1654 pp.

DuBar, J. R. 1958. Stratigraphy and paleontology of the late Neogene strata of the Caloosahatchee River area of southern Florida. Florida Geological Survey Bull. 40, 267 p.

DuBar, J. R. 1962. Neogene biostratigraphy of the Charlotte Harbor area in Southwestern Florida. Florida Geological Survey Geological Bulletin No. 43, 83pp.

Evans, M.W. and A.C. Hine. 1991. Late Neogene sequence stratigraphy of a carbonate-silici-clastic transition: Southwest Florida: Geol. Soc. Am. Bull., 103: 679-699.

Heilprin, A. 1887. Explorations on the West Coast of Florida and in the Okeechobee Wilderness. Wagner Free Institute of Philadelphia, 134p.

Jones, D.S., B.J. MacFadden, S.D. Webb, P.A. Mueller, D.A. Hoddell, and T.M. Cronin. 1991. Intergrated geochronology of a classic Pliocene fossil site in Florida: Linking marine and terrestrial biochronologies: Jour. of Geology, v. 99, p. 637-648.

Meeder, J.F. 1987. The paleoecology, petrology and depositional model of the Pliocene Tamiami Formation, Southwest Florida (with special reference to corals and reef development): Ph.D. dissertation, Univ. of Miami, Coral Gables, Florida, 749 pp.

Missimer, T. M. 1992. Stratigraphic relationships of sediment facies within the Tamiami Formation of Southwest Flonda: Proposed intraformational correlations. p. 63-92 in Scott, T. M., and W. A. Allmon, eds., The Plio-Pleistocene Stratigraphy and Paleontology of Southern Florida. Florida Geological Survey Special Publication No. 36.

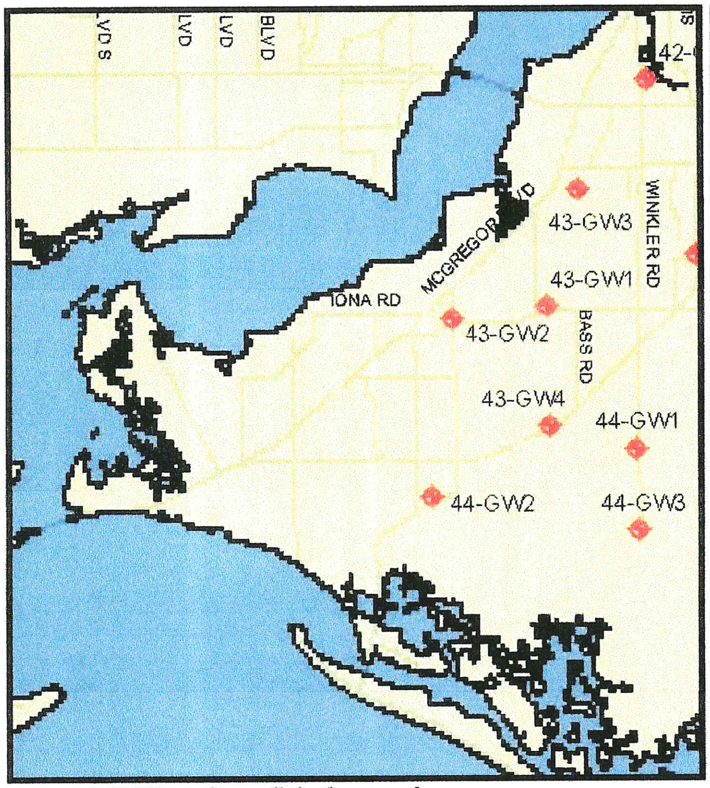
Missimer, T. M. 1993. Pliocene stratigraphy of southern Florida: Unresolved issues of facies correlation in time. p. 33-42 in Zullo, V. A., W. B. Harris, T. M. Scott, and R. W. Portell, The Neogene of Florida and Adjacent Regions, Proceedings of the Third Bald Head Island Conference on Coastal Plains Geology. Flonda Geological Survey Special Publication 37.

Missimer, T. M. 1997. Late Oligocene to Pliocene evolution of the central portion of the South Florida Platform: Mixing of siliciclastic and carbonate sediments. Unpublished Ph.D. dissertation, University of Miami, Coral Gables, Florida, 2 volumes, 1001 pp.

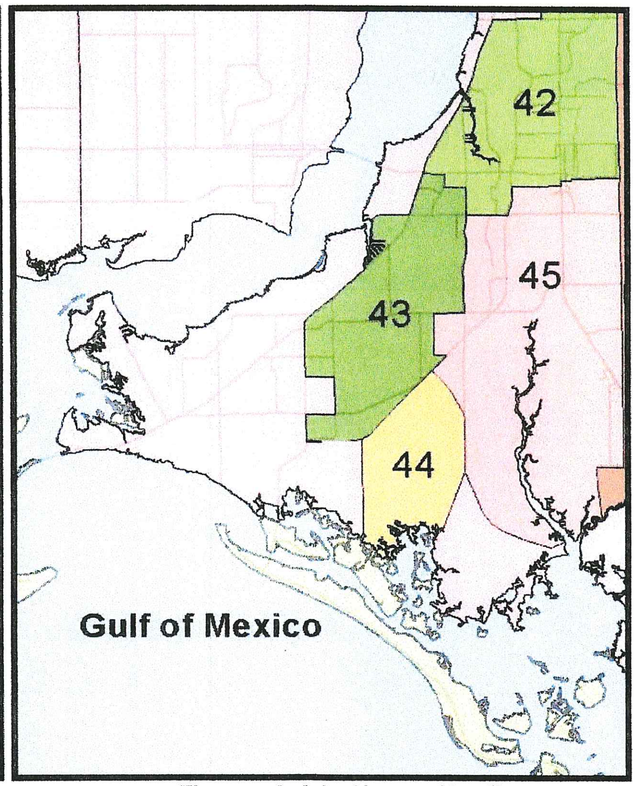
Olsson, A. A., and A. Harbison. 1953. Pliocene Mollusca of Southern Florida. Acad. of Natural Science, Philadelphia, Mon. 8, 457pp.

# HYDROLOGICAL DATA

## AREA MONITOR WELLS & WATERSHEDS




*LCDNR monitor wells in the general area.*

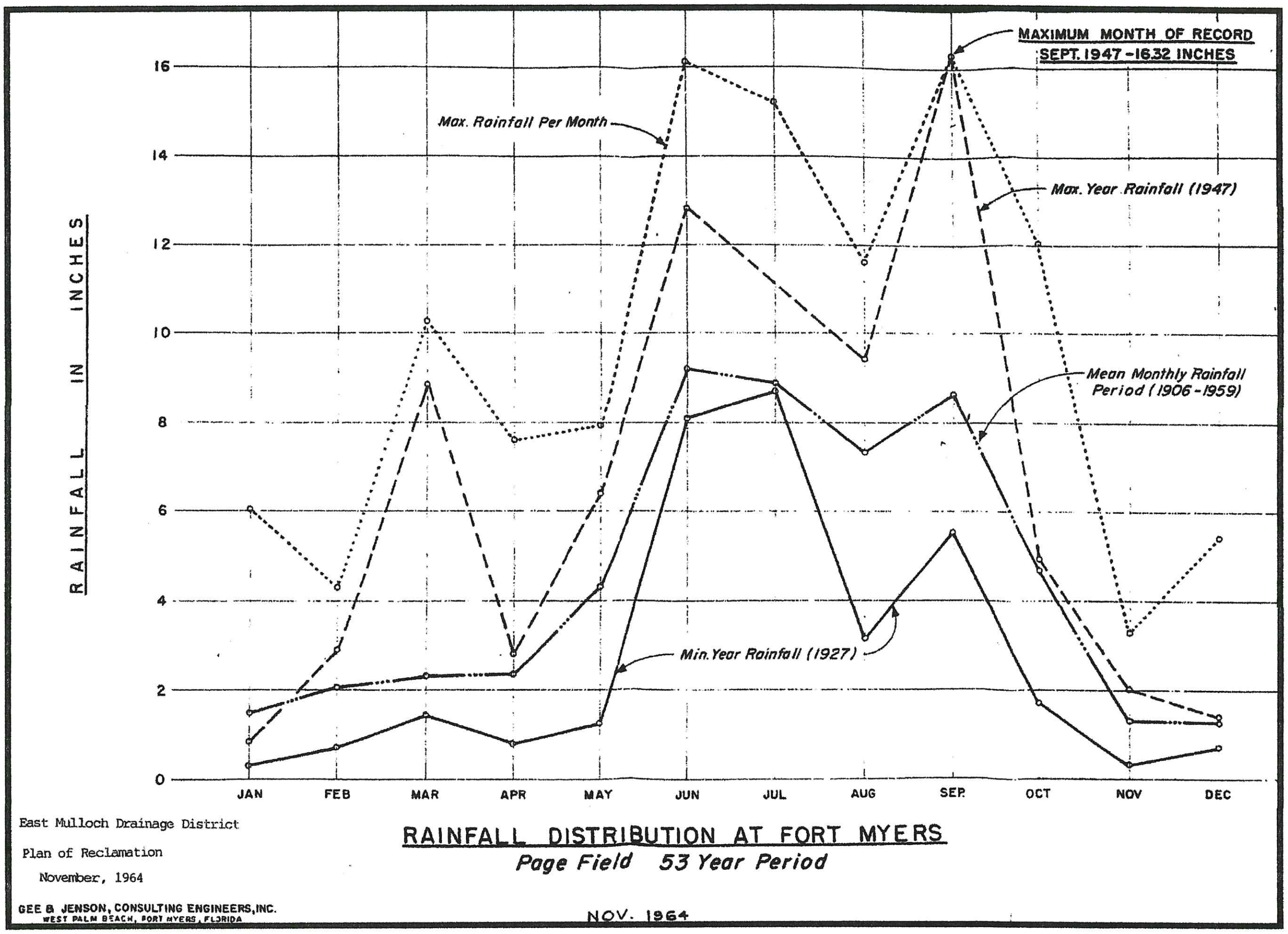


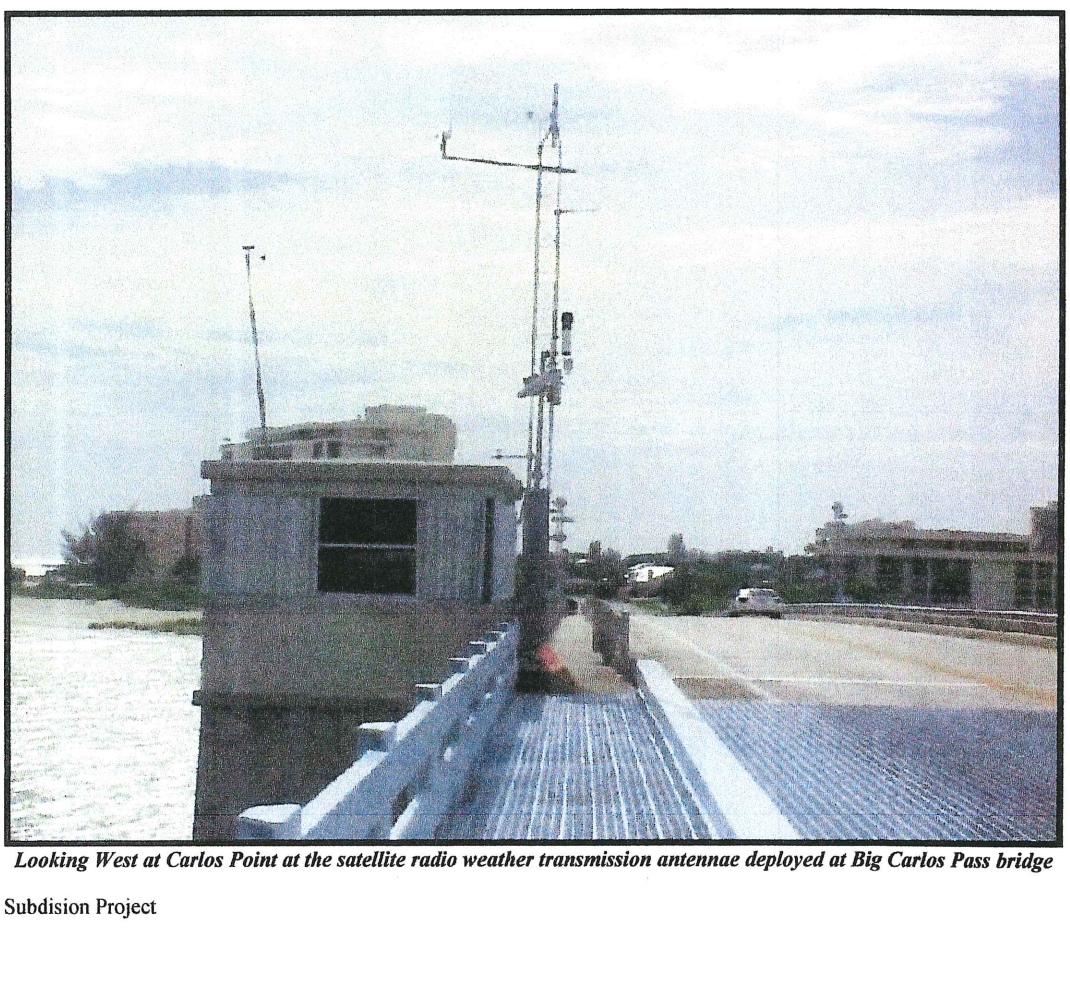

*The watersheds in this part of Lee County*

## LONG-TERM RAINFALL DATA IN LEE COUNTY

**Mean Monthly Rainfall (1991-2009) (inches)**

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1991 | ND | ND | ND | ND | ND | ND | ND | ND | 5.79 | 3.61 | 0.60 | 0.18 | 10.18+ |
| 1992 | 1.43 | 4.02 | 3.76 | 2.59 | 0.84 | 12.41 | 7.36 | 7.44 | 3.92 | 1.22 | 0.85 | 0.46 | 46.30 |
| 1993 | 4.50 | 2.63 | 3.56 | 2.18 | 2.56 | 6.46 | 6.38 | 9.08 | 7.33 | 7.30 | 0.85 | 1.16 | 53.99 |
| 1994 | 2.99 | 1.97 | 1.60 | 6.77 | 1.59 | 5.93 | 8.43 | 10.37 | 8.65 | 2.86 | 2.61 | 4.10 | 57.87 |
| 1995 | 3.61 | 1.34 | 1.13 | 4.79 | 3.21 | 14.40 | 16.49 | 16.56 | 8.26 | 15.01 | 1.13 | 1.33 | 87.26 |
| 1996 | 2.72 | 0.80 | 4.29 | 2.04 | 6.48 | 14.16 | 6.66 | 9.58 | 9.61 | 5.73 | 0.36 | 0.87 | 63.30 |
| 1997 | 1.81 | 1.73 | 2.04 | 7.55 | 5.03 | 9.36 | 10.61 | 8.75 | 11.78 | 0.52 | 5.20 | 8.09 | 72.47 |
| 1998 | 4.10 | 10.53 | 7.39 | 1.08 | 4.22 | 4.37 | 11.56 | 11.40 | 12.89 | 2.68 | 9.87 | 1.81 | 81.90 |
| 1999 | 3.46 | 0.23 | 0.82 | 1.38 | 4.94 | 18.46 | 8.88 | 15.06 | 10.82 | 3.28 | 1.86 | 1.41 | 70.60 |
| 2000 | 1.28 | 0.26 | 3.02 | 1.31 | 1.82 | 7.81 | 9.14 | 10.39 | 14.66 | 2.86 | 0.44 | 1.01 | 54.00 |
| 2001 | 0.38 | 0.05 | 6.98 | 0.53 | 2.32 | 8.90 | 18.24 | 9.96 | 16.77 | 2.37 | 0.45 | 1.60 | 68.55 |
| 2002 | 2.12 | 1.57 | 1.62 | 1.85 | 4.03 | 12.35 | 6.68 | 9.97 | 8.64 | 3.16 | 5.28 | 3.66 | 60.93 |
| 2003 | 1.46 | 0.92 | 4.58 | 3.29 | 4.88 | 13.56 | 6.50 | 13.02 | 13.53 | 0.60 | 2.34 | 3.18 | 67.86 |
| 2004 | 2.95 | 3.77 | 0.22 | 2.78 | 0.91 | 9.37 | 9.57 | 15.35 | 7.14 | 0.82 | 0.75 | 1.49 | 55.12 |
| 2005 | 0.56 | 2.68 | 7.15 | 3.40 | 2.89 | 16.95 | 11.07 | 6.65 | 5.42 | 8.55 | 3.90 | 0.21 | 69.43 |
| 2005 | 0.56 | 2.68 | 7.15 | 3.40 | 2.89 | 16.95 | 11.07 | 6.65 | 5.42 | 8.55 | 3.90 | 0.21 | 69.43 |
| 2006 | 0.35 | 2.66 | 0.74 | 0.06 | 2.28 | 9.45 | 11.88 | 10.04 | 8.67 | 0.98 | 0.71 | 1.40 | 49.19 |
| 2007 | 0.48 | 0.99 | 0.24 | 1.69 | 2.45 | 5.96 | 8.18 | 5.93 | 6.91 | 1.94 | 0.34 | 1.23 | 36.34 |
| 2008 | 1.24 | 2.19 | 2.34 | 3.58 | 0.85 | 9.34 | 11.90 | 11.73 | 8.99 | 2.40 | 0.39 | 1.67 | 56.62 |
| 2009 | 0.35 | 0.26 | | | | | | | | | | | |
| Mean | 1.99 | 2.14 | 3.03 | 2.76 | 3.02 | 10.54 | 9.97 | 10.66 | 9.43 | 3.66 | 2.11 | 1.94 | 61.25^ |
| | 1.99 | 4.13 | 7.16 | 9.92 | 12.94 | 23.48 | 33.45 | 44.11 | 53.54 | 57.20 | 59.31 | 61.25 | |



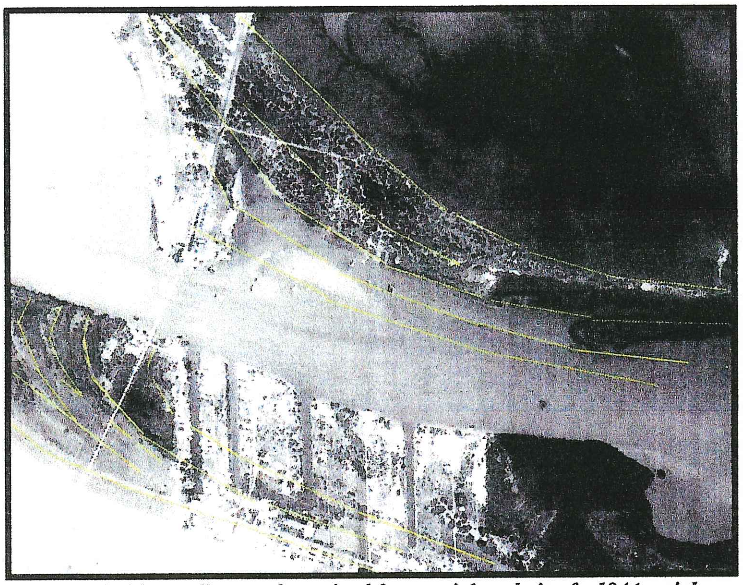



*Looking West at Carlos Point at the satellite radio weather transmission antennae deployed at Big Carlos Pass bridge*

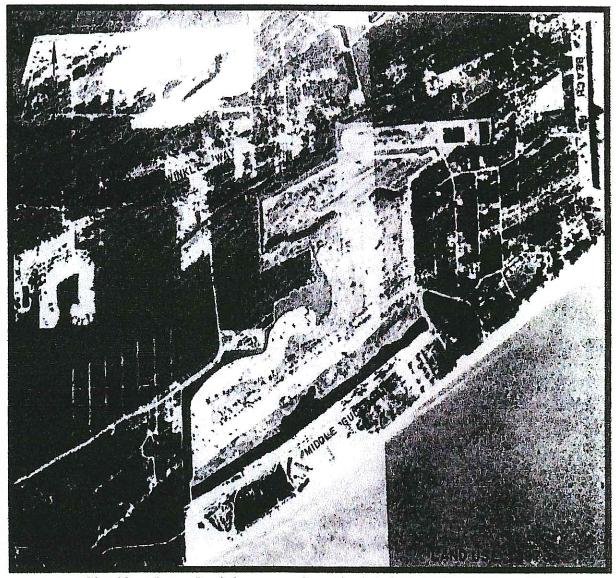
# CONCLUSIONS

The beach ridges of San Carlos and Estero islands were probably joined as one complex in the past when originally formed. Later major storms and the rise in sea level caused the formation of Matanzas Pass that was originally a low-lying swale area between the ridges. This remnant swale area is now probably the deep channel that exists along the bay shoreline of Estero Island.

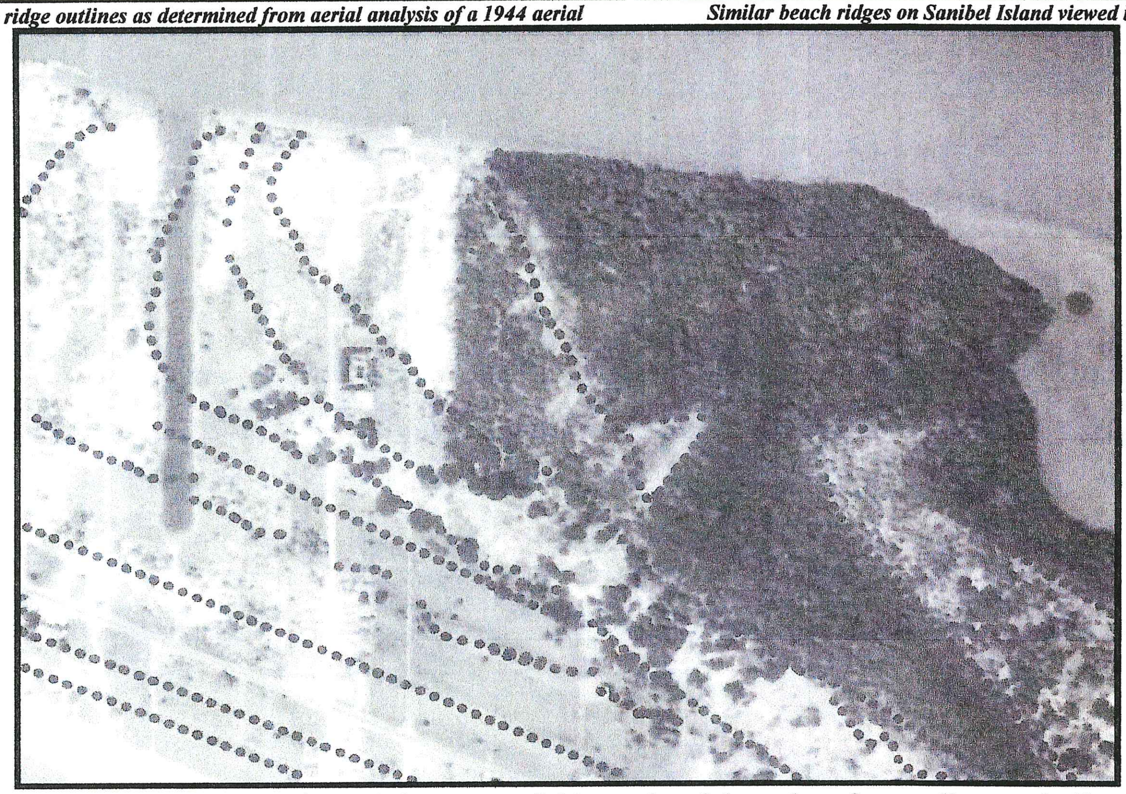
Beach ridges commonly occur on the barrier islands along the Lee County coast. A nearby example is that of the Sanibel Island beach ridges which were formed in a similar fashion and approximately at the same geologic time as those on Estero and San Carlos Islands.



***Beach ridge outlines as determined from aerial analysis of a 1944 aerial***




***Similar beach ridges on Sanibel Island viewed in 1973***



The historical photographs and the cores of this study of the subsurface sediments indicate that the area was formerly a beach ridge complex. The microscopical analyses also confirms that the area was a beach ridge and swale complex in the past.

# RECOMMENDATIONS

There is no further field investigation of this parcel necessary to determine that the site was part of a beach-ridge complex at one time in the past. The cores and sediment analyses confirmed this historical fact.

It is recommended that the campsite be cleaned and the cloth and other items removed.

# BIOLOGICAL REPORT FOR THE SEAGRAPE PROJECT SURVEYS

On March 21st, 2009, Joe Mallon and Cherie Sukovich, biologists; Dr. Hugh Mitchell-Tapping and Chad Ward, geologists; and Joanne Semmer, environmental consultant, inspected the Seagrape Division property.

Joe Mallon and Cherie Sukovich, biologists, began inspection from the southwestern corner of the property following the mosquito control canal west until the canal divided into two separate canals turning northward. We then followed the smaller western canal approximately 50 feet when the canal became impassable. We entered the property on foot on the spoil at the eastern side of the canal. The spoil mound elevation was approximately 10 feet. There was an abandoned homeless camp at this location. We followed the rolling spoil berm, which was typical for a dragline dredge depositing material, The dredge would then moving forward and deposit more material in new spoil piles.

The flora seen was a variety of common weeds, succulents, and Australian pine. To the western side of the berm, the flora was a majority mangrove monoculture with red mangrove being the dominant species, followed by black mangroves and a few white mangroves. As we followed the berm to the north, the canal dried up and we crossed to a road which we followed to the north until coming to the bay. At this point a reference GPS coordinate was shot using a Garmin model 60CSx handheld GPS unit. Another reference point was shot approximately 100 feet to the east for our north-south transect.

Traveling south on the north/south transect, soil cores were taken every 30 meters using a narrow spade. GPS coordinates taken for location recording, the location photographed, and the soil and stored in sample bags.

Generally, the flora was an 80/20 percentage of red mangroves to black mangroves. There was a moderate canopy above and layers of intertwined prop and drop roots on the surface that made traversing extremely difficult. Growing between the mangrove roots, there were a large volume of immature mangroves as well as some black mangrove pneumatophores. The surface soil was a heavy layer of moist organics.

As we moved to the South, the percentages of specific species of mangroves varied. An increase in black mangrove pneumatophores significantly changed the ground surface wherever the black mangrove percentages increased.

To optimally cover the land between the mosquito canals, additional cores were taken 10 meters to the west of the original transect until the distance between the two canals narrowed. Moving south along the original transect on the property, the canopy opened up, possibly indicating that the mangrove community there is younger.

Just South of this area, an abandoned camp was located. Further South, there is the mosquito control ditch, thus completing the survey of the western half of the property.

The survey continued, entering the north eastern end of the property. We took the first coordinate and core 15 meters west of the canal. The community is predominately an older mangrove monoculture of the red, black and white species, with larger prop and drop roots which made traversing even more difficult.

We decided to move our North/South transect ten meters to the west in order to equally divide the land between the mosquito canal in the center of the property and the navigable canal on the eastern side of the property.

As we moved South, we took cores, pictures and recorded the flora percentages at 25 meter intervals. Approximately 90 meters into the survey, another ditch was encountered that cut back into the navigable canal. GPS coordinates were taken at the beginning and end of the ditch.

This transect continued South until we reached the east/west section of the mosquito control canal. Depth, water temperature and GPS coordinates were taken from the mouth of the canal and along the length of the mosquito canals until each became impassible.

The fauna observed or heard during the survey were mangrove crab, fiddler crab, white Ibis, Florida curlew, yellow-crowned night heron, osprey and abundant crab-like spiny orb-weaver spiders.

As noted earlier the property is primarily a mangrove monoculture with a few Australian pine, seagrape, succulents and minimal palmetto, oak, and buttonwood.

# BIOLOGICAL WETLAND DELINEATION SECOND REPORT

On March 28th, 2009, biologist Joe Mallon, geologist Chad Ward and environmental consultant Joanne Semmer arrived at The Seagrape Subdivision Property on Mango Street.

A reference GPS coordinate was shot using a Garmin model 60CSx waypoint at the South/West corner of the property on Mango Street.

The delineation/inspection began at the northwest end of the property on Mango Street. by differentiating between the upland flora and the eastern side of the spoil from that was deposited from western mosquito control canal.

For the delineation, 18" wooden stakes were driven in the ground, flagged with orange tape, marked with the GPS location with the northerlies and easterlies, as well as the stake the chronological numbering of the stakes as the delineation progressed.

The numbering recorded on the stakes started from the northwest corner with the marking OB1 (Ostego Bay stake #1) and continued South/ Southeast to OB13. Along the delineation line it was noted that there were numerous trees that were marked with faded orange marking take, presumably from a prior delineation.

Some of the flora on the upland side of the delineation was, but nut limited to: Brazilian pepper, Seagrape, Live Oak, Gumbo Limbo, Buttonwood, Australian Pine and Carrotwood. On the Wetland side of the delineation the flora included but not limited to: Black Mangrove, Red Mangrove and Coin Vine.

The canal was crossed to get to the eastern side of the mosquito control ditch. At various locations, using a 300 foot construction tape, measurements were taken, from the OB delineation stakes, on the western side of the canal to the eastern side of the canal spoil. This was conducted to estimate the amount of disturbed area caused by dredging the western mosquito control canal.

The eastern mosquito control canal also displaced spoil which was deposited on both sides of that canal. This created a piece of land between the two mosquito control canals that appeared to be of a higher elevation then the surrounding area and appears to have been used as a homeless camp.

The area, between the outside edges of the easternmost edge of spoil and the westernmost edge of the other interior spoil, was marked with stakes and GPS coordinates taken, in order to continue to mark the disturbed area.

# GLOSSARY

## Certification

***The inspector certifies and agrees that:***

(1) The inspector has no present or contemplated future interest in the property inspected.
(2) The inspector has no personal interest in or bias with respect to the subject matter of the assessment report or the participants to the sale. This Report is not based in whole or in part upon the race, color, or national origin of the prospective owners or occupants of the property inspected, or upon the race, color or national origin of the present owners or occupants of the properties in the vicinity of the property inspected.
(3) The inspector has personally inspected the property. To the best of the inspectors' knowledge and belief, all statements and information in this Report are true and correct, and the inspector has not knowingly withheld any significant information.
(4) The address furnished is correct.
(5) This inspection report has been made in conformity with and is subject to the requirements of the Code of Professional Ethics and Standards of Professional Conduct of the environmental organizations with which the inspector is affiliated.
(6) All conclusions and opinions concerning the real estate that are set forth in the Report were prepared by the project manager and consultant whose signatures appear on the Assessment Report.

***Contingent and limiting conditions:***

(1) The inspector assumes no responsibility for matters of a legal nature affecting the property inspected or the title thereto, nor does the inspector render any opinion as to the title. The property is inspected as though under response ble ownership.
(2) Any sketch in the report may show approximate dimensions and is included to assist the reader in visualizing the property. The inspector has not surveyed the property.
(3) The inspector will not be required to give testimony or appear in court because of having made the Assessment with reference to the property in question, unless arrangements have been previously made therefore.
(4) Possession of this Report does not carry with it the rights of publication, and any parts thereof may not be reproduced in any form without written permission of its writer.
(5) The inspector assumes that there are no hidden, non-apparent, or latent conditions or defects in or of the property, subsoil, or structures that would render it more or less valuable or hazardous. The inspectors assume no responsibility for such conditions or for the inspection, engineering, or repair that might be required to discover or correct such factors.
(6) Information, estimates, and opinions furnished and contained in the report were obtained from sources considered reliable and believed to be true and correct. However no responsibility for accuracy of such items furnished the inspector can be assumed by the inspector.
(7) This Assessment is not intended to have any direct effect on the value of the property inspected but simply to provide an Assessment solely for the benefit of the Principal Parties.
(8) Neither all, nor any parts, of the contents of this report, especially any conclusions as to value or hazards, nor the identity of the inspectors shall be disseminated to the public through advertising media, public relations media, news media, sales media, or any other public means of communication without the prior written consent and approval of the inspectors.