Brevard County Board of County Commissioners
Environmentally Endangered Lands Program

Hog Point Sanctuary
Management Plan

June 2002

HOG POINT SANCTUARY
MANAGEMENT PLAN

TABLE OF CONTENTS **PAGINATION**

TABLE OF CONTENTS (Continued)

APPENDICES

LIST OF FIGURES

I. EXECUTIVE SUMMARY

The Hog Point Sanctuary is part of the sanctuary network established by the Environmentally Endangered Lands (EEL) Program in Brevard County. The intent of the EEL Program is to acquire environmentally sensitive lands as a first step "towards long-term protection of essential natural resources, open space, green space, wildlife corridors and maintenance of natural ecosystem functions" (Brevard County EEL Program, Sanctuary Management Manual, 1997). The program also establishes a network of public land to provide passive recreation and environmental education programs to Brevard County residents and visitors.

The Hog Point Sanctuary encompasses approximately 20 acres, located 9 miles south of the Melbourne Causeway (US 192) on State Road A1A. Approximately 1 acre of the site is coastal dune habitat located east of A1A. The remainder of the property is located west of A1A and consists of coastal strand, scrub and impounded tidal swamp. The site is bordered on the north by the Wingate subdivision, undeveloped private land to the south and the Atlantic Ocean and Indian River Lagoon to the east and west respectively. Though portions of the site have been heavily degraded in the past, it offers relatively undisturbed sections of coastal strand and scrub and maritime hammock communities. The EEL Program acquired the site in 1994 as part of the Maritime Hammock initiative C.A.R.L. Project. The State reimbursed the County for approximately 50% of the purchase price in March 1999. The land is Titled to the state and Brevard County is the designated land management agency under lease # 4177.

The Hog Point Sanctuary, along with the other EEL properties in the South Beaches Regional Management Area will be served by an EEL Center for Regional Management at the Barrier Island Ecosystem Center (BIEC), located 5 miles south of the sanctuary. As described in the Sanctuary Management Manual, the Hog Point Sanctuary is a Category 2, or intermediate use site, meaning that the site will receive minimal capital development that may include limited trails and kiosks.

The primary goals of the site include the conservation and restoration of ecosystem function, natural communities and native species' habitat. The collection and documentation of natural and cultural resource data are also important management goals. Other management goals include provisions for public access and environmental education and the preservation of natural landscape/topographic features.

The Hog Point Sanctuary will provide outstanding opportunities for nature-based outdoor recreation, environmental education, field research, and guided or self-guided interpretive tours highlighting the sanctuary's unique ecology and geology. Due to the sensitive nature of the resources, access will be limited to passive recreation activities such as hiking, nature study, picnicking, and environmental education. On-site facilities will be limited to informational kiosks and trail signage.

The proposed recreation and educational opportunities will serve both regional residents and tourists to Brevard County. An emphasis will be placed on providing education to Brevard County schools to promote the understanding and appreciation of the unique and valuable resources available in Brevard County and thereby promote long-term preservation.

II. INTRODUCTION

In a 1990 referendum, Brevard County voters approved the Environmentally Endangered Lands (EEL) Program. The referendum provided for collection of 0.25 mil for 20 years or up to $55 million to acquire, protect and maintain environmentally sensitive lands. The Program Vision Statement is as follows:

"The Environmentally Endangered Lands (EEL) Program acquires, protects and maintains environmentally endangered lands guided by scientific principles for conservation and the best available practices for resource stewardship and ecosystem management. The EEL protects the rich biological diversity of Brevard County for future generations through acquisition and management. The EEL Program provides passive recreation and environmental education opportunities to Brevard's citizens and visitors without detracting from the primary conservation goals of the program. The EEL Program encourages active citizen participation and community involvement."

The program established a conceptual framework and funding mechanism to implement an EEL sanctuary network in Brevard County. The scientifically based Selection and Management Committee, a seven-member committee of scientists, have the responsibility of establishing criteria for land selection. The Committee identifies and recommends to the Board of County Commissioners those lands acquired with EEL Program funds. The EEL Program sanctuary network represents a collection of protected natural areas that form a regional conservation effort focused upon protection of biological diversity. Within the countywide EEL Sanctuary Network, four regional management areas are geographically defined within Brevard County. For each management area, a specific site is identified as a Center for Regional Management. The sites that will function as centers for regional management for the EEL Program are listed:

I. Barrier Island Ecosystem Center
Regional Management Center for South Beaches

II. The Enchanted Forest Sanctuary
Regional Management Center for North Mainland

III. Malabar Scrub Sanctuary
Regional Management Center for South Mainland

IV. Helen and Allan Cruickshank Sanctuary
Regional Management Center for Central Mainland

These centers provide strategically located hubs for implementing the countywide conservation, passive recreation and environmental education goals of the EEL Program.

As outlined in the Sanctuary Management Manual (SMM), the EEL Program will adopt and implement an ecosystem approach to environmental management. Ecosystem

management is defined as an integrative, flexible approach to the management of natural resources, key themes of ecosystem management include:

1. Adaptive Management Natural areas must be managed in the context of the landscape in which they exist and based on scientific knowledge. Resource managers must adapt to continuing advances in the scientific understanding of ecosystems and changing environmental and human influences on the resources.

2. Partnerships Interagency and private sector partnerships are essential to manage and protect ecosystems. Natural resource management is complex and requires multi-disciplinary skills and experiences.

3. Holistic Approach Ecosystem management includes the maintenance, protection and improvement of both natural and human communities. This systems approach to management considers the "big picture" of natural resource protection, community economic stability and quality of life.

Land management issues, such as fire management, protection and restoration of natural hydrologic cycles, threatened and endangered species, and removal of invasive exotics must be integrated with issues, such as provisions for public access and levels of human use. The integration of ecosystem protection and human needs combine to form the foundation of an effective ecosystem management strategy.

The Sanctuary Management Manual of the Environmentally Endangered Lands Program establishes a general framework for management of specific sites and establishes ten Principles of Conservation summarized, to achieve the following:

1. Maintain all sites in a natural state and/or restore sites to enhance natural resource values;

2. Protect natural resource values by maintaining biological diversity and using conservation as a primary goal for decision making;

3. Balance human use with the protection of natural resources;

4. Apply the most accurate scientific principles to strategies for conservation;

5. Collect and use the most accurate data available for developing site management plans;

6. Consider the interests and values of all citizens by using scientific information to guide management policy making;

7. Promote effective communication that is interactive, reciprocal, and continuous with the public;

8. Promote the value of natural areas to Brevard County residents and visitors through the maintenance of the quality of resource values, public services, and visitor experiences;

9. Promote the integration of natural resource conservation into discussions of economic development and quality of life in Brevard County; and

10. Provide a responsible financial strategy to implement actions to achieve long-term conservation and stewardship goals.

In addition to the conservation principles, this management plan provides specific goals, strategies and actions to guide management of the Hog Point Sanctuary in terms of the objectives of the Environmentally Endangered Lands Program. The plan is divided into the listed 10 sections.

I. *Executive Summary* identifies the location, size, general natural resource features and primary management goals for the site.

II. *Introduction* provides a brief introduction to the EEL Program, as well as a description of the structure of the management plan

III. *Site Description and Location* provides a detailed site location and description.

IV. *Natural Resource Descriptions* includes physical resources (climate, geology, topography, soils, and hydrology), biological resources (ecosystem function, flora, fauna, special concern species, and biological diversity), and cultural (archeological, historical, land-use history, public interest).

V. *Factors Influencing Management* includes natural trends, human-induced trends, external influences, legal obligations and constraints, management constraints, and public access and passive recreation.

VI. *Management Action Plans* include specific goals, strategies and actions.

VII. *Projected Timetable for Implementation* prioritizes activities and provides a timeframe for management plan implementation.

VIII. *Financial Considerations* discusses funding mechanisms and projected management costs.

IX. *Bibliography* cites original research and publications used to develop the Management Plan.

X. *Appendices* include supplemental information.

III. SITE DESCRIPTION AND LOCATION

The Hog Point Sanctuary is located within boundaries of the Archie Carr National Wildlife Refuge (the Refuge). The United States Fish and Wildlife Service (USFWS) established the Refuge in 1989 under the Department of the Interior to protect sea turtle populations and their nesting habitat along the central Atlantic coastline of Florida.

The Refuge was named after the late Dr. Archie Carr, a pioneer in Florida ecology and sea turtle biology. The 20.5 miles of coastline within the refuge host the largest concentration of loggerhead and green sea turtles in the United States. Green turtles nest within the refuge but not in globally significant numbers. The beaches of the Refuge in Brevard County represent the northern extent of leatherback turtle nesting areas in the United States (Brevard County EEL Program, 1995a).

The Hog Point Sanctuary is 20 acres, located 9 miles south of the Melbourne Causeway (US 192) and south of the town of Melbourne Beach, Florida (Section 10, Township 29, Range 38) as shown in Figure 1. The sanctuary is comprised of two parcels whose tax-parcel IDs are 29-38-33-00-9 and –500. The legal descriptions are attached as Appendix A. The EEL Program acquired the site in 1994 as part of the Maritime Hammock initiative C.A.R.L. Project. The State reimbursed the County for approximately 50% of the purchase price in March 1999. The land is titled to the state and Brevard County is the designated land management agency under lease # 4177. Access to the site by vehicle is from SR A1A, which separates a 1-acre portion of the site, located on the east side of A1A, from the bulk of the property. The site east of A1A covers 325 linear feet of beach front.

Figure 2 outlines the Hog Point Sanctuary and adjacent properties. The portion east of A1A is bounded by the Atlantic Ocean to the east, SR A1A to the West, and private homes to the north and south. The remainder of the property is bounded by A1A to the east, the Indian River Lagoon to the west, an undeveloped parcel to the south and the Wingate subdivision to the north.

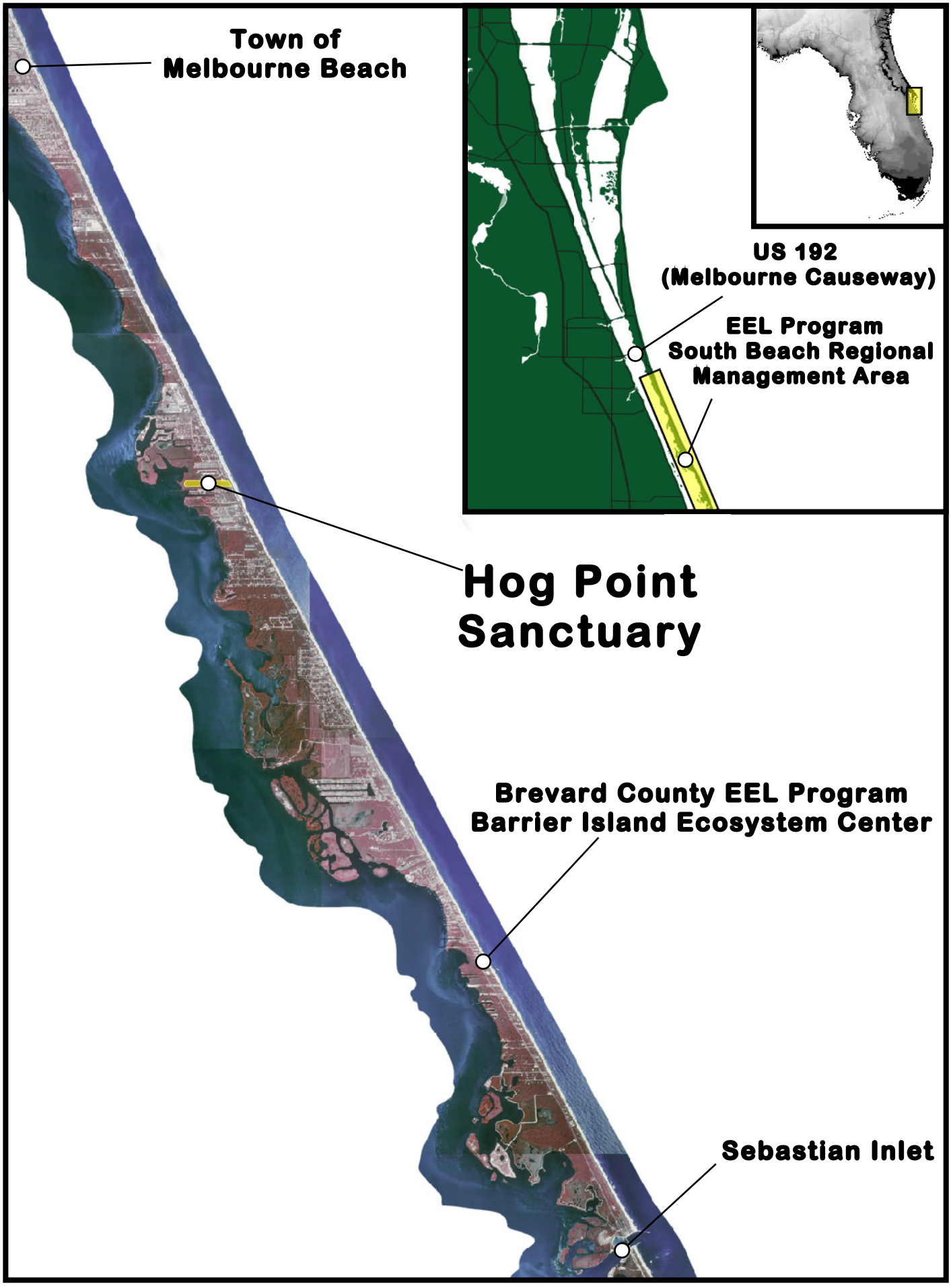

Figure 1. Location of the Hog Point Sanctuary

Figure 2. Hog Point Sanctuary and Adjacent Properties

IV. NATURAL RESOURCE DESCRIPTIONS

This section provides descriptions of natural resources, including physical resources (climate, geology, topography, soils and hydrology), biological resources (ecosystem function, flora, fauna, special concern species and biological diversity) and cultural resource information (archeological, historical, land-use history and public interest). Figures 3 and 4 show the site from 1943 through the present.

A. PHYSICAL RESOURCES

1. Climate

The Hog Point Sanctuary is located in east central Florida, an isothermal area at the junction of the temperate and sub-tropical climatic zones. Temperature data from representative locations in Brevard County indicate an average annual temperature of approximately 74° F. August is typically the warmest month, averaging 82° F, whereas January is the coolest month, averaging about 62° F (Schmocker, et. al., 1990). Summer temperatures are moderated by frequent afternoon thunderstorms. Periods of extreme cold weather are infrequent due to the site's latitude and proximity to the Atlantic Ocean. The most recent "hard" freeze occurred in the winter of 1989/1990 resulting in the die back of many plants including many red mangroves (Rhizophora mangle) and the exotic Australian Pine (Casuarina equisetifolia). Long-term rainfall data for the area indicate an average of 50 to 52 inches per year in southernmost Brevard County (Schmocker et. al., 1990). Wet and dry seasons are typically well defined, with the wet season occurring between May and October, the dry season between November and April. Annual and seasonal rainfall is subject to large variation in both amount and distribution.

Prevailing winds are generally from the north to northeast during the dry season (November-April) and from the east-southeast during the wet season (May-October). Climatic change, seasonal variability, and disturbance contribute to species distribution and community composition.

2. Geology

The ecosystems of the barrier island are largely a result of the fluid geology of the region, which is continually being sculpted and changed. The following relevant geological information, provided by the EEL Program in the Characterization Report for the Archie Carr National Wildlife Refuge (Brevard County EEL Program, 1995a), is summarized below.

Formation of most North American barrier islands occurred about 7,000 years ago. At the end of the Holocene ice age, 18,000 years before present (YBP), sea level was about 130 meters below its present level. At this time, glacier melting released water to the oceans creating a rise in sea level. The rise in sea level created flooding and formation of barrier islands along the North American coastline (Parkinson, 1995).

The barrier island in the vicinity of the Hog Point Sanctuary is believed to be perched on a rise in the underlying coquina rock, or Anastasia Formation. The Anastasia Formation runs from St. Augustine, Florida (St. John's County) south to Boca Raton, Florida (Palm Beach County). This formation is thought to be composed of late Pleistocene sediments that were deposited to the east of the Atlantic Coastal Ridge and lithified in places to form beach rock (Johnson and Barbour, 1990). The Brevard County portion of the barrier island has a ridge and swale topography with some ridge elevations in excess of 30 feet (Parkinson, 1995; Parkinson and White, 1994). Maximum elevations at the Hog Point Sanctuary are 18 feet above mean sea level.

At present, the coastal processes that lead to the development of the geomorphology at the Hog Point Sanctuary are unknown. Three processes are possible: 1) washover, 2) tidal inlet evolution, and 3) beach ridge progradation. Washover fans occur when waves surge over the crest of the dune, depositing sand on the backbarrier of the island. A flood-tidal delta develops when sand flushes through a tidal inlet under rising tide or storm surge conditions. Unlike washover events, inlets are transitory features that open, migrate, and close in response to the rate of sea-level rise, sediment supply, wave climate, tidal range, and frequency of storm events. Inlet dynamics, washover events and the overall landward retreat of the barrier island have significant impacts on the barrier island ecosystems. Beach ridge progradation occurs when either a large volume of sediment is introduced to the area via long-shore currents and/or sea-level elevation stabilizes or drops. Either process yields a succession of beach ridges separated by low-relief swales. The combination of these processes yields a barrier island ecosystem with a relatively straight sandy seaward shoreline and rugged backbarrier shoreline. The straight seaward shoreline is indicative of erosion and the rugged backbarrier shoreline is indicative of depositions (Parkinson, 1995; Parkinson and White, 1994).

3. Topography

The Hog Point Sanctuary has a relatively simple topography with elevations up to 20' National Geodetic Vertical Datum (NGVD) on a ridge east of SR A1A. To the east of this line the land slopes off to a 15-foot line along the dune edge. To the west the land slopes off towards the lagoon with a 5-foot line running midway between SR A1A and the Indian River Lagoon (Figure 3). Though no detailed elevation surveys have been performed, the sloping of the site from A1A to the eastern dike of the mosquito control impoundment is probably characterized by several swales running north to south that is typical for this section of the barrier island.

The elevation on the site is not solely the result of natural processes. A review of aerial photos of the property shows that a large section was cleared to bare soil between 1980 and 1986 (figs. 4 and 5). Recent visits suggest that there was considerable reworking of the soil during this time. By 1958 the salt marsh on the western portion of the property had been impounded for mosquito control purposes, with ditch/dike systems installed along the upland marsh interface as well as along the Indian River Lagoon.

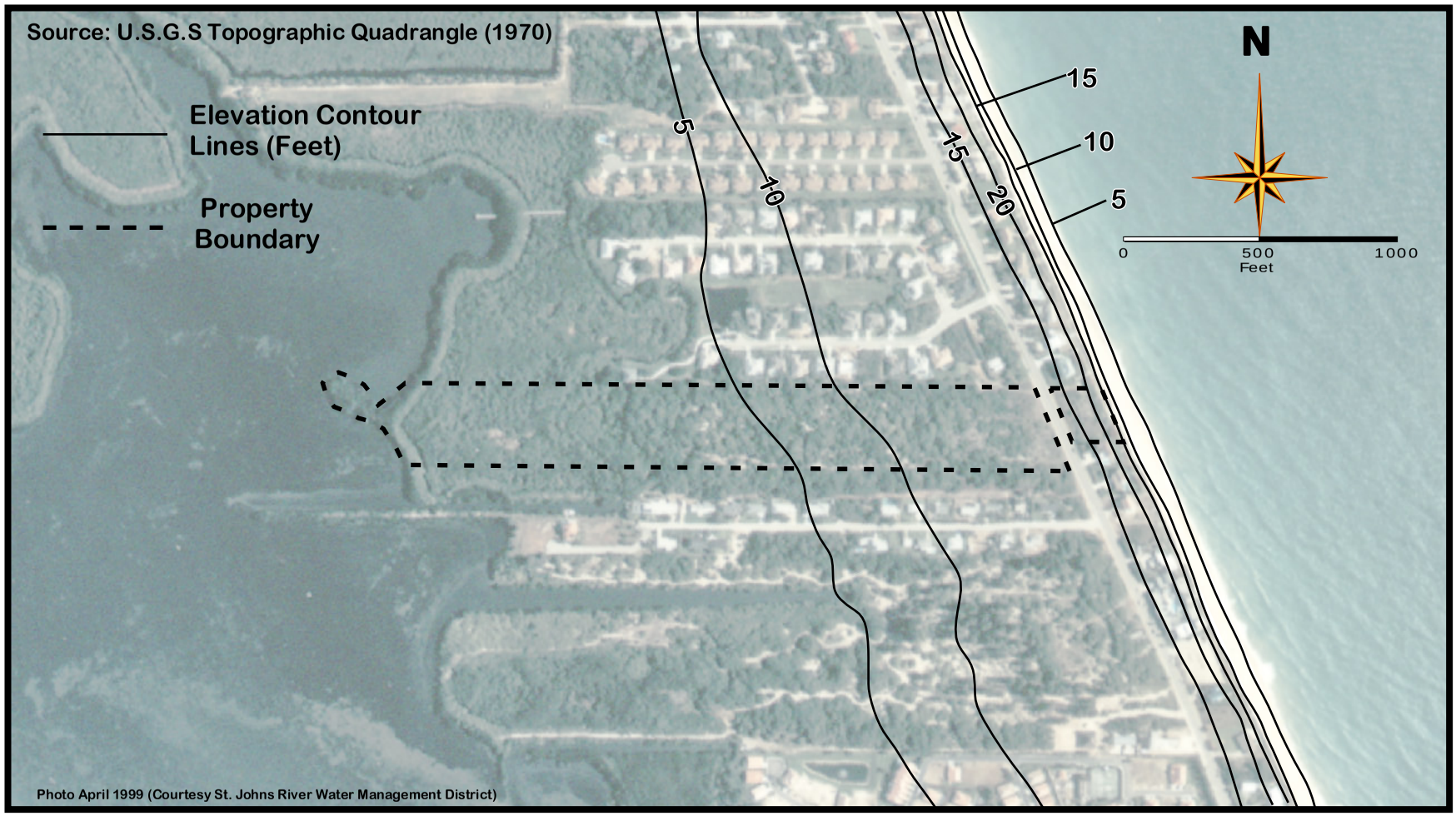

Figure 3. Hog Point Sanctuary Topography

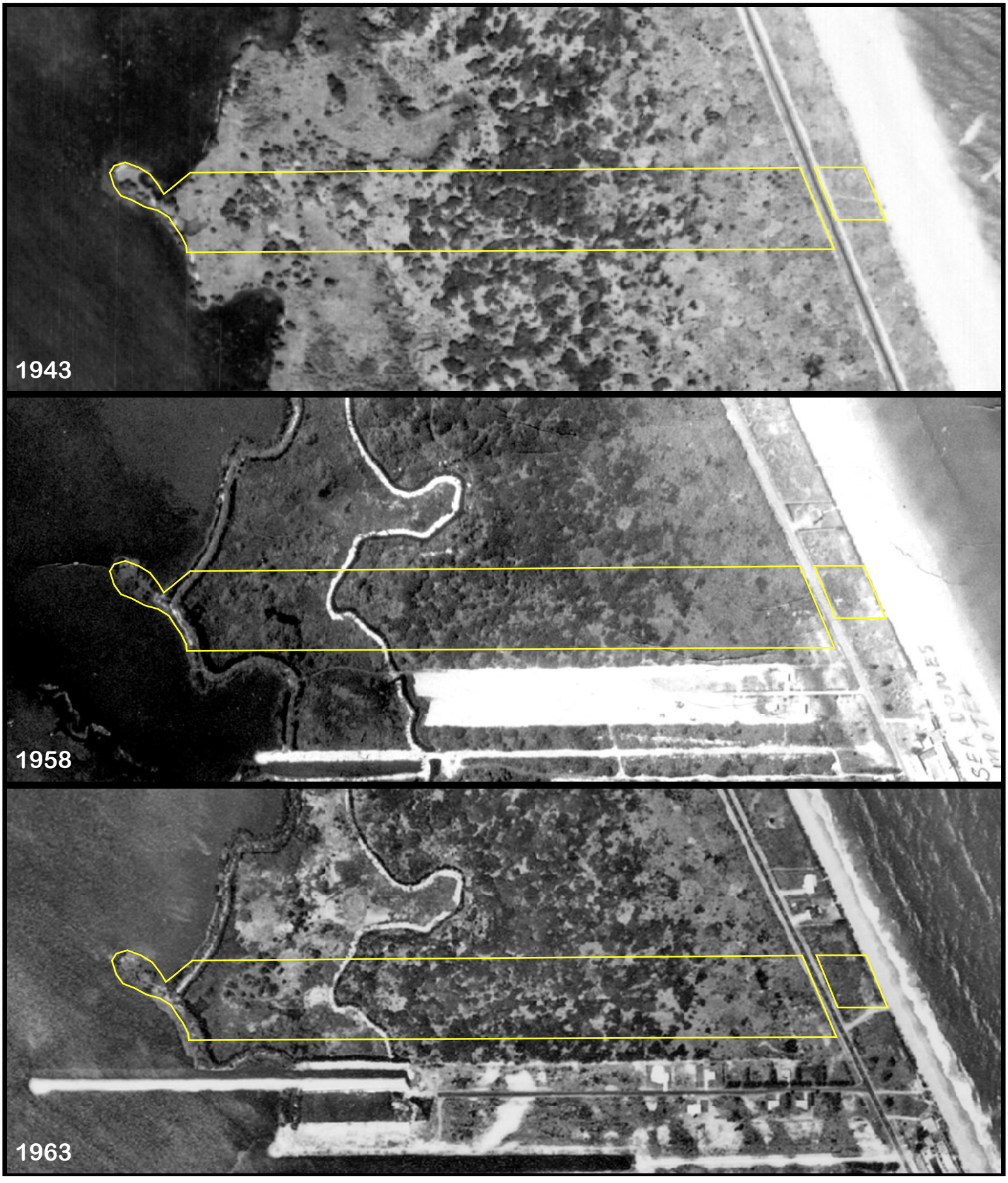

Figure 4. Representative Aerial Photos of the Hog Point Sanctuary (1943-1963)

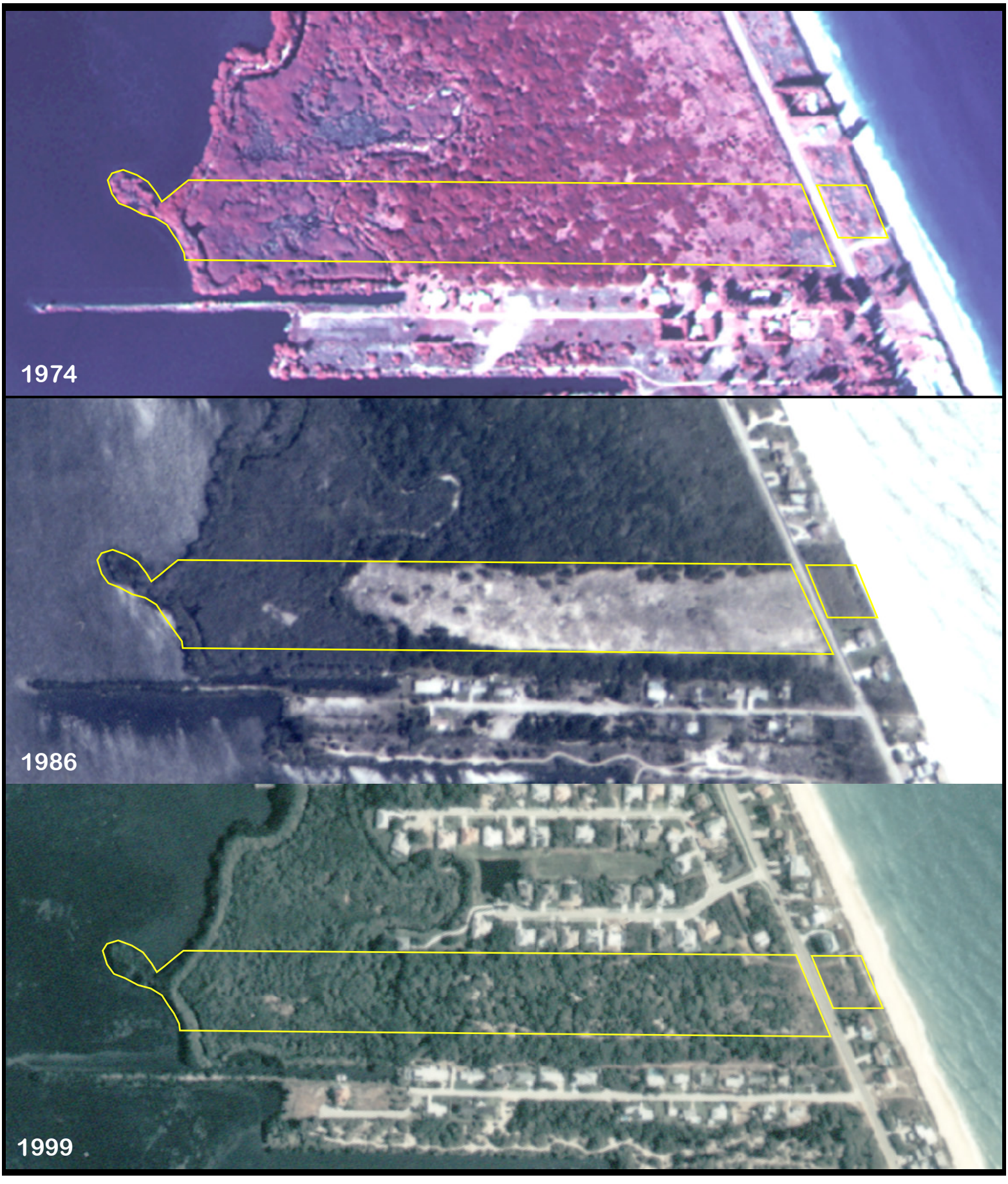

Figure 5. Representative Aerial Photos of the Hog Point Sanctuary (1974-1999)

4. Soils

The Natural Resource Conservation Service (formerly the Soil Conservation Service) describes the soils within the Hog Point Sanctuary (Figure 6) as follows:

Coastal series (Ck)
Palm Beach sand (Pb)
Canaveral complex (Ca)
Tidal swamp (Ts)
(Source: Huckle et al., Florida, 1974)

Coastal Beaches (Ck) consist of nearly level or gently sloping sand, along the Atlantic Ocean. Consisting primarily of quartz sand and shell fragments, this area is partially covered during high tides. It is subject to reworking by wave and wind action.

Palm Beach sand (Pb) is classified as a nearly level to gently sloping, excessively drained soil on dune-like ridges that are approximately parallel to the Atlantic Ocean. The soil is composed of mixed sand and shell fragments. Natural vegetation found on Palm Beach sand consists of saw palmetto, sand live oak, sea grape, prickly pear cactus and sea oats. The water table is usually at a depth of more than 9 foot.

Canaveral complex soils (Ca) are located on a strip along the eastern edge of the mosquito impoundment. This series consists of nearly level, well-drained sandy soils on broad ridges interposed with long narrow sloughs. The water table is usually at a depth of 10 to 40 inches during the wet season and below 60 inches during the dry season. The soils are composed of sand and shell fragments.

Tidal swamp (Ts) is located primarily within the mosquito impoundment though a small area exists west of the impoundment dike. Tidal swamp consists of nearly level areas that are near sea level and are generally covered with mangroves or other marsh vegetation. The soils may be composed of mixed sand and shell fragments along with organic matter.

5. Hydrology

The Hog Point Sanctuary has not been surveyed to determine the depth of the surficial aquifer. Ground infiltration of precipitation is the primary mechanism for recharge of the surficial aquifer, which is the primary source of freshwater in the south beaches, making this property valuable to the local water resources.

In addition to the hydrologic impacts due to SR A1A, the hydrology has also been altered by recent disturbances, including vegetation clearing and the impounding of wetlands for mosquito control on the western portion of the property. The salt marsh enclosed within

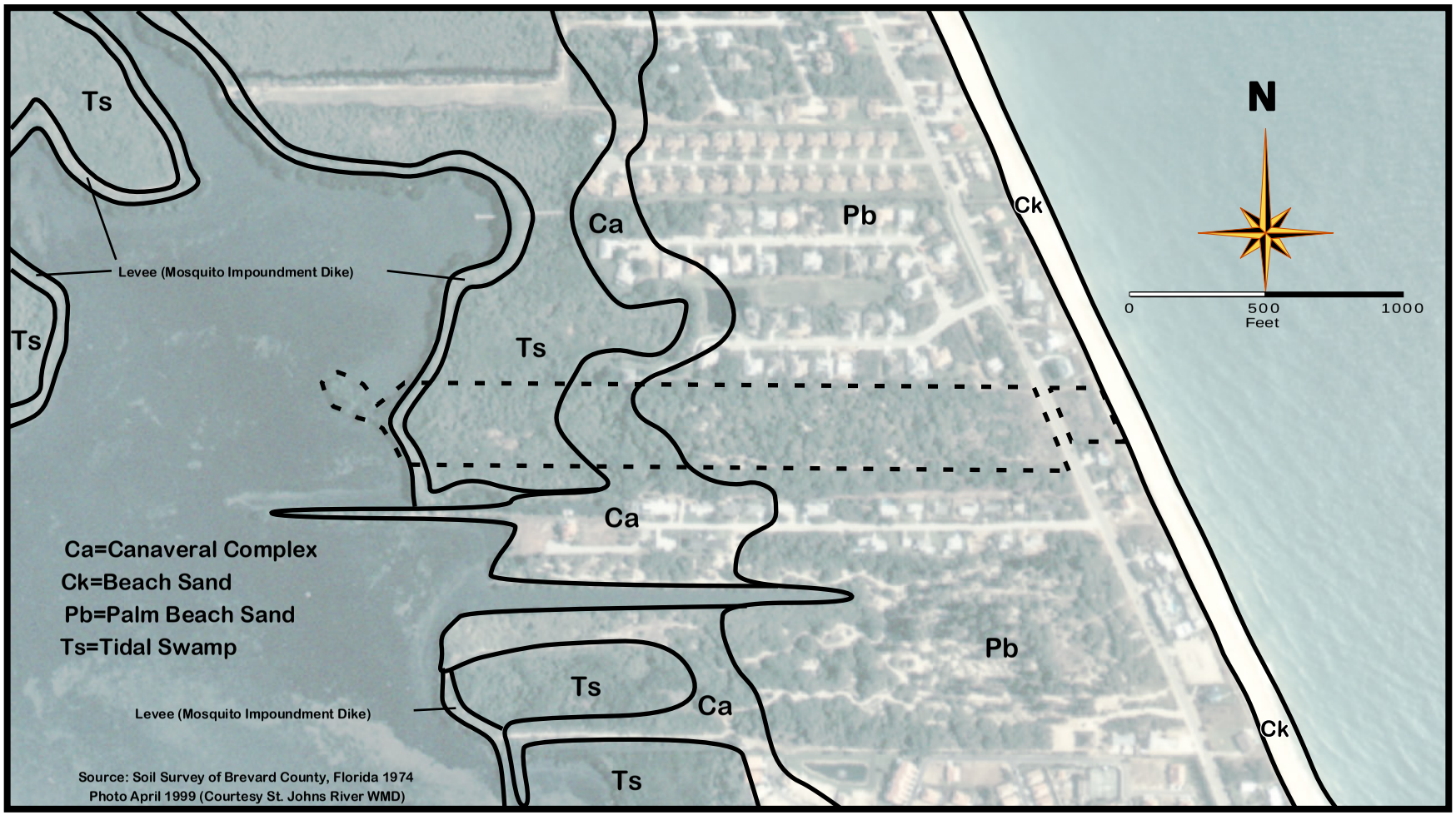

Figure 6. Hog Point Sanctuary Soils

the mosquito impoundment has been isolated from the Indian River Lagoon by the western ditch/dike system and from the adjacent uplands by the eastern ditch/dike system (Figure 7). The installation of the eastern ditch/dike is unusual for impoundment on the south beaches. It appears from the vegetation growth on the dikes in the 1958 photo that the eastern ditch was installed after the western ditch. One possible explanation for the installation of the eastern ditch would be to prevent flooding of the area to the southeast of the Hog Point Sanctuary, which had been cleared for development. The Brevard County Mosquito Control District will reconnect the impoundment adjacent to the Hog Point Sanctuary to the Indian River Lagoon through a series of culverts during the spring of 2001.

The central portion of the property is outside of the 100-year flood zone (Federal Emergency Management Agency, FEMA). The entire barrier island system of Brevard County is however expected to be inundated in the event of a Category 3 or greater hurricane event (Brevard County Planning, 1991).

B. Biological Resources

1. Ecosystem Function

The Hog Point Sanctuary consists of a Coastal Dune community that grades westward into Coastal Scrub which in turn grades westward into an Estuarine Tidal Swamp along the Indian River Lagoon. The site is important in the preservation of designated plant and animal species. The site provides 325 linear feet of beachfront, free from light pollution, for the nesting of endangered sea turtles on the parcel east of A1A. Additionally, the site is home to numerous Gopher Tortoises (Gopherus polyphemus). Several designated plant species, including Erect Pricklypear (Opuntia stricta), Beach Creeper (Ernodea littoralis), Coastal Mock Vervain (Glandularia maritima), Twinberry (Myrcianthes fragrans), and Tough Bully (Sideroxylon tenax) are also found on the site.

2. Flora

In order to understand the floral communities currently on site the land use history of the site must be reviewed (Figures 3 & 4). In 1943, the site was nearly pristine with a small footpath leading from SR A1A east to the beach. The remainder of the property appears to have been an impenetrable stretch of coastal strand, scrub and open high salt marsh. By extrapolating from the areas present on site today, which have not been disturbed, the habitat immediately west of A1A was probably covered with sand live oak and saw palmetto with a wide strip of maritime hammock grading towards the lagoon as a wide strip of salt marsh. The more open and lower stature vegetation structure than in subsequent years is consistent with the decline in fire frequency (active fire suppression) observed across the region in the past 60 years. Interestingly, the marsh present in the 1943 aerial shows open marsh areas with sparse mangrove coverage. The predominance of red and black mangroves common in the area today were not present at this time. Though the large scale impounding of salt marshes has certainly led to the dominance of the red and white mangroves within impounded marshes, the marshes present in 1943

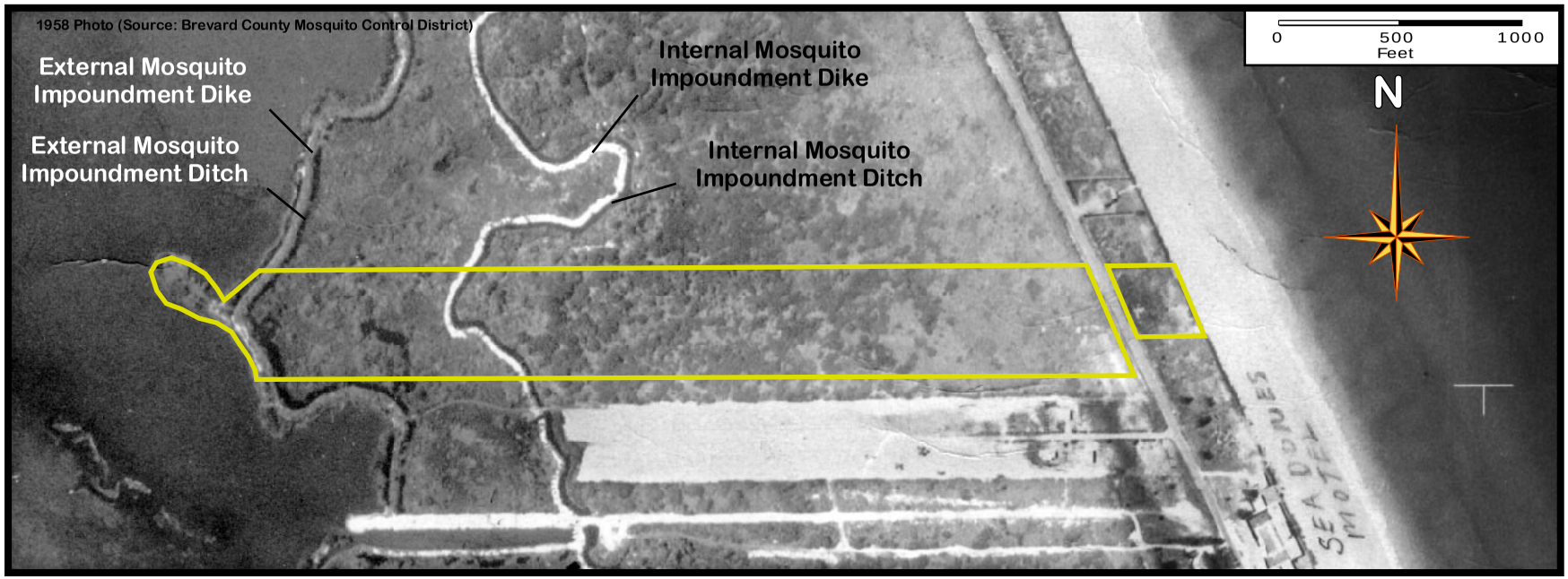

Figure 7. Hog Point Sanctuary Hydrological Alterations

appear similar to the unimpounded high marshes found further north within the Mosquito Lagoon. Additionally, marshes present in 1943 may have included high marsh species (e.g. *Spartina bakeri*) which would carry fire and limit trees and shrubs (Schmalzer et al, 1991.)

By 1958, major disturbances had occurred on site with the impoundment of the salt marsh for mosquito control. In addition, a large area south of the Sanctuary had been cleared for development. By 1963, a canal was dug south of the mosquito impoundment with spoil deposited westward into the Indian River Lagoon. The site remained undisturbed until 1980 (not shown) when a series of survey trails was cut through the site with the bulk of the site between A1A and the mosquito impoundment being cleared by 1986. A thin strip of the original hammock was left intact along the northern edge of the property and the southwestern edge adjacent to the mosquito impoundment. By 1999, much of the vegetation in the cleared areas had recovered and development of the Wingate subdivision to the north was nearly complete. Though much of the site has been revegetated by sprouting from roots and rhizomes and/or the native seed bank, exotic plants, primarily Brazilian pepper (Schinus terebinthifolius) were able to exploit the open habitat.

The undisturbed portions of hammock which persist on the site include a variety of temperate and tropical species including tallowwood (Ximenia americana), white stopper (Eugenia axillaris), yellow necklacepod (Sophora tomentosa), redbay (Persea borbonia), wild coffee (Psychotria nervosa), naked wood (Myricanthes fragrans) along with other species described for this community. The disturbed portion of the site has been colonized by a wide variety of native species including live oaks (Quercus virginiana), Hercules club (Zanthoxylum clava-herculis), tough bully (Sideroxylon tenax), wax myrtle (Myrica cerifera), saw palmetto (Seronea repens) and other species common to coastal strand/scrub habitats in the area. Saw palmetto is very poor at colonizing sites from which it is eliminated, and it grows slowly (Abrahamson 1995, 1999). Its presence on a site suggests that it survived the past disturbance.

Plant surveys have been conducted at the Hog Point Sanctuary by amateur plant biologists Margaret Hames and Travis McClendon in 1991 and 1999 respectively. A total of 88 plant species have been identified (Appendix B). Additional sampling needs to be conducted to identify density and locations of designated species.

The need for fire management on the Hog Point Sanctuary has been determined to be minimal for the immediate future. The relatively young age of many of the plants that have recolonized in the past 15-20 years is obvious by the low levels of fuels and open understory. Future burns may be needed, though the proximity of residential areas would necessitate the installation of a fire break either north or south of the undisturbed hammock areas.

The history of land clearing and alteration on site has also led to the proliferation of exotic plant species on site. The primary invasive exotic plant on the site is the Brazilian Pepper (Schinus terebinthifolius). In addition, Madagascar periwinkle (Catharanthus

roseus), Guinea grass (Panicum maximum), Simpleleaf Chastetree (Vitex trifolia), and Sea Hibiscus (Hibiscus tilaceus) are also found on site.

In May 1999, the EEL Program was awarded a grant for the removal of Brazilian pepper from the Hog Point Sanctuary through the Florida Department of Environmental Protection. Herbicide treatment using a combination of basal bark application of Garlon 4 and JLB oil (10-20% solution depending on the size of the individual plants) removed Brazilian Pepper. Cut stump (cutting the stump followed by immediate chemical treatment) application of Garlon 3A (50% solution) or Rodeo (100% solution) was used to treat plants found along the portion east of SR A1A and a 100 foot strip west of A1A. Figure 8 shows the results of the removal program with dead pepper readily identifiable.

The EEL Program is dedicated to the long-term removal of invasive exotic plants from within the Hog Point Sanctuary and will work with adjacent property managers to ensure the success of this program. Plans are currently underway to assess the extent of the other exotic plant species on site and to develop specific plans for their removal.

3. Fauna

The Hog Point Sanctuary has had no formal faunal surveys. The site is known to contain numerous Gopher Tortoise (Gopherus polyphemus) burrows. Faunal surveys are an initial goal of the EEL Program for the Hog Point Sanctuary.

The portion of the property located east of A1A is important in providing nesting sites for endangered sea turtles free from light pollution. Between 1990 and 1995, loggerhead turtles (Caretta caretta) nested at densities (per 500 meters of beach) of between 75 and 85 nests per year on the beaches adjacent to the parcel east of A1A. (Zahorcak, 1996). For this same time frame, 0.5-1.0 green turtle (Chelonia mydas) nests per year (per 500 meters of beach) were recorded for the same area.

4. Designated Species

The Hog Point Sanctuary is home to five designated plant species (Appendix A) and one designated animal species, the Gopher Tortoise (Gopherus polyphemus), that reside on the property. In addition, the endangered green (Chelonia mydas) and loggerhead (Caretta caretta) sea turtles are known to nest on the beach adjacent to the portion of the sanctuary east of A1A.

Plants

Though several plant surveys have been conducted on site, these were mainly conducted to determine the presence or absence of species. The next step will require the generation of maps and a photographic series detailing the extent of coverage of the designated species followed by careful monitoring of the resources. Once a baseline has been established, additional management (e.g. replanting) can be addressed. Continued efforts to remove invasive exotic plants will allow for the natural progression of native species.

Figure 8. May 2000 Aerial Photo of the Hog Point Sanctuary Showing Treated Brazilian Pepper.

The location of designated species can be considered during the creation of public access trails and during other management efforts including exotic plant removal and prescribed fire planning.

Sea Turtles

It has been shown that the beach east of the Hog Point Sanctuary is an important nesting site for endangered sea turtles. Between 1990 and 1995, loggerhead turtles (Caretta caretta) nested at densities (per 500 meters of beach) of between 75 and 85 nests per year on the beaches adjacent to the parcel east of A1A. (Zahorcak, 1996). For this same time frame, 0.5-1.0 green turtle (Chelonia mydas) nests per year (per 500 meters of beach) were recorded for the same area. By providing an unlit property west of A1A we are not only making the adjacent beach attractive to nesting turtles, but also increasing the chance for survival by hatchlings.

5. Biological Diversity

No work has been conducted with an eye towards assessing biological diversity. Additional data will need to be collected in order to assess the biological diversity (both richness and evenness) so that changes in diversity can be tracked over time. Methodologies will need to be established for all of the relevant taxonomic groups and researchers and staff tasked to address this particular need.

C. CULTURAL

1. Archaeological

In 1994, a review of the Hog Point Sanctuary by the Division of Historic Resources identified a series of shell/sand mounds covering approximately 2-3 acres on the southwestern portion of the upland section. These sites were identified by a local informant and several artifacts including 2 St. John's plains shards, worked shell and possible human bones (10 cm long x 2 cm diameter) were identified. The site ranges from 5 to 15' NGVD of borrowed material (with adjacent borrow depressions). Recommendations for the site (BR1649) include an evaluation of the significance and the determination of the presence of human remains.

2. Historical

The following information is summarized from the Characterization Report for the Archie Carr National Wildlife Refuge (Draft, October 1995):

Ais Indians (1000 BC – 1500 AD)

The first people to inhabit Florida arrived about 12,000 years ago, from the central and southern areas of the North American continent, at the end of the last ice age. At this time much of the North American continent was still covered by glaciers. Sea level was

200 feet below its current level and much of the earth's water was stored in glaciers (Brown, 1994).

At the time of European contact in the 16th century, the Ais ("Eyes") Indians were known to inhabit the barrier island in the Brevard County area. The Ais did not exhibit the nomadic existence of other native Americans, as the semi-tropical climate provided for their needs without having to travel great distances.

Twenty-six shell middens and four burial sites have been recorded on the Barrier Island within the Archie Carr National Wildlife Refuge. One shell midden (burial mound?) is located on the Hog Point Sanctuary.

Turn of the Century to Present

During the late 1800s and early 1900s, naturalists were the primary visitors to Brevard County. Notable scientists came to this species rich, semi-tropical region to collect specimens for natural history museums. These specimens included rare bird life such as the Carolina parakeet (Conuopsis carolinensis), which is now extinct. Many of these visitors stayed at Mrs. Lathams's Oak Lodge located on the barrier island in the current location of the mullet creek islands (Austin, 1967).

In the early 1900s, people came to Brevard County from around the country via the Florida East Coast Railway. There was an increase in settlement and development of towns brought about by the creation of railroads and canals. At that time, Melbourne Beach was accessible by the Melbourne Beach Improvement Company's motor train (Shofner, 1995).

The increase in population was also the result of the 1916 Drainage Acts of Florida and the establishment of Mosquito Control measures beginning in 1927. The Drainage Acts rerouted drainage patterns which permanently lowered water tables in areas where standing water naturally existed for six or more months each year. Mosquito control (pesticide spraying) lowered the mosquito population to acceptable levels (Barille, 1988).

In the 1920s, improved roads such as the Dixie Highway (U.S. 1) brought more cars and people to Brevard County. In 1921, a bridge was built over the Indian River Lagoon from Melbourne to Indialantic and hotels and casinos were established. Air conditioning was introduced, and Florida became known as the residential and tourist destination it remains today.

3. Land-use History

In 1943, the Department of Agriculture conducted the first formal aerial survey of Florida. As previously stated, the site was almost entirely undisturbed at the time, with the exception of old A1A, which appears to have been unpaved at this time. As of 1958, a mosquito control impoundment was installed on the western edge of the property. A large portion of the site had been cleared by 1986, presumably for development. The site

has been allowed to recover on its own and in 1999 a large scale Brazilian pepper removal project has increased the opportunities for native vegetation to recover.

4. Public Interest

Public interest for the EEL Program as a whole has been enthusiastic and supportive. A public meeting held on June 8, 1998 that introduced the Master Site Plan for the Barrier Island Ecosystem Center was very well received. Additional partners in the management and maintenance of the site include the Archie Carr National Wildlife Refuge partners, Brevard County schools, and local universities. The Archie Carr National Wildlife Refuge is also served by a working group composed of local, state, federal, citizen and private groups dedicated to the preservation and management of the Refuge's resources. Public interest in the Hog Point Sanctuary has been limited to issues raised by the exotic plant removal program.

V. FACTORS INFLUENCING MANAGEMENT

A. NATURAL TRENDS

The primary variable that affects the formation and succession of Florida's barrier island communities is the ocean, including associated storms, wind, and salt. Each of the coastal plant communities is specifically adapted to its geographic and topographic position. Natural alterations are frequent, resulting from storm surges and overwash, or loss of canopy trees due to age, wind and occasionally fire. The role of fire and changes with fire suppression need to be considered on the barrier island. The loss of dunes due to storm surge or human activity can greatly affect the back dune, coastal strand and maritime hammock communities. Land management practices developed for the Hog Point Sanctuary must consider the restoration and maintenance of the barrier dunes.

Another important factor controlling the communities within the Hog Point Sanctuary is the remnant mangrove communities along the Indian River Lagoon. The installation of the mosquito control impoundment has altered the extent/depth and water quality of the area with impacts to both plant and animal communities.

B. HUMAN-INDUCED TRENDS

The mild sub-tropical climate and easy access to major population centers makes the barrier island a prime resort and retirement area. Humans have altered the surrounding landscape through activities such as development, agriculture, beach armoring, the introduction of exotic plants and animals, recreation and tourism.

The major historical human influences on site have been the previous clearing of roughly 70% of the site, presumably for some unrealized development. The location of Route A1A has obvious influences on the survivorship of designated species such as gopher tortoises.

C. EXTERNAL INFLUENCES

There are currently no known encroachments from adjoining property owners on the Hog Point Sanctuary. The Archie Carr National Wildlife Refuge draws people during sea turtle nesting season (May-September). Local interest groups such as the Sea Turtle Preservation Society hold guided "turtle walks" during the season. These walks are held after sunset and follow well-known nesting areas. The guides are trained and follow standard guidelines for sea turtle nesting observation.

D. LEGAL OBLIGATIONS AND CONSTRAINTS

The following is a list of possible legal constraints to management and public access on site.

St. John's River Water Management District

The proposed hiking trail on site will be primarily restricted to previously disturbed roads and paths. An opportunity to create a new path through the area currently bisected by the mosquito control ditches may be desirable and could end in an overlook of the Indian River Lagoon. The St. John's River Water Management District (SJRWMD) regulates impacts to wetlands pursuant to Part IV, Chapter 373 of the Florida Statutes and in accordance with Chapters 40C-400 of the Florida Administrative Code (F.A.C.). The SJRWMD typically requires an Environmental Resource Permit (ERP) to impact wetlands. Since the construction of a simple bridge over the mosquito ditch would impact less than 0.5 acres, no mitigation would be required.

Prior to submitting an application for dredging or filling within waters of the State, it is recommended that the areas proposed for impact be delineated in accordance with the Unified Wetland Delineation Methodology for the State of Florida dated 1 July, 1994 and then reviewed by SJRWMD staff.

Division of Forestry

The Florida Division of Forestry (DOF) issues permits for prescribed burns for land management to land managers with certified burn numbers. Certification is provided by DOF.

E. MANAGEMENT CONSTRAINTS

1. Exotic Plant Species

Invasive, exotic, and/or nuisance plants have the potential to displace native species and to significantly alter natural ecosystem function. Exotic species are a major concern within the Hog Point Sanctuary, particularly along roads and the shore of the Indian River Lagoon. The primary species of concern, Brazilian Pepper (Schinus terebinthifolius) has been targeted through a grant under the Florida Department of Environmental Protection's Invasive Plant Management Program. The complete treatment of the above mentioned species was completed in the fall of 1999.

A thorough survey of the extent of the Madagascar Periwhinkle (Catharanthus roseus), Guinea Grass (Panicum maximum), and Simpleleaf Chastetree (Vitex trifolia) needs to be conducted. Once determined, these species can be treated and monitored. The EEL Program is currently developing a comprehensive treatment and monitoring program to ensure the long-term removal of these species from the Hog Point Sanctuary and other EEL managed properties.

2. Exotic Animal Species

The non-indigenous animal species which are likely to be found within the Hog Point Sanctuary include the Cuban Tree Frog (Osteopilus septentrionalis), the brown anole (Anolis sagrei), and several other herpetile species as well as several ant species. Further investigation into the levels and impacts of these species will be conducted prior to the establishment of a control strategy.

F. PUBLIC ACCESS AND PASSIVE RECREATION

The EEL Program is committed to providing a range of public use opportunities that are consistent with the conservation and protection goals of the voter approved referendum. It has been determined that passive recreational activities best support the EEL Program goals. The EEL Program *Sanctuary Management Manual* (SMM) defines passive recreation as:

> "recreational types of uses, level of uses and combination of uses that do not, individually or collectively, degrade the resource values, biological diversity, and aesthetic or environmental qualities of a site."

The Hog Point Sanctuary is a Category III site, which means that no capital improvements are planned. The size, location and habitats of the Hog Point Sanctuary will dictate the types of activities that will be compatible with the overriding conservation mandate. The current size of the site, the condition of its habitats and its proximity to residential makes it unsuitable for public access. Preservation of the historic resources on site also supports limited public access.

A positive use of the site is as a research and educational resource. The undisturbed areas interspersed with areas that have been disturbed by human use can be used to illustrate the ways in which habitats recover. Whenever possible, research and restoration conducted on site will be used to guide educational programs.

VI. MANAGEMENT ACTION PLANS

The following is a comprehensive outline of the goals, strategies and actions necessary to manage the Wagner Sanctuary.

A. GOALS

The *Sanctuary Management Manual* of the EEL Program provides the following management goals for the Wagner Sanctuary.

- Documentation of historic public use
- Conservation of ecosystem function
- Conservation of natural (native) communities
- Conservation of species (including endemic, rare, threatened and endangered species)
- Documentation of significant archeological and historical sites
- Provision of public access for responsible public use
- Assessment of carrying capacity of natural resources with public use
- Provision of environmental education programs
- Provision of opportunities for compatible uses
- Assurance of general upkeep and security of the property

B. STRATEGIES AND ACTIONS

The following is an outline of the specific management strategies and actions that are needed to meet the management goals for the Wagner Sanctuary.

GOAL: DOCUMENTATION OF HISTORIC PUBLIC USE

Strategy 1: Document historic public use

Actions:
- Collect historic information regarding the types of activities that have occurred on-site
- Evaluate how historic public use impacted the site's natural resources
- Consider historic public use patterns in planning future public uses

GOAL: CONSERVATION OF ECOSYSTEM FUNCTION

Strategy 2: Protect, maintain, and restore native diversity, ecological patterns, and the processes that maintain diversity.

Actions:
- Research and monitor baseline conditions of natural systems
- Research the connection of on-site natural resources with adjacent resources
- Research hydrologic patterns on and off-site

- Research native species' movement patterns on and off-site
- Focus natural community restoration efforts on enhancing native diversity
- Investigate the historic hydroperiod and restore natural hydrologic patterns

GOAL: CONSERVATION OF NATURAL (NATIVE) COMMUNITIES

Strategy 3: Restore degraded, disturbed, or altered uplands within the Wagner Sanctuary

Actions:

- Conduct monitoring to establish baseline conditions within the upland communities
- Collect historic information regarding prior wetland communities that may have occurred on-site
- Consult local experts and current literature regarding best scientific methods for wetland restoration
- Prioritize the upland communities in need of restoration
- Identify appropriate restoration activities
- Assess possible impacts of proposed restoration on adjacent communities and off-site properties
- Implement the selected restoration activities
- Monitor the effects of the restoration activities, evaluate the success of the restoration projects, and revise the restoration plan as necessary

Strategy 4: Design and implement a "natural" fire management program

Actions:

- Identify natural communities that require prescribed fire management
- Identify and evaluate individual proposed burn management units
- Identify the goal of the application of fire to each proposed burn unit
- Document listed species within each burn unit
- Identify and plan perimeter and internal fire breaks
- Develop and implement public education campaign including programs and literature regarding the need for periodic controlled burns
- Secure the necessary permits from the State Division of Forestry
- Begin prescribed fire management program
- Monitor the effects of the fire management activities, evaluate the success of the program, and revise the program strategies as needed

GOAL: CONSERVATION OF SPECIES (INCLUDING ENDEMIC, RARE, THREATENED AND ENDANGERED)

Strategy 5: Protect on-site populations of endemic, rare, threatened and endangered species through the utilization of existing habitat management and species recovery plans.

Actions:
- Develop a methodology and work plan to accomplish the identification of designated plant and animal species
- Survey for, and identify, designated plant and animal species
- Plot the location of identified designated species within and/or adjacent to the sanctuary for use in the implementation, or re-distribution, of amenities or site improvements
- Periodically update these baseline survey data to determine possible changes in designated species distribution or density
- Review management plans for consistency with USFWS and FGFWFC guidance concerning listed species
- Implement habitat restoration activities for listed species (i.e. removal of exotic/nuisance species, restoration of ecosystem function)
- Establish periodic monitoring of habitat suitability (where indices are available for a given species), species population levels, diversity levels, and exotic/nuisance species, as a means of evaluating the success of management strategies

GOAL: DOCUMENTATION OF SIGNIFICANT ARCHAEOLOGICAL AND HISTORIC SITES

Strategy 6: Survey for archaeological and historical sites within the Wagner Sanctuary.

Actions:
- Contact the State Division of Historic Resources to conduct a Phase I survey of the site
- Review available maps and historic records for indications of past usage of the site
- Map all archaeological and historic sites for future reference

GOAL: PROVISION FOR PUBLIC ACCESS AND RESPONSIBLE PUBLIC USE

Strategy 7: Establish and enforce specific policies and management techniques governing public access and responsible public use.

Actions:
- Plan appropriate public facilities by examining the site's natural and cultural resources and reviewing public input
- Evaluate proposed public facilities for consistency with ADA guidelines

- Establish social and environmental carrying capacities for proposed public facilities
- Use daily or seasonal quotas, restricted access or limited parking to enforce established carrying capacities
- Coordinate recreational use with the ecological burning strategies of the EEL Program
- Minimize unauthorized trail expansion by educating the users, providing on-site public info, establishing sufficient trails, constructing handrails, and developing written guidelines
- Construct hiking trails in accordance with the USDA Forest Service "Standard Specifications for the Construction of Trails"
- Construct terraces for erosion control

GOAL: ASSESSMENT OF CARRYING CAPACITY OF NATURAL RESOURCES WITH PUBLIC USE

Strategy 8: Establish a monitoring program to assess effects of public usage on natural resources.

Actions:
- Establish baseline vegetation monitoring transects to provide data regarding existing conditions
- Establish a methodology and record keeping system to document public use
- Conduct regular monitoring to assess impacts of public use on natural habitats
- Conduct regular walk-throughs" on frequently used sites to assess the need for changes in routing/user types or user intensity
- Re-route users from sensitive areas or popular sites on a regular or as-needed basis
- Re-align public use to avoid areas which observations or data indicate are too sensitive for the level of use originally planned

GOAL: PROVISION OF ENVIRONMENTAL EDUCATION PROGRAMS

Strategy 9: Develop a plan to provide on-going environmental education programs to Brevard County residents and visitors.

Actions:
- Determine target audiences and types of programming best suited to those groups
- Design and develop indoor and outdoor exhibits, signs and printed materials
- Include educators, friends groups and other organizations in the design, development and delivery of programs
- Develop and coordinate a docent program to assist in program delivery
- Develop and provide training and site specific informational materials for use by docents and other educators
- Develop a marketing and promotions plan for educational programs
- Develop criteria and process of evaluation for program review and refinement
- Provide a "special collection" of books and other materials specifically related to the environmental and cultural character of the Sanctuary

GOAL: PROVISION OF OPPORTUNITIES FOR COMPATIBLE USES

Strategy 10: Provide opportunities for multiple use and compatibility when practical.

Actions:
- Use fire breaks as multi-use recreation trails when not needed for resource management
- Include multiple benefits of natural community restoration efforts in education program

GOAL: ASSURANCE OF GENERAL UPKEEP AND SECURITY OF THE PROPERTY

Strategy 11: Secure and maintain the Sanctuary to the highest degree possible using EEL staff. Parks and Recreation staff, contract employees and volunteers.

Actions:
- Employ a land manager to oversee maintenance and security activities;
- Contract with Brevard County, Parks and Recreation for maintenance of parking areas, fire breaks, trails, boardwalks, bridges, benches etc.;
- Coordinate daily maintenance tasks using staff and volunteers.

VII. PROJECTED TIMETABLE FOR IMPLEMENTATION

The implementation of the management plan is outlined in a recommended timeline. This timeline includes immediate, short-term and long-term time frames. Immediate time frame is defined as within one year of the adoption of this management plan, short term is 1 to 5 years, and long-term is more than 5 years. Some actions are also defined as on-going, if the activity is required for the on-going maintenance of the Wagner Sanctuary.

ACTION	TIMELINE
Strategy 1: Document historic public use	
Collect historic information regarding the types of activities that have occurred on-site	Complete
Evaluate how historic public use impacted the site's natural resources	Complete
Consider historic public use patterns in planning future public uses	Complete
Strategy 2: Protect, maintain, and restore native diversity, ecological patterns, and the processes that maintain diversity	
Research and monitor baseline conditions of natural systems	Immediate
Research the connection of on-site natural resources with adjacent resources	Immediate
Research hydrologic patterns on and off-site	Immediate
Research native species' movement patterns on and off-site	Immediate
Focus natural community restoration efforts on enhancing native diversity	On-Going Short-Term
Investigate the historic hydroperiod and restore natural hydrologic patterns	Long-Term
Strategy 3: Restore degraded, disturbed, or altered uplands with the Wagner Sanctuary	
Conduct monitoring to establish baseline conditions within the upland communities	Immediate
Collect historic information regarding prior wetland communities that may have occurred on-site	Immediate
Consult local experts and current literature regarding best scientific methods for wetland restoration	On-Going
Prioritize the upland communities in need of restoration	On-Going
Identify appropriate restoration activities	On-Going
Assess possible impacts of proposed restoration on adjacent communities and off-site properties	On-Going
Implement the selected restoration activities	Short-Term
Monitor the effects of the restoration activities, evaluate the success of the restoration projects, and revise the restoration plan as necessary	Long-Term

Strategy 4: Design and implement a "natural" fire management program

Identify natural communities that require prescribed fire management	Complete
Identify and evaluate individual proposed burn management units	Long-Term
Identify the goal of the application of fire to each proposed burn unit	Long-Term
Document listed species within each burn unit	Long-Term
Identify and plan perimeter and internal fire breaks	Long-Term
Develop and implement public education campaign including programs and literature regarding the need for periodic controlled burns	Long-Term
Secure the necessary permits from the State Division of Forestry	Long-Term
Begin prescribed fire management program	Long-Term
Monitor the effects of the fire management activities, evaluate the success of the program, and revise the program strategies as needed	Long-Term

Strategy 5: Protect on-site populations of endemic, rare, threatened and endangered species through the utilization of existing habitat management and species recovery plans

Develop a methodology and work plan to accomplish the identification of designated plant and animal species	Immediate
Survey for, and identify, designated plant and animal species	Immediate
Plot the location of identified designated species within and/or adjacent to the sanctuary for use in the implementation, or re-distribution, of amenities or site improvements	Immediate
Periodically update these baseline survey data to determine possible changes in designated species distribution or density	Short-Term
Review management plans for consistency with USFWS and FGFWFC guidance concerning listed species	Immediate
Implement habitat restoration activities for listed species	Short-Term
Establish periodic monitoring of habitat suitability, species population levels, diversity levels, and exotic/nuisance species, as a means of evaluating the success of management strategies	Immediate

Strategy 6: Survey for archaeological and historic sites within the Wagner Sanctuary.

Contact the State Division of Historic Resources to conduct a Phase I survey of the site	Complete
Review available maps and historic records for indications of past usage of the site	Complete
Map all archaeological and historic sites for future reference	Complete

Strategy 7: Provide opportunities for multiple use and compatibility when practical

Use fire breaks for multi-use recreation trails when not needed for resource management	Short-Term
Include multiple benefits of natural community restoration efforts in education program	Immediate & On-Going

Strategy 8: Secure and maintain the Sanctuary to the highest degree possible using EEL staff. Parks and Recreation staff, contract employees and volunteers

Employ a land manager to oversee maintenance and security activities	Complete
Contract with Brevard County, Parks and Recreation for maintenance of parking areas, fire breaks, trails, boardwalks, bridges, benches etc	Short-Term
Coordinate daily maintenance tasks using staff and volunteers	On-Going

VIII. FINANCIAL CONSIDERATIONS

The following is a breakdown of the general costs estimated for capital improvement and annual management of the Wagner Sanctuary:

Capital Improvement	
Property Boundary Fencing (FY 1999/2000)	$25,000.00
Property Boundary Signs (FY 2000/2001)	$ 840.00
Kiosks (FY 2000/2001)	$ 700.00
Initial Treatment of Brazilian pepper (FY 1999/2000, FDEP, Bureau of Invasive Plant Management Grant)	$15,000.00
Annual Management	
Follow-up treatment of Brazilian Pepper	$ 800.00
Treatment for other invasive plants species	$ 220.00
Upkeep of fences and kiosks	$ 600.00

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Appendix A. Hog Point Sanctuary Legal Description.

Tax parcel IDs 28-38-10-9 and 28-38-10-500

THE NORTH 110 FEET OF GOVERNMENT LOT 4, SECTION 10, TOWNSHIP 29 SOUTH, RANGE 38 EAST, OF BREVARD COUNTY, FLORIDA, LYING WEST OF STATE ROAD A1A AND RUNNING FROM STATE ROAD A1A TO THE INDIAN RIVER

AND

THE SOUTH 241.78 FEET OF THE NORTH 1341.78 FEET OF GOVERNMENT LOT 3, SECTION 10, TOWNSHIP 29 SOUTH, RANGE 38 EAST (MEASURED AT RIGHT ANGLES WITH THE NORTH LINE OF SAID GOVERNMENT LOT 3), AND THAT PART OF GOVERNMENT LOT 2, SECTION 10, TOWNSHIP 29 SOUTH, RANGE 38 EAST, WHICH LIES BETWEEN A PROLONGATION WEST TO THE INDIAN RIVER OF THE NORTH AND SOUTH BOUNDARY LINES OF THE ABOVE DESCRIBED PARCEL IN LOT 3, BREVARD COUNTY, FLORIDA

Appendix B. Hog Point Sanctuary Observed Plant Species

Note: Surveyors: H=Margaret Hames, S= Dr. Paul Schmalzer, M=Travis McClendon

SCIENTIFIC NAME	COMMON NAME	Exotic	Surveyor	FFWCC Status
Ageratina jucunda	Ageratina		M	
Ambrosia artemisiifolia	Common Ragweed		H	
Andropogon longiberbis	Hairy Bluestem		S	
Ardisia escallanoides	Marlberry		M	
Asclepias sp.	Milkweed		M	
Baccharis halimifolia	Groundsel Tree, Sea Myrtle		S	
Bidens alba	Begger tick		M	
Bursea simaruba	Gumbo-Limbo		M	
Callicarpa americana	Beautyberry		M	
Canavalia rosea	Bay Bean		S	
Catharanthus roseus	Madagascar Periwhinkle	X	H	
Cenchrus sp.	Sandbur		M	
Centrosema virginianum	Butterfly-pea		M	
Chamaecrista fasciculata	Partridge Pea		M	
Chiococca alba	Snowberry		M	
Citharexylum fruiticosum	Fiddlewood		H	
Cnidoscolus stimulosus	Tread Softly		S	
Coccoloba uvifera	Seagrape		S	
Commelina erecta	Whitemouth Dayflower		S	
Conyza canadensisvar. pusilla	Canadian Horseweed		S	
Croton glandulosusvar. glandulosus	Vente Conmigo		H	
Dodonaea viscosa	Varnish leaf		M	
Encyclia tampensis	Florida Butterfly Orchid		M	
Ernodea littoralis	Beach Creeper		M	T
Erythrina herbacea	Coral Bean		S	
Eugenia axillaris	White stopper		M	
Eupatorium capillifolium	Dog fennel		M	
Ficus aurea	Strangler fig		M	
Gaillardia pulchella	Firewheel		S	
Glandularia maritima	Coastal Mock-Vervain		M	E
Gnaphalium sp.	Cudweed		M	
Helianthus debilis	Dune Sunflower		S	
Heterotheca subaxillaris	Camphorweed		S	
Hibiscus tilaceus	Sea Hibiscus	x	M	
Ilex glabra	Inkberry, Gallberry		M	
Iresene diffusa	Bloodleaf		M	
Lantana camera x depressa	Lantana		M	
Lantana depressa var. floridana	Florida Lantana		M	Endemic 1, FWS C2, FNAI
Lantana involucrata	Lantana		M	
Licania michauxii	Gopher Apple		M	
Melothia pendula	Creeping Cucumber		M	
Mentzelia floridana	Poor man's patch		M	
Mikania cordifolia	Florida Keys Hempvine		S	
Momordica charantia	Wild balsam apple		M	
Monarda punctata	Horse-mint		M	
Myrcianthes fragrans	Twinberry		H	T
Myrica cerifera	Wax Myrtle		S	
Opuntia humifua	Pricklypear		S	
Opuntia stricta	Erect Pricklypear		M	T
Panicum maximum	Guinea grass	x	M	
Parthenocissus quinquefolia	Virginia creeper		S	
Persea borbonia	Red Bay		M	

Phyllanthus abnormis	Drummond's Leafflower		S	
Physalis walteri	Walter's Groundcherry		S	
Phytolacca americana	Wild poinsettia		M	
Poinsettia cyathophora	American Pokeweed		M	
Polygala grandiflora	Showy Milkwort		H	
Polypodium polypodioides	Resurrection Fern		H	
Portulaca pilosa	Pink Purslane		M	
Prunus caroliniana	Carolina Laurelcherry		M	
Psychotria nervosa	Wild Coffee		H	
Quercus pumila	Running Oak		S	
Quercus virginiana	Virginia Live Oak		H	
Randia aculeata	White Indigoberry		S	
Rapanea punctata	Myrsine		S	
Rhus copallinum	Natal grass		S	
Rhychelytrum repens	Castor-oil plant		M	
Ricinus copallina	Winged Sumac		M	
Sabal palmetto	Cabbage Palm		S	
Schinus terebenthifolius	Brazilian Pepper	X	S	
Schoepfia chrysophylloides	Greytwig		S	
Seronea repens	Saw Palmetto		M	
Sida acuta	Common Fireweed		M	
Sideroxylon tenax	Tough Bully		S	E
Smilax sp.	Bamboo Vine		S	
Solidago sempervirens	Seaside Goldenrod		S	
Sophora tomentosa	Slender Cordgrass		H	
Spartina patens	Yellow Necklace Pod		M	
Tillandsia recurvata	Ball moss		S	
Tillandsia usneoides	Spanish Moss		M	
Toxicodendron radicans	Poison Ivy		M	
Trichostema dichotomum	Forked Bluecurls		M	
Verbesina virginica	Frostweed		S	
Vitex trifolia	Simpleleaf Chastetree	x	M	
Vitis munsoniana	Muscadine grape		S	
Vitis shuttleworthii	Calloose Grape		M	
Ximenia americana	Tallow Wood		H	
Zanthoxylum clava-herculis	Hercules' Club		S	

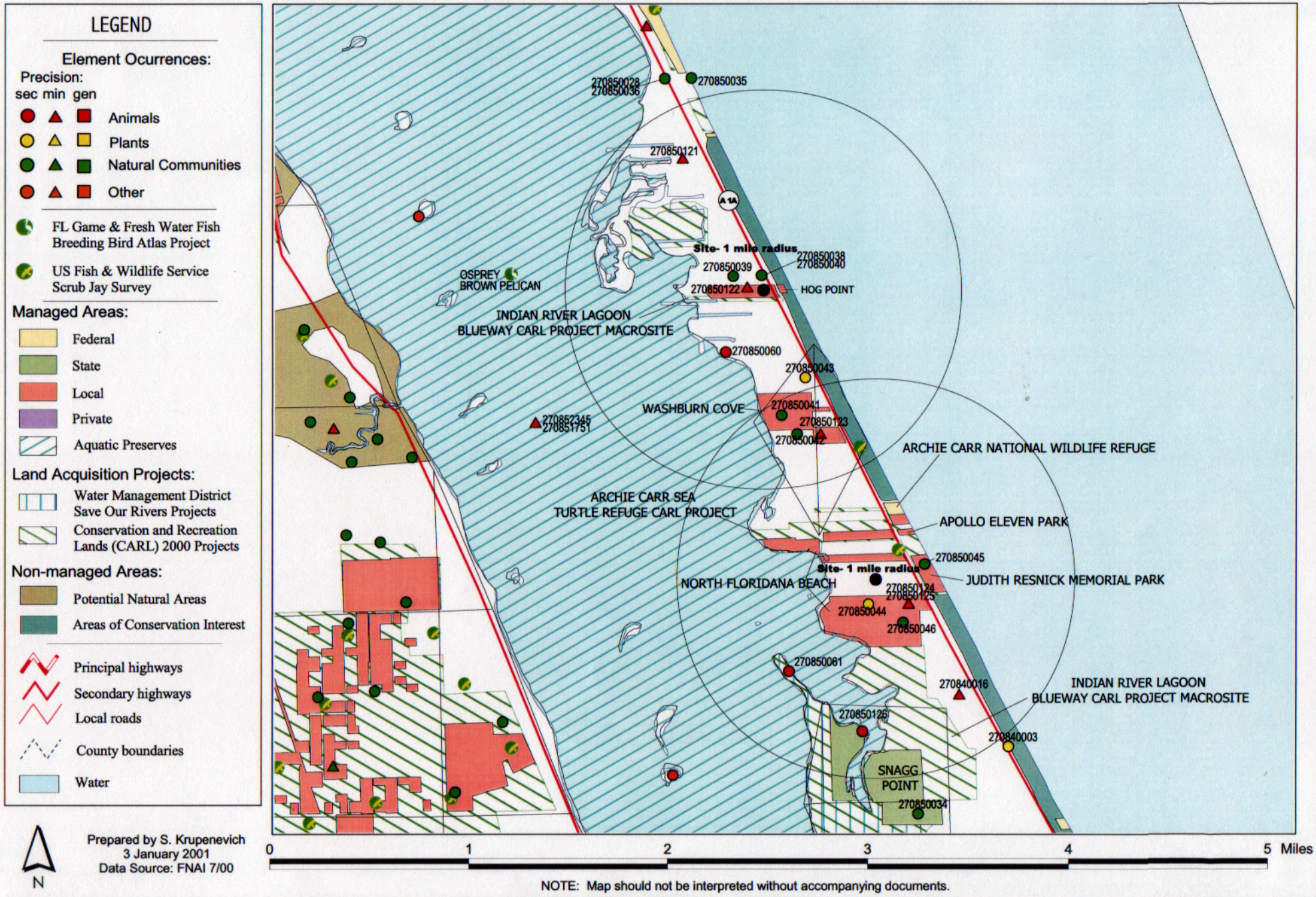
FFWCC=Florida Fish and Wildlife Conservation Commision
E=Endangered
T=Threatened
C=Common

FNAI

Florida Natural Areas Inventory

1018 Thomasville Road, Suite 200-C
Tallahassee, FL 32303
(850) 224-8207

Maritime Hammock Sanctuary and Hog Point Sanctuary, Brevard County



NOTE: Map should not be interpreted without accompanying documents.

FNAI ELEMENT OCCURRENCE RECORDS ON OR NEAR SITE

GIS ID	SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS	DATE OBSERVED	DESCRIPTION	COMMENTS
270840003	DATA SENSITIVE		G2	S2	N	LE	1983-07-26		
270840016	GOPHERUS POLYPHEMUS	GOPHER TORTOISE	G3	S3	(PS)	LS	1989-08	VACANT, WEEDY LOT IN RESIDENTIAL AREA.	ONE TORTOISE SEEN FEEDING BY STEPPING ON PLANT STALKS, BENDING THEM OVER AND EATING THE TOPS.
270850028	APHELOCOMA COERULESCENS	FLORIDA SCRUB-JAY	G3	S3	LT	LT	1991-07-15	COASTAL STRAND - PNDHAR03; STRAND DISTURBED BY CLEARING - F90JOH17.	RESIDENT: HARDENS HAVE OBSERVED SCRUB JAYS ON THE DISNEY SOUTH TRACT SINCE 1972 BUT HAVE NOT ATTEMPTED TO LOCATE NESTS. F90JOH17 - SAW THREE TAME JAYS IN DISTURBED PORTION OF STRAND (SOUTHERN). 1990-01-28: 1 JAY REPORTED; 1990-02-03: 4 JAYS REPORTED; 199
270850034	MARITIME HAMMOCK		G4	S2	N	N	1990-02-18	TALL OAK/PALM FOREST BORDERING MANGROVES. MANY EPIPHYTES. NOT TOO DIVERSE.	CANOPY 40-50' TALL: SABAL PALMETTO, QUERCUS VIRGINIANA, PERSEA BORBONIA, MORUS RUBRA. UNDERSTORY: RAPANEA PUNCTATA, MYRCIANTHES FRAGRANS, ERYTHRINA HERBACEA, SERENOA REPENS, ARDISIA ESCALLONIOIDES.
270850035	COASTAL STRAND		G3?	S2	N	N	1990-02-21	SAW PALMETTO STRAND WITH LOW CABBAGE PALMS PROTRUDING. SHRUBS MORE COMMON TOWARDS A1A. FOUR DISJUNCT PARCELS.	SERENOA REPENS-ABUNDANT; SABAL PALMETTO-OCCASIONAL; COCCOLOBA UVIFERA (X)-0; CHRYSOBALANUS ICACO 9X)-RARE; RAPANEA PUNCTATA (X)-0; FORESTIERA SEGREGATA-0; MYRCIANTHES FRAGRANS-0; BUMELIA TENAX-A; QUERCUS VIRGINIANA-0; PERSEA BORBONIA-0.
270850036	COASTAL STRAND		G3?	S2	N	N	1990-02-21	DENSE SPRAY PRUNED HEDGE OF TROPICAL AND TEMPERATE SHRUBS. FOUR DISTINCT PARCELS.	PERSEA BORBONIA-ABUNDANT; MYRCIANTHES FRAGRANS-A; QUERCUS VIRGINIANA-A; SERENOA REPENS (BLUE FORM)-OCCASIONAL; BUMELIA TENAX-A; FORESTIERA SEGREGATA-RARE; RAPANEA PUNCTATA (X)-0.
270850038	COASTAL STRAND		G3?	S2	N	N		DENSE "HEDGE" OF SHRUBS 5-8' HIGH ON W SIDE OF A1A GRADING INTO HAMMOCK TO WESTWARD.	PERSEA BORBONIA, BUMELIA TENAX, MYRICA CERIFERA, SERENOA REPENS (BLUE FORM), SABAL PALMETTO, MYRCIANTHES FRAGRANS, ZANTHOXYLUM CLAVA-HERCULIS, FORESTIERA SEGREGATA, RAPANEA PUNCTATA (X), ERYTHRINA HERBACEA (X).

FNAI ELEMENT OCCURRENCE RECORDS ON OR NEAR SITE

GIS ID	SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS	DATE OBSERVED	DESCRIPTION	COMMENTS
270850039	MARITIME HAMMOCK		G4	S2	N	N	1990-02-21	OAK/PALM HAMMOCK EXTENDING TO MANGROVES ON LAGOON.	QUERCUS VIRGINIANA, SABAL PALMETTO, BURSERA SIMAROUBA (X). UNDERSTORY: TOXICODENDRON RADICANS, RAPANEA PUNCTATA (X), CALLICARPA AMERICANA, XIMENIA AMERICANA, ENCYCLIA TAMPENSIS, BUMELIA CELASTRINA, PSYCHOTRIA NERVOSA.
270850040	GLANDULARIA MARITIMA	COASTAL VERVAIN	G3	S3	N	LE	1990-02-21	FEW PLANTS ALONG S MARGIN OF N PIECE OF HAMMOCK.	PLANTS FLOWERING.
270850041	MARITIME HAMMOCK		G4	S2	N	N	1990-02-21	SHORT (15-25') OAK/PALM HAMMOCK PLUS EPIPHYTES.	CANOPY: QUERCUS VIRGINIANA (PLUS RESURRECTION FERNS, TILLANDSIAS, AND BUTTERFLY ORCHIDS), PERSEA BORBONIA, SABAL PALMETTO, ZANTHOXYLUM CLAVA-HERCULIS. UNDERSTORY: MYRCIANTHES FRAGRANS, RAPANEA PUNCTATA (X), EUGENIA FOETIDA (X), BUMELIA TENAX, SERENOA REP
270850042	MARITIME HAMMOCK		G4	S2	N	N	1990-02-21	TALL OAK/PALM HAMMOCK (35') WITH SCATTERING OF TROPICAL TREES (GUMBO LIMBO, INKWOOD).	CANOPY: QUERCUS VIRGINIANA, BURSERA SIMAROUBA, PERSEA BORBONIA, SABAL PALMETTO, EXOTHEA PARNICULATA. UNDERSTORY: TOXICODENDRON RADICANS, EUGENIA AXILLARIS, CHIOCOCCA ALBA (X), ENCYCLIA TAMPENSIS, NECTANDRA CORIACEA (X).
270850043	GLANDULARIA MARITIMA	COASTAL VERVAIN	G3	S3	N	LE	1990-02-21	CLEARING IN MARITIME HAMMOCK.	SEVERAL PROSTRATE PLANTS IN FLOWER AROUND CLEARING ADJ. TO ELECTRICAL INSTALLATION. SURROUNDING COMMUNITY IS COASTAL STRAND GRADING TO MARITIME HAMMOCK.
270850044	GLANDULARIA MARITIMA	COASTAL VERVAIN	G3	S3	N	LE	1990-02-22	PALM/OAK HAMMOCK GRADING TO STRAND TOWARD OCEAN AND TOWARD TALL PALM FOREST TOWARD LAGOON (MANGROVE FRINGE). SEMI-TROPICAL UNDERSTORY OF MARLBERRY, MYRSINE AND NAKEDWOOD.	SEVERAL PLANTS PROSTRATE ALONG SAND PATH ENDING S OF SEWAGE INSTALLATION FOR ST. MARKS LDG. DEVELOPMENT (BANKRUPT-FDIC). LAVENDER FLOWERS.

FNAI ELEMENT OCCURRENCE RECORDS ON OR NEAR SITE

GIS ID	SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS	DATE OBSERVED	DESCRIPTION	COMMENTS
270850045	COASTAL STRAND		G3?	S2	N	N	1990-02-22	SAW PALMETTO E OF A1A GRADING TO SHRUB HEDGE E & W OF A1A (7-8' TALL).	SERENOA REPENS, SABAL PALMETTO AND COCCOLOBA UVIFERA(X) E OF A1A. PERSEA BORBONIA, MYRCIANTHES FRAGRANS, BUMELIA TENAX, QUERCUS VIRGINIANA, ZANTHOXYLUM CLAVA-HERCULIS, RAPANEA PUNCTATA (X) W OF A1A.
270850046	MARITIME HAMMOCK		G4	S2	N	N	1990-02-22	PALM/OAK HAMMOCK GRADING TO STRAND TOWARD OCEAN AND TOWARD TALL PALM FOREST TOWARD LAGOON (MANGROVE FRINGE). SEMI-TROPICAL UNDERSTORY OF MARLBERRY, MYRSINE AND NAKEDWOOD.	CANOPY: QUERCUS VIRGINIANA (WITH FERNS AND BUTTERFLY ORCHIDS); SABAL PALMETTO, PERSEA BORBONIA, MORUS RUBRA (RARE). UNDERSTORY: MYRCIANTHES FRAGRANS, BUMELIA TENAX, PSYCHOTRIA NERVOSA, ERYTHRINA HERBACEA, TOXICODENDRON RADICANS, SERENOA REPENS.
270850060	RIVULUS MARMORATUS	MANGROVE RIVULUS	G3	S3	(PS)	LS	1997	MANGROVE SWAMP.	SEVEN SPECIMENS CAPTURED IN DEC. 1989.
270850061	RIVULUS MARMORATUS	MANGROVE RIVULUS	G3	S3	(PS)	LS	1997	MANGROVE SWAMP.	TWO SPECIMENS CAPTURED IN NOV. 1990.
270850121	GOPHERUS POLYPHEMUS	GOPHER TORTOISE	G3	S3	(PS)	LS	1993	No data given in U93COA01FLUS.	Species reported as on-site by U93COA01FLUS; additional data needed.
270850122	GOPHERUS POLYPHEMUS	GOPHER TORTOISE	G3	S3	(PS)	LS	1993	No data given in U93COA01FLUS.	Species reported as on-site by U93COA01FLUS; additional data needed.
270850123	GOPHERUS POLYPHEMUS	GOPHER TORTOISE	G3	S3	(PS)	LS	1993	No data given in U93COA01FLUS.	Species reported as on-site by U93COA01FLUS; additional data needed.
270850124	GOPHERUS POLYPHEMUS	GOPHER TORTOISE	G3	S3	(PS)	LS	1993	No data given in U93COA01FLUS.	Species reported as on-site by U93COA01FLUS; additional data needed.
270850125	APHELOCOMA COERULESCENS	FLORIDA SCRUB-JAY	G3	S3	LT	LT	1993	No data given in U93COA01FLUS.	Species reported as on-site by U93COA01FLUS; additional data needed.
270850126	RIVULUS MARMORATUS	MANGROVE RIVULUS	G3	S3	(PS)	LS	1993-10-14	Un-impounded mangroves.	1993 - 1 fish collected at site; 1991 - 3 fish collected at site (PNDTAY05FLUS).
270851751	PELECANUS OCCIDENTALIS	BROWN PELICAN	G4	S3	(PS)	LS	1989-05-10	Cedar, palm, Australian pine.	1989/05/10: J.A. Hovis, GFC. Surveyed from helicopter. Site visited by plane on 04/28/89. "Total" = D (includes GREG, BRPE, DCCO).
270852345	ARDEA ALBA	GREAT EGRET	G5	S4	N	N	1989-05-10	Spoil Island with cedar, palm, Australian pine.	1989/05/10: J.A. Hovis, GFC; Surveyed from helicopter. Site visited by plane on 04/28/89. "Total" = D (includes GREG, BRPE, DCCO).