

**LIGNUMVITAE KEY BOTANICAL STATE PARK**

**UNIT MANAGEMENT PLAN**

**APPROVED PLAN**

**STATE OF FLORIDA**

**DEPARTMENT OF ENVIRONMENTAL PROTECTION**  
**Division of Recreation and Parks**

**DECEMBER 19, 2000**



Jeb Bush  
Governor

# Department of Environmental Protection

Marjory Stoneman Douglas Building  
3900 Commonwealth Boulevard  
Tallahassee, Florida 32399-3000

David B. Struhs  
Secretary

January 2, 2001

BryAnne White, Planner  
3900 Commonwealth Blvd.  
Tallahassee, FL 32399  
M.S. 525

Dear Ms White:

**Re: Lignumvitae Key State Botanical Site, Lease Number 2534**

On December 19, 2000 the Office of Environmental Services, acting as agent for the Board of Trustees of the Internal Improvement Trust Fund, approved the subject management plan. Pursuant to Section 253.034 and 259.032, Florida Statutes, and Chapter 18-2, Florida Administrative Code the plan's five year update will be due in December, 2005.

Approval of this land management plan does not waive the authority or jurisdiction of any governmental entity that may have an interest in this project. Implementation of any upland activities proposed by this management plan may require a permit or other authorization from federal and state agencies having regulatory jurisdiction over those particular activities. Please forward copies of all permits to this office upon issuance.

Sincerely,

William Howell, OMC Manager  
Office of Environmental Services  
Division of State Lands

*"More Protection, Less Process"*

*Printed on recycled paper.*

## TABLE OF CONTENTS

<b>INTRODUCTION</b>	1
<b>PURPOSE AND SCOPE OF PLAN</b>	1
<b>MANAGEMENT PROGRAM OVERVIEW</b>	4
Management Authority And Responsibility	4
Park Management Goals	5
Management Coordination	6
Public Participation	6
Other Designations	6
 <b>RESOURCE MANAGEMENT COMPONENT</b>	
<b>INTRODUCTION</b>	9
<b>RESOURCE DESCRIPTION AND ASSESSMENT</b>	9
Natural Resources	9
Cultural Resources	21
<b>RESOURCE MANAGEMENT PROGRAM</b>	22
Special Management Considerations	22
Management Needs And Problems	23
Management Objectives	24
Management Measures For Natural Resources	25
Management Measures For Cultural Resources	27
Research Needs	27
Resource Management Schedule	28
Land Management Review	28

## LAND USE COMPONENT

<b>INTRODUCTION</b>	29
<b>EXTERNAL CONDITIONS</b>	29
Existing Use Of Adjacent Lands	29
Planned Use Of Adjacent Lands	29
<b>PROPERTY ANALYSIS</b>	30
Recreation Resource Elements	30
Assessment Of Use	31
<b>CONCEPTUAL LAND USE PLAN</b>	34
Potential Uses And Proposed Facilities	34
Facilities Development	36
Existing Use And Optimum Carrying Capacity	36
Optimum Boundary	37

### TABLE

<b>TABLE 1 - Existing Use And Optimum Carrying Capacity</b>	37
---	----

### LIST OF ADDENDA

#### ADDENDUM 1

Acquisition History and Lease Agreement Number 2534	A 1 - 1
--	---------

#### ADDENDUM 2

References Cited	A 2 - 1
------------------	---------

#### ADDENDUM 3

Soil Descriptions	A 3 - 1
-------------------	---------

#### ADDENDUM 4

Natural Community Descriptions	A 4 - 1
--------------------------------	---------

**ADDENDUM 5**

Plant And Animal List A 5 - 1

**ADDENDUM 6**

Designated Species List A 6 - 1

**ADDENDUM 7**

Cultural Management Statement  
Department of State  
Division of Historical Resources A 7 - 1

**ADDENDUM 8**

Priority Schedule and Cost Estimates A 8 - 1

**ADDENDUM 9**

Land Management Review  
Report and Response A 9 - 1

**MAPS**

Location Map	2
Vicinity Map	3
Topographic Map	10
Soils Map	13
Natural Communities Map	15
Base Map	32
Conceptual Land Use Plan Map	35
Optimum Boundary Map	38

## **INTRODUCTION**

Lignumvitae Key Botanical State Park, which includes Shell Key, is located in Monroe County (see Location Map) about one mile west of Islamorada. In this region of the Florida Keys, the island chain is oriented in a NE - SW direction. Within this chain, Lignumvitae Key and Shell Key are located between the inhabited islands of upper and Lower Matecumbe Keys, although offset to the north by approximately one mile. The park islands and the majority of the park submerged land are located northwest of U.S. Highway 1 in the Florida Bay. The remainder of the submerged lands is southeast of the highway and considered part of the Atlantic Ocean. Since the park consists of unbridged islands and submerged land, access must be from boat. The closest road access is from U.S. Highway 1 near mile marker 79. From there, the park can be viewed or a boat can be taken to the actual site (see Vicinity Map).

On March 2, 1971, the Board of Trustees of the Internal Improvement Trust Fund (Trustees) obtained title to the property that later became Lignumvitae Key Botanical State Park (see Addendum 1). Since the initial purchase in 1971, the Trustees have acquired several separate parcels and added them to Lignumvitae Key Botanical State Park. The park was purchased with funds from the Land Acquisition Trust Fund and Preservation 2000.

At Lignumvitae Key SBS, public outdoor recreation is the designated single use of the property. There are no legislative or executive directives that constrain the use of this property.

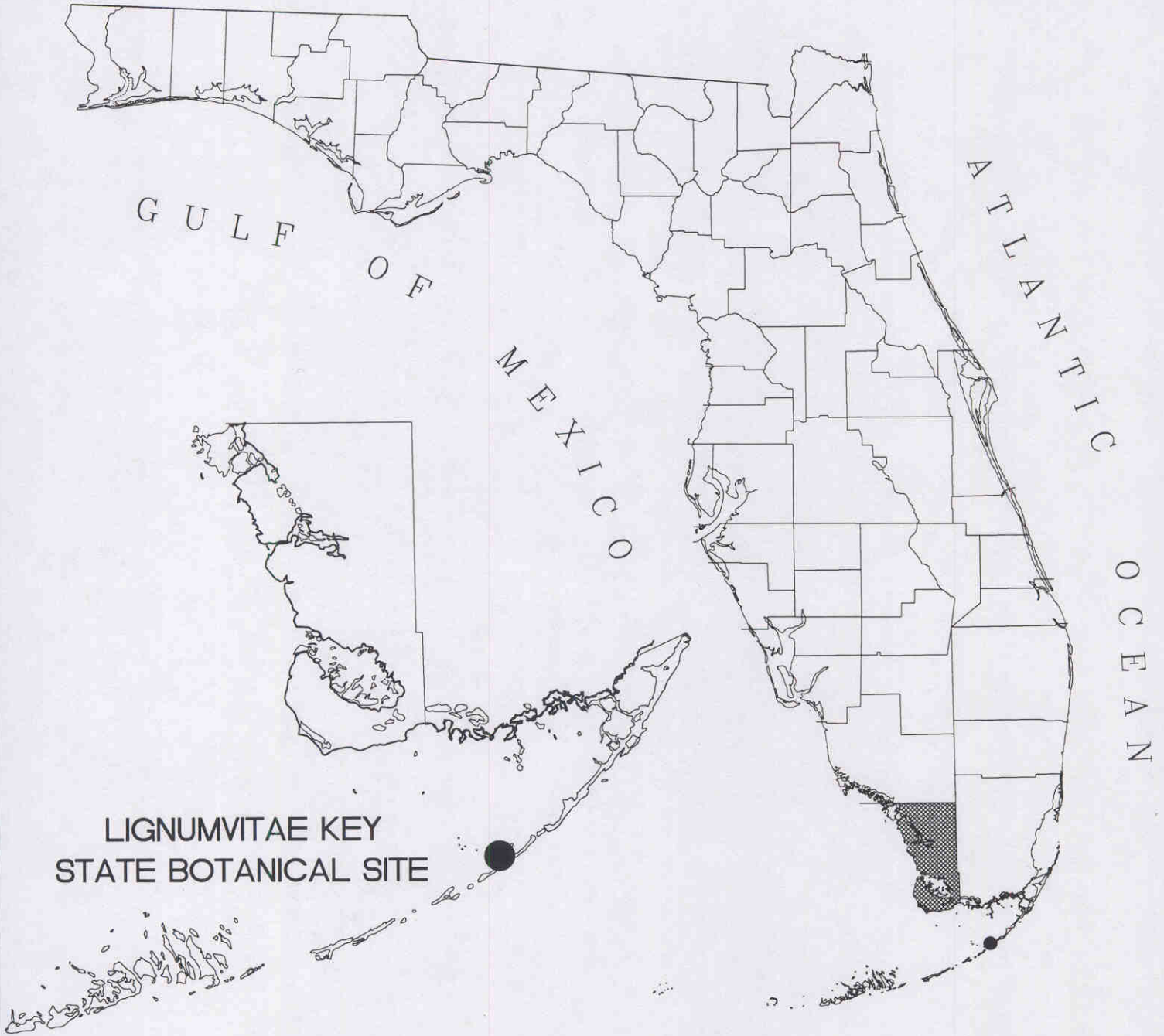
## **PURPOSE AND SCOPE OF THE PLAN**

This plan serves as the basic statement of policy and direction for the management of Lignumvitae Key Botanical State Park as a unit of Florida's state park system. It identifies the objectives, criteria and standards that guide each aspect of park administration, and sets forth the specific measures that will be implemented to meet management objectives. The plan is intended to meet the requirements of Sections 253.034 and 259.032, Florida Statutes, Chapter 18-2, Florida Administrative Code, and intended to be consistent with the State Lands Management Plan. All development and resource alteration encompassed in this plan is subject to the granting of appropriate permits; easements, licenses, and other required legal instruments. Approval of the management plan does not constitute an exemption from complying with the appropriate local, state, or federal agencies. This plan is also intended to meet the requirements for beach and shore preservation, as defined in Chapter 161, Florida Statutes, and Chapters 62B-33, 62B-36 and 62R-49, Florida Administrative Code.

The plan consists of two interrelated components. Each component corresponds to a particular aspect of the administration of the park. The resource management component provides a detailed inventory and assessment of the natural and cultural resources of the park. Resource management problems and needs are identified, and specific management objectives are established for each resource type. This component provides guidance on the application of such measures as prescribed burning, exotic species removal, and restoration of natural conditions.

The land use component is the recreational resource allocation plan for the unit. Based on considerations such as access, population, and adjacent land uses, an optimum allocation of the physical space of the park is made, locating use areas and proposing types of facilities and volume of use to be provided.

# LOCATION MAP



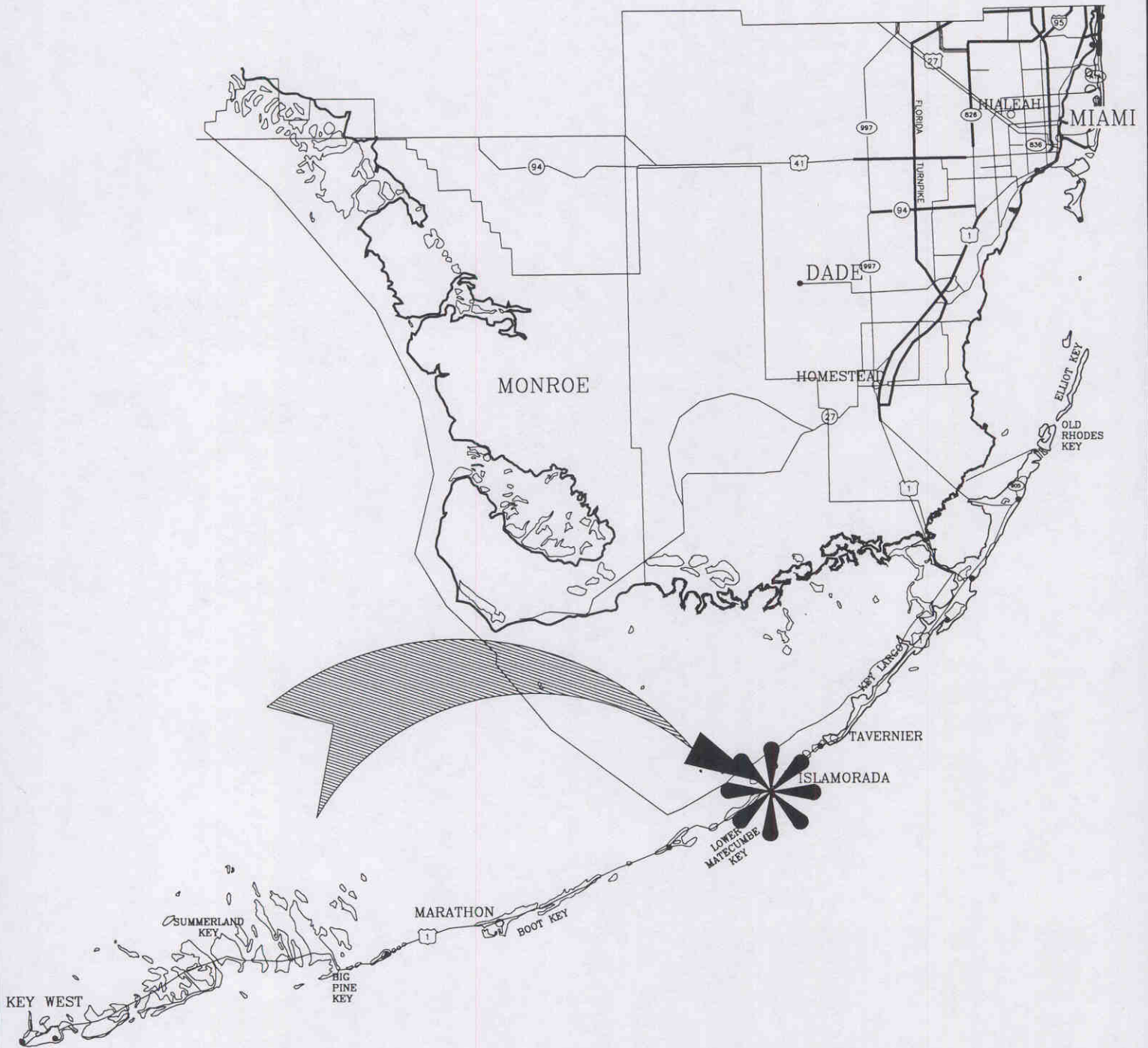
LIGNUMVITAE KEY  
STATE BOTANICAL SITE

LIGNUMVITAE KEY  
STATE BOTANICAL SITE  
MONROE COUNTY



NORTH

# VICINITY MAP



LIGNUMVITAE KEY  
STATE BOTANICAL SITE  
MONROE COUNTY





In the development of this plan, the potential of the park to accommodate secondary management purposes (“multiple uses”), such as agriculture, water management, and timber management, was analyzed. These secondary purposes were considered within the context of the entire park and its natural and cultural resources, visitation and management. For this park, it was determined that no secondary purposes could be accommodated in a manner that would be compatible and not interfere with the primary purpose of outdoor recreation and conservation.

The potential for generating revenue to enhance management was also analyzed. It was determined that multiple-use management activities would not be appropriate as a means of generating revenues for land management. Instead, techniques such as entrance fees, concessions, and similar measures will be employed on a case-by-case basis as a means of supplementing park management funding.

The use of private land managers to facilitate restoration and management of this unit was also analyzed. Decisions regarding this type of management (such as mitigation projects, management and/or removal of timber for resource protection, restoration, or enhancement, removal of exotic species, etc.) will be made on a case-by-case basis as necessity dictates.

## **MANAGEMENT PROGRAM OVERVIEW**

### **Management Authority and Responsibility**

The Division of Recreation and Parks (DRP) is charged with the responsibility of developing and operating Florida's recreation and parks system. These properties are administered in accordance with Chapter 258, Florida Statutes, and Chapter 62D-2, Florida Administrative Code.

In all of its management efforts, the Division will be following the DEP's initiative of ecosystem management. The stated management measures in this plan are consistent with the Department's overall mission in ecosystem management.

The Trustees have also granted management authority of certain sovereign submerged lands to the DRP under Management Agreement MA 68-086 (as amended January 19, 1988). The management area includes a 400-foot zone from the edge of mean high water where a park boundary borders sovereign submerged lands fronting beaches, bays, estuarine areas, rivers or streams. Where emergent wetland vegetation exists, the zone extends waterward 400 feet beyond the vegetation. The agreement is intended to provide additional protection to resources of the park and nearshore areas and to provide authority to manage activities that could adversely impact public recreational uses.

Lignumvitae Key Botanical State Park is managed in conjunction with two other state park units, Indian Key State Historic Site and San Pedro Underwater Archaeological Preserve. The Lignumvitae Key Botanical State Park management plan was prepared and processed simultaneously with the Indian Key and San Pedro management plans. Because Indian Key State Historic Site and San Pedro Underwater Archaeological Preserve both contain less than 160 upland acres, these management plans were approved on June 26, 2000, by the Division of State Lands as delegated authority for the Trustees.

In the management of Lignumvitae Key SBS preservation and enhancement of natural conditions is all important. Resource considerations are given priority over user considerations and development is restricted to the minimum necessary for ensuring its protection and

maintenance, limited access, user safety and convenience, and appropriate interpretation. Permitted uses are primarily of a passive nature, related to the aesthetic, educational and recreational enjoyment of the preserve, although other compatible uses are permitted in limited amounts. Program emphasis is placed on interpretation of the natural and cultural attributes of the preserve.

### **Park Management Goals**

1. Protect all of the natural communities in the park from habitat fragmentation or human disturbance and provide interpretation of the resources to the public.
2. Remove exotic vegetation on an ongoing basis as it becomes established to eliminate or minimize its presence.
3. Protect the marine grass beds from boating damage by continuing to improve and maintain channel markers, regulatory signs, and mooring buoys. In addition, continue to distribute educational materials regarding safe boating and park resources, and obtain additional law enforcement presence in the area.
4. Restore damaged seagrass beds in the protected submerged areas of the park.
5. Seek funding for management and restoration of the seagrass beds.
6. Coordinate with other agencies to establish a standardized method for assessing boat-grounding damage in seagrass communities.
7. Survey and monitor the status and condition of all designated species and manage to protect from impacts. In particular, the status of the lignumvitae tree and the Florida tree snail need to be determined since potential impacts exist.
8. Assess the magnitude and biological impact of scale infestation on lignumvitae trees and determine if any resource management actions are needed. If so, initiate the recommendations.
9. In a limited manner, continue to trim hammock vegetation around selected lignumvitae trees and propagate seedlings in the nursery until research regarding the tree and the scale definitively determines the needed course of action.
10. Continue to remove trash from the shoreline and upland solution holes.
11. Replace existing generator with a wind or solar powered energy source.
12. Continue to preserve and maintain historic structures, including stabilization of the concrete reinforcement of the Matheson house and removal of the bathroom and office facilities from beneath the house.
13. Conduct a comprehensive cultural resource survey of Lignumvitae Key in cooperation with the Division of Historical Resources.
14. Minimize human disturbance on Shell Key to encourage its use as a bird rookery.
15. Continue to leave an unmowed border between the landscaped clearing and hammock as butterfly habitat.
16. Facilitate research on the island regarding population dynamics of marsh rabbits, reptiles, rodents, and other wildlife.
17. Seek funding for additional staff.
18. Seek funding to provide new recreational and interpretive opportunities as outlined in this management plan.

### **Management Coordination**

The park is managed in accordance with all applicable Florida Statutes and administrative rules. Agencies having a major or direct role in the management of the park are discussed in this plan.

The Department of Agriculture and Consumer Services, Division of Forestry (DOF), assists park staff in the development of wildfire emergency plans and furnishes permits required for prescribed burning. The Florida Fish and Wildlife Conservation Commission (FFWCC) assists staff in the enforcement of state laws pertaining to wildlife, freshwater fish and other aquatic life existing within park boundaries. In addition, the FFWCC aids the Division of Recreation and Parks with wildlife management programs, including the development and management of Watchable Wildlife programs. The Department of State, Division of Historical Resources (DHR) assists staff to assure protection of archaeological and historical sites. The Department of Environmental Protection (DEP), Office of Coastal and Aquatic Managed Areas (CAMA) aids staff in aquatic preserves management programs. The DEP, Bureau of Beaches and Coastal Systems aids staff in planning and construction activities seaward of the Coastal Construction Line. In addition, the Bureau of Beaches and Coastal Systems aids the staff in the development of erosion control projects. Emphasis is placed on protection of existing resources as well as the promotion of compatible outdoor recreational uses.

Division staff continues to coordinate planning and development of new facilities with the Department of Community Affairs, Monroe County, the City of Islamorada, and Village of Islands, in accordance with section 380.05, Florida Statutes, as an Area of Critical State Concern. The DRP District 5 staff also coordinates regulatory and similar issues with Federal, state, and county agencies; in addition, there is cooperation with the U.S. Fish and Wildlife Service and the Florida Fish and Wildlife Conservation Commission on an ongoing basis concerning listed species.

### **Public Participation**

A public workshop was held on April 11, 2000. The purpose of the meeting was to present the management plan to the public.

A DEP Advisory Group meeting was held on April 12, 2000. The purpose of the meeting was to provide the Advisory Group members the opportunity to discuss this management plan.

### **Other Designations**

Lignumvitae Key SBS is within the Florida Keys Area of Critical State Concern as defined in section 380.05, Florida Statutes.

Lignumvitae Key SBS is listed on the National Register of Historic Places, is a National Park Service (NPS) Registered Natural Landmark, is listed on the Monroe County Register of Archaeological, Historical and Cultural Landmarks, and is listed as a State Natural Feature.

All waters within the unit have been designated as Outstanding Florida Waters, pursuant to Chapter 62-302 Florida Administrative Code. Administered by the Department of Environmental Protection, this program was created by Section 403.061, Florida Statutes, and protects lakes, rivers, streams, estuaries, bays and marine waters against degradation of existing ambient water quality. Surface waters in this unit are also classified as Class III waters by DEP.

A portion of this unit is within the Lignumvitae Key Aquatic Preserve as designated under provision of the Florida Aquatic Preserve Act of 1975 (section 258.35, Florida Statutes).

Several other significant land and water resources near the park. They include: Bahia Honda State Park, Big Cypress National Preserve, Big Mullet Key Research Natural Area, Coupon Bight Aquatic Preserve, Coupon Bight State Buffer Preserve, Cowpens Sanctuary, Crocodile Lake National Wildlife Refuge, Curry Hammock State Park, Dry Tortugas National Park, Everglades National Park, Florida Keys National Marine Sanctuary, Florida Keys Wildlife and Environmental Area, Fort Zachary Taylor Historic State Park, Great White Heron National Wildlife Refuge, Indian Key Historic State Park, John Pennekamp Coral Reef State Park, Key Largo Hammock Botanical State Park, Key Largo National Marine Sanctuary, Key West National Wildlife Refuge, Lignumvitae Key Aquatic Preserve, Little Mullet Key Research Natural Area, Long Key State Park, Looe Key National Marine Sanctuary, National Key Deer Refuge, San Pedro Underwater Archaeological Preserve State Park and Windley Key Fossil Reef Geologic State Park.

## **RESOURCE MANAGEMENT COMPONENT**

### **INTRODUCTION**

The Division of Recreation and Parks has implemented resource management programs for preserving for all time the natural and cultural resources of statewide significance under its administration. This component of the unit plan describes the natural and cultural resources of this park and identifies the methods that will be employed to manage them. When necessary to support statements made in this plan, published and non-published sources have been cited. These references are contained in Addendum 2.

The guiding management philosophy for natural resources is natural systems management. Primary emphasis is on restoring and maintaining the natural processes that shape the structure, function, and species composition of the State's diverse natural communities as they occurred in the state's original domain. Single species management is implemented when the recovery or persistence of a species is problematic, provided it is compatible with natural systems management or does not seriously compromise park values.

The Division also implements ecosystem management through the greenline program, which identifies the ecosystem of the unit and activities that may adversely impact the natural, cultural, recreational, aesthetic or economic values of the park. The Division maintains these greenlines and list of potential activities of concern.

### **RESOURCE DESCRIPTION AND ASSESSMENT**

#### **Natural Resources**

##### **Topography**

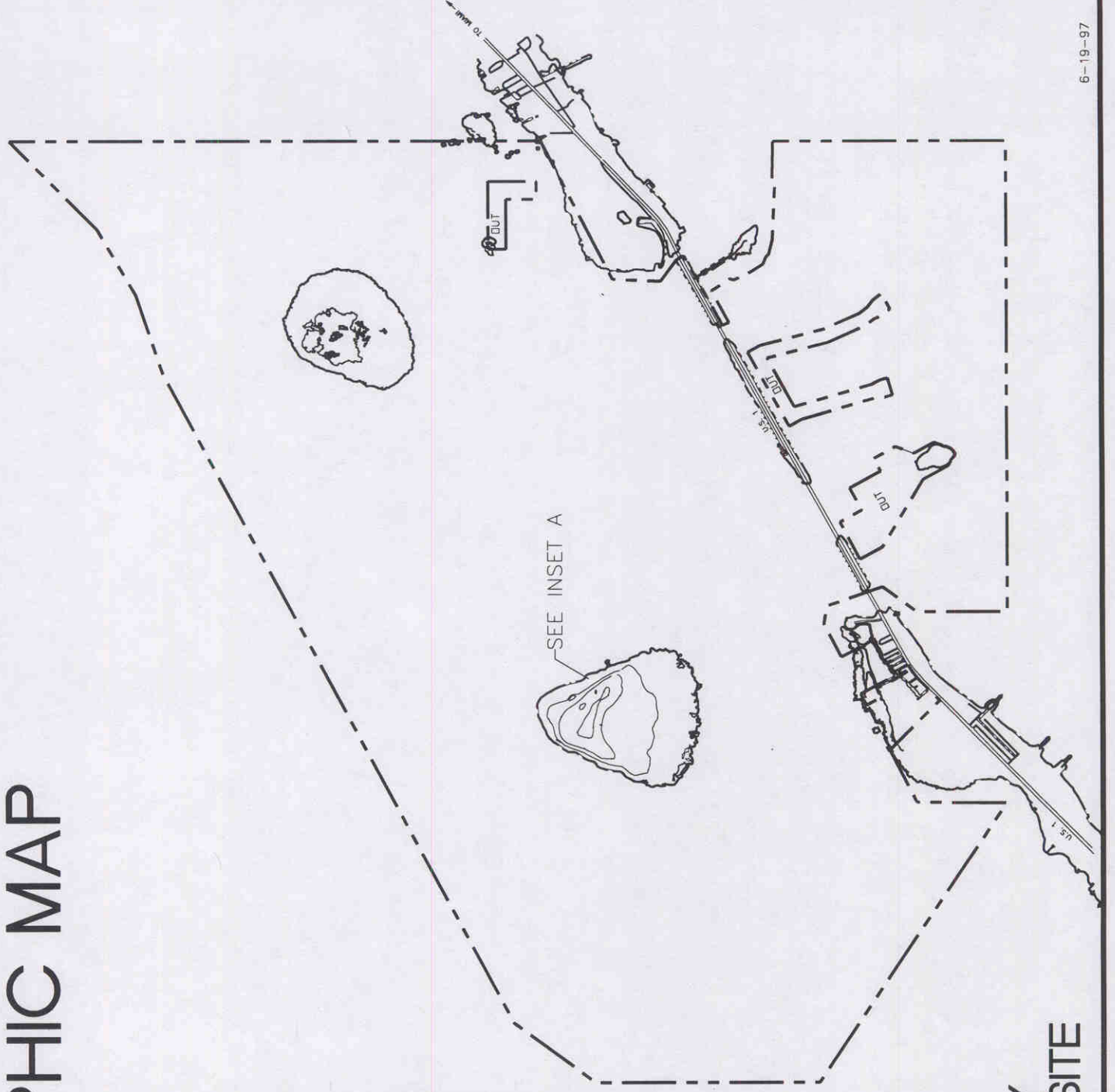
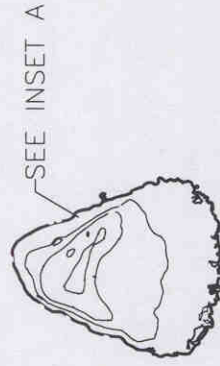
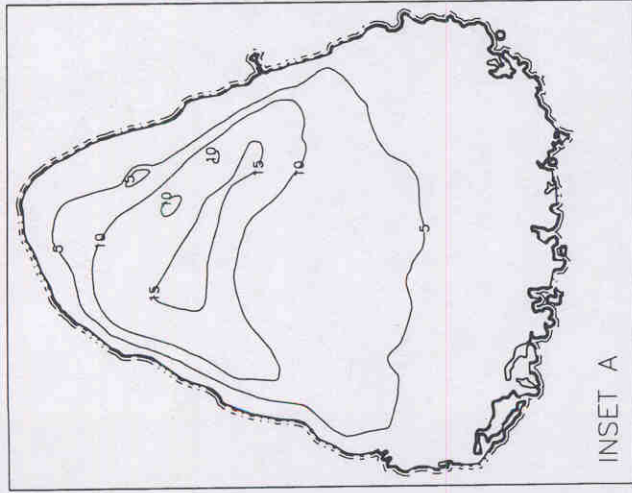
Lignumvitae Key is part of the physiographic region of the High Coral Keys, the southernmost continuation of the Atlantic Barrier Chain. The edge of the continental shelf parallels the Keys approximately seven miles offshore. Lignumvitae Key, being a fossilized patch reef, exhibits a similar domed topography as observed on current patch reefs, having the highest elevations near the center and tapering gradually down to the shoreline (see Topographic Map). The island is triangular shaped, with the top of the triangle facing north and the base of the triangle facing south. The highest elevations occur in the northern portion of the park. In this area, elevations reach a maximum of 16.5 feet, one of the highest reported elevations in the Keys. Elevations along the northeast and northwest shorelines drop sharply from ten to three feet.

Numerous large solution holes up to five feet in depth create additional topographic relief on the island. The southern end of the park slopes gradually down to sea level and is vegetated with an extensive mangrove forest.

The northeast end of Lower Matecumbe Key is also of coral origin. Elevations in the hammock range from five to ten feet, tapering gradually down to the wide mangrove fringe. A series of canals were dredged through this property. A portion of the fill from this dredging was spread on the adjacent uplands.

Shell Key State Preserve is a mangrove island with a large interior lagoon. The island originated as a supratidal mud bank, typical of other Florida Bay islands. With the exception of a narrow slightly elevated berm on the west side of the island, emergent land on Shell Key is of intertidal elevation. A narrow creek of approximately 1 to 3 feet MLW depth connects the

# TOPOGRAPHIC MAP



LIGNUMVITAE KEY  
STATE BOTANICAL SITE

lagoon with the bay. Because it is highly overgrown with mangroves it is not easily visible from outside the island and is barely passable by canoe. Water depth in the open waters of the lagoon is approximately 1 foot MLW.

The submerged habitat in the park consists of several high elevation mud banks separated from each other by deep-water channels. Water depth on the banks ranges from 1 to 4 feet mean low water (MLW). However, the surfaces of the grassflats are occasionally exposed during extreme low tide conditions. Banks within park boundaries include Peterson Bank, Lignumvitae Key Bank, and Shell Key Bank. Six channels cut through the banks in a north to south direction. These include Lignumvitae, Indian Key, Shell Key, Teatable Key, Yellow Shark and Race Channels. Water depth in these channels ranges from 6 to 16 feet MLW.

There has been no alteration to the topography of Shell Key and minimal alteration to the topography of Lignumvitae Key. On the latter, an Indian midden and burial ground created two slightly elevated areas in the mangroves. All other alterations to the physical character of the key are due to vegetative clearing. This includes the historic area around the Matheson house on the east side of the island, a mangrove area on the southwest end of the island which was cleared around 1947 for an airstrip, and a former planting area dating back to the 1800s on the west side of the island. The latter two areas are in varying stages of recolonization.

The major alteration to the topography of the submerged area was the filling of the open waters between Upper and Lower Matecumbe Keys in the early 1900s due to construction of Flagler's Railroad. At that time bridges were constructed over Indian Key, Lignumvitae, and Teatable Key Channels. The banks were filled by dredging sediment from adjacent areas of the banks parallel to and north of the existing roadway. This area is now referred to as Indian Key Fill. Partial blocking of the once wide tidal pass is thought to have accelerated the rate of sediment deposition on the surrounding banks, raising their height in the water column. Boat groundings and propeller damage from motorized vessels have created blowout holes and long narrow trenches through the seagrass beds, especially along the channel edges. These cuts in the seafloor vary in depth from a few inches to as much as six feet in depth.

### **Geology**

The geological formation of the Upper Keys is Key Largo limestone. The present geological formations began approximately 100,000 years ago during the Pleistocene Era when sea level was approximately 25 feet above present level. At that time, Lignumvitae Key was a submerged living patch reef. Sea level dropped during the Wisconsin glaciation period, exposing fossilized patch reefs and portions of the seafloor as islands. The exposed portions of the islands, subjected to the erosive forces of wind, rain, and plant colonization, eventually developed soil and vegetation. Currently, sea level is rising at variable estimated rates ranging from 2 to 16 inches per 100 years (Hoffmeister 1974; Wanless 1989).

Lignumvitae Key is an excellent example of the ancient domed patch reef formation. Key Largo limestone is visible on the surface of the island in many areas. It is white to light gray in color, very porous, and permeable. As the limestone partially dissolves from chemical, physical, and biological weathering, the bedrock becomes pitted with solution holes of variable size. Crystalline calcite is deposited in the empty spaces. Numerous solution holes, some as deep as five feet, can be found on Lignumvitae Key. Some of these hold fresh or brackish water

seasonally. On the uplands, a thin layer of organic soil and leaf litter covers the majority of the fossilized coral, although outcrops of exposed rock can be observed. In some of the intertidal areas, particularly on the south end of the island, bands of jagged irregular limestone can be found. In other areas, the surface between the solution holes has weathered into smooth caprock. Other intertidal areas, especially on the east side of the island, are covered with a layer of marl. A thick layer of organic muck covers the limestone in the mangrove forests.

Shell Key, in contrast to Lignumvitae Key, originated as a supratidal mud bank island. It is typical of Florida Bay mangrove islands. Initial sediment deposits began over a raised ridge on the lagoon floor. The present configuration of the island is the result of the stabilizing influence of marine grasses, algal mats, and mangrove colonization. Approximately 30 years ago, there was a large opening to Florida Bay on the northwest side of the island (Nielsen 1990). Deposition of sand and expansion of mangroves on this side of the island, restrict tidal exchange in the interior lagoon. Elevation of the berm on the northwest side of the island is only slightly greater than that found in the surrounding tidal mangroves. The submerged areas of the park consist of calcareous sediments overlying Key Largo limestone.

### **Soils**

According to the Natural Resources Conservation Service (USDA 1995) there are four soil types in this park (see Soils Map). The unaltered upland soils are classified as Pennekamp gravelly muck. These thin organic soils are typical of Florida Keys rockland hammock. The soil types in the wetlands are classified as Islamorada muck or Key Largo muck. Both soils are tidally inundated daily and are typically found underlying mangrove swamps in the Upper Keys. The two soil types differ in that Key Largo muck is generally thicker and the associated vegetation has a greater percentage of red mangroves relative to black mangroves. In addition, a small area on the southwest side of Lignumvitae Key is classified as rock outcrop - Tavernier complex. In this area, the bedrock is exposed. The soil is subject to daily tidal flooding and usually supports mangrove vegetation. On the northeast and north side of the island, fine calcareous sediments have been deposited in a narrow slightly elevated berm along the shoreline. The shallow submerged mud banks are composed primarily of calcareous sediments of a molluscan and foraminifera origin. Detrital material from seagrass and coarse sediment from decomposed calcareous algae and small corals comprise a smaller portion of the submerged sediments. As one progresses from the bay to the ocean there is a general transition in the sediment composition from high content of fine mollusk based sediment to increased coarse coral and algal based sediments (Nielsen 1990). Addendum 3 contains detailed soil descriptions.

### **Minerals**

There are no known minerals of commercial value occurring at this unit.

### **Hydrology**

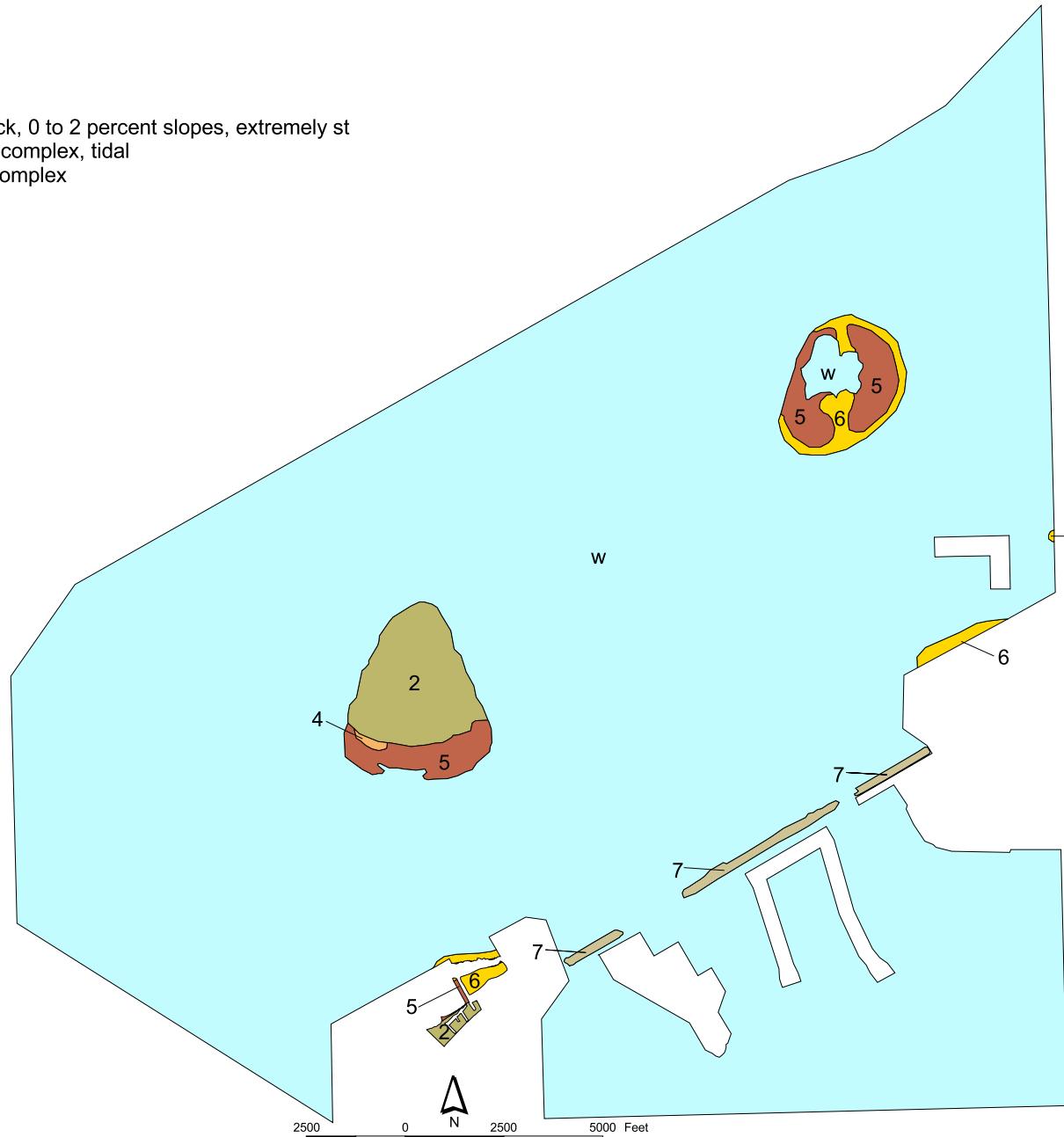
The only source of fresh water in the Florida Keys is rain. Historically, early settlers collected rainwater in cisterns or used water from shallow wells that tapped into small fresh water lenses. These lenses formed above sea level during the rainy season.

Because Key Largo limestone is extremely porous, fresh water lenses in the Upper Keys were limited to scattered flooded basins in the hardwood hammocks. Historically the Matecumbe region held one of the few fresh water supplies between Key West and the mainland. Ships



LEGEND

- 05-Islamorada muck, tidal
- 06-Keylargo muck, tidal
- 02-Pennekamp gravelly muck, 0 to 2 percent slopes, extremely st
- 04-Rock outcrop, Tavernier complex, tidal
- 07-Udorthents-Urban land complex
- water



LIGNUMVITAE KEY  
BOTANICAL STATE PARK

Prepared By:  
Florida Department of Environmental Protection  
Division of Recreation and Parks  
Office of Park Planning  
Date: September 15 1999 - AE  
Printed: June 15, 2001-BJB  
ARC Review Draft

SOILS MAP

traveling between Spain and South America often stopped in the area for this reason. There were reportedly five natural wells containing excellent water as early as 1775 (Jutro 1975). These "wells" were described as being about four feet deep and may actually have been large solution holes. Currently there are three to four large solution holes on Lignumvitae Key which retain water year-round.

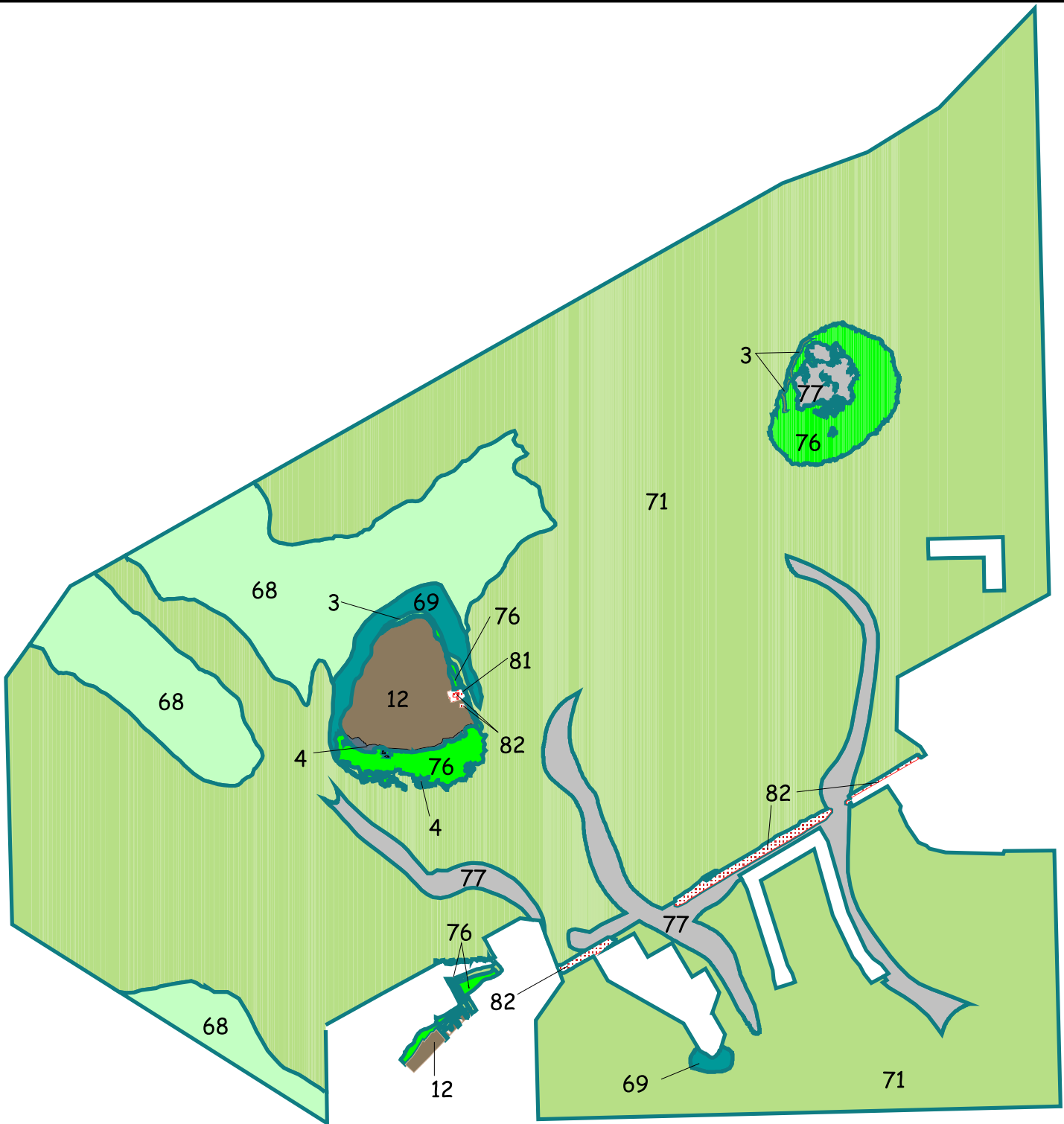
Drainage of the upland areas in the Keys, including Lignumvitae Key, consists of surface runoff into the adjacent marine environment and seepage through the porous limestone bedrock. During periods of lower sea level, the gradual slope of the continental shelf created a gradient for the drainage of runoff from the uplands. The currently submerged rivers or streambeds are now marine channels. Particulate matter and sediment is transported by tidal cycles through the main channels. The channels facilitate mixing of the less saline waters of the Florida Bay with the Atlantic Ocean. Tidal cycles in this area are mixed, having two highs and two lows of unequal amplitude each day. Average tidal range is approximately 1.8 feet. All waters in the unit are classified as Outstanding Florida Waters. Although there is good circulation from wind and tides, water quality has declined in recent years due to adjacent development impacts, increased boating activity, and water quality degradation in Florida Bay (Water Quality Protection Program for the Florida Keys National Marine Sanctuary, Phase 1 Report, 1992).

### **Natural Communities**

The system of classifying natural communities employed in this plan was developed by the Florida Natural Areas Inventory (FNAI). The premise of this system is that physical factors, such as climate, geology, soil, hydrology and fire frequency generally determine the species composition of an area, and that areas which are similar with respect to these factors will tend to have natural communities with similar species compositions. Obvious differences in species composition can occur, despite similar physical conditions. In other instances, physical factors are substantially different, yet the species compositions are quite similar. For example, coastal strand and scrub--two communities with similar species compositions--generally have quite different climatic environments, and these necessitate different management programs.

The park contains eight distinct natural communities in addition to ruderal and developed areas (see Natural Communities Map). The acreage for each natural community is reflected on the Natural Communities Map. Park specific assessments of the existing natural communities are provided. FNAI descriptions of these natural communities are contained in Addendum 4. A list of plants and animals occurring in the park is contained in Addendum 5.

**Coastal berm.** Half of the coastal berm occurs on the northern side of Lignumvitae Key. It consists of a narrow slightly elevated ridge of storm deposited sediment, shell fragments, and debris bordering the shoreline of Florida Bay. In contrast to more typical coastal berms that are generally larger and located behind a mangrove shoreline, this berm is situated immediately adjacent to the nearshore waters and is not densely vegetated. Vegetation consists primarily of herbaceous plants and shrubs such as spider lily (*Hymenocallis latifolia*), prickly pear cactus, saltwort (*Batis maritima*), sea ox-eye daisy (*Borrchia* spp.), and scorpion tail (*Heliotropium angiospermun*). Buttonwood (*Conocarpus erectus*), black mangrove (*Avicennia germinans*), nickerbean (*Caesalpinia* sp.), and Spanish stopper (*Eugenia foetida*) are found scattered along the shoreline but do not form a continuous canopy. Behind the berm, the land dips down to a narrow band of mangroves and then rises sharply up to rockland hammock. This community is in excellent condition.



**LEGEND**

- 3 - Coastal Berm - 3.10 ac.
- 4 - Coastal Rock Barren - 8.99 ac.
- 12 - Rockland Hammock - 181.00 ac.
- 68 - Marine Composite Substrate - 1094.40 ac.
- 69 - Marine Consolidated Substrate - 89.84 ac.
- 71 - Marine Grass Bed - 8383.77 ac.
- 76 - Marine Tidal Swamp - 243.22 ac.
- 77 - Marine Unconsolidated Substrate - 436.73 ac.
- 81 - Ruderal - 2.74 ac.
- 82 - Developed - 37.00 ac.



A very low and narrow coastal berm also occurs on the west side of Shell Key. In this area, a slightly elevated sandy ridge can be found parallel to the shoreline just behind a narrow fringe of mangroves. The canopy is not well developed. Black mangroves grow scattered in low densities on the berm. The dominant vegetation however consists of herbaceous plants such as glasswort, saltwort, and sea ox-eye daisy. Raccoon tracks have been observed in this area.

**Coastal rock barren.** The coastal rock barren occurs on the south side of the island as an ecotonal community between the rockland hammock and the extensive mangrove forest. An abundance of exposed and eroded limestone caprock forms an irregular jagged surface pockmarked with numerous small solution holes. Vegetation consists of stunted xeric and halophytic shrubs, cacti, and herbaceous plants. Black mangrove, white mangrove, and buttonwood are the dominant trees in this intertidal community. Height varies, being taller along the edges of the rock barren and stunted in the interior. Saltwort, glasswort (*Salicornia* spp.) key grass (*Monanthe litoralis*) and sea purselane (*Sesuvium portulacastrum*) are typical herbaceous plants.

At the west end of the rock barren, there is a large open area with a limited amount of vegetation. This area, originally part of the mangrove forest, was cleared around 1947 for an airstrip. It is in the process of recovering and can now be classified as rock barren due to the substrate and vegetation. It will eventually succeed back to tidal swamp community. In contrast to the eastern portion of the rock barren, exposed caprock in this area is less abundant and smoother. Small succulent plants, similar to that found in the eastern end of the rock barren, comprise the majority of vegetation. A periphyton mat has developed on the unvegetated marl surface. The open structure of the rock barren adjacent to the dense coverage of the mangroves and hammock makes this habitat highly desirable to butterflies, wading birds, and hawks, all of which are frequently observed in the area.

**Rockland hammock.** This community is in excellent condition. The substantially undisturbed tropical hardwood hammock on Lignumvitae Key is the most distinctive biological feature of the site. Free from the impacts associated with the modern day conveniences of roads and electricity, a walk through the hammock can give a visitor a feel for what the Upper Keys were once like. The hammock is approximately 3200 feet long on its north - south axis and 3000 feet wide on its broadest east - west axis. The well-developed canopy is approximately 40 feet high, although some trees may be up to 70 feet tall. Although some disturbance occurred to the hammock primarily for agricultural planting, many trees are reported to be up to 1000 years old (Wilson and Eisner, 1968).

Vegetation of the rockland hammock is of West Indian origin. Their seeds were transported to the Keys by storms, ocean currents, and birds. Because of its maturity, the rockland hammock has a dense closed canopy and mostly open understory. Some of the predominant trees include gumbo limbo (*Bursera simaruba*), poisonwood (*Metopium toxiferum*), mastic (*Mastichodendron foetidissimum*), pigeon plum (*Coccoloba diversifolia*), strangler fig (*Ficus aurea*), and lignumvitae (*Guaiacum sanctum*). Approximately forty-five native hammock trees have been identified on the site. The largest trees have trunks up to three feet in diameter. The understory consists of small shade tolerant trees, shrubs, and cactus. The effect of past

hurricanes is evident by the numerous old windthrows observed throughout the hammock. However there has been no physical hurricane impacts to the key since Hurricane Donna in 1960.

A distinct transition zone exists as a narrow band of vegetation around the edge of the hammock at lower elevations. It is predominant along the western shoreline. The hammock in this area is dense and contains a high concentration of palms, cactus, and other spiny vegetation. Species include Florida thatch palm (*Thrinax radiata*), barbed wire cactus (*Cereus pentagonus*), prickly pear cactus (*Opuntia stricta*), and seven year apple (*Casasia clusiifolia*). These species are more salt tolerant than those found further inland at higher elevations. This lower area of the hammock has been the most impacted by invasive exotic vegetation. Cork tree (*Thespesia populnea*) and Brazilian pepper (*Schinus terebinthifolius*) can be found along the east and north edges of the hammock.

Rockland hammock also occurs in the park on the northeast end of Lower Matecumbe Key. This area, previously known as the Klopp tract, was recently acquired through the CARL program and amended to the Lignumvitae lease. The portion of hammock located between the dredged canals has a high concentration of invasive exotic vegetation, including Brazilian pepper and Australian pine. The area south of the canal system is in better condition. It consists of moderately dense low canopy hammock. Designated species on the tract include lignum vitae and Florida thatch palm. Several sinkholes are present in the hammock.

**Marine composite substrate.** Marine composite substrate in this park represents an ecotonal community between seagrass, consolidated substrate, and unconsolidated substrate where some plant and animal species of each may be found together. Because of this, marine composite community is highly variable in composition and size and offers a great amount of diversity. This habitat is in excellent condition. It is found north and west of Lignumvitae Key and northwest of the property on Lower Matecumbe Key. In this habitat, seagrass has sparsely colonized bedrock with very little sediment. Sponges and algae are the predominant hardbottom species present.

**Marine consolidated substrate.** The marine consolidated substrate, also referred to as hardbottom, occurs west and north of Lignumvitae Key and around the south and southwest shorelines of Indian Key. The hardbottom occurring around Indian Key is described in more detail in the Indian Key SHS Management Plan since it is within 400 feet of that island. Plant and animal composition of this community is highly variable but is usually dominated by calcareous algae and invertebrates such as sponges, soft coral, sea anemone, and small stony corals. Typical algae are *Acetabularia* sp., *Halimeda* sp., and *Udotea* sp. Stony corals found in the hardbottom include finger coral (*Porites furcata*), starlet coral (*Siderastrea radians*), rose coral (*Manicina areolata*), and lobed star coral (*Solenastrea hyades*). These species vary from a few inches to a foot in height. Fish and crustaceans typically found in seagrass and mangrove habitat also use this community.

**Marine grass beds.** The extensive seagrass beds are the most significant features of the marine resources of the park. Visitors come from all parts of the world to fish the shallow seagrass beds, also referred to as flats, for tarpon, bonefish, and snook. Seagrass beds are ecologically significant because they stabilize sediment, cycle nutrients, and provide habitat for a diversity of

plants and animals. This community is in fair condition.

Turtle grass (*Thalassia testudinum*), shoal grass (*Halodule wrightii*), and manatee grass (*Syringodium filiforme*) are the three species of seagrass found at Lignumvitae Key SBS. Turtle grass is considered a climax species and is the dominant vegetation in well-established beds. Shoal grass is typically a pioneer species that colonizes disturbed sites. Because it has a greater tolerance for temperature and salinity extremes, shoal grass can generally be found in greater concentration nearshore and on high banks where water depth is minimal. Seagrass colonization requires a minimum amount of sediment, low current velocity, and sufficient light availability. Light penetration decreases with increased turbidity and water depth. Because of this, seagrass is not well established in the deep channels, along the edges of the mud banks, or on consolidated substrate.

Other organisms found in the grass beds include macroalgae, mollusks, echinoderms, crustaceans, sponges, and coral. Epiphytes, tiny organisms that grow or live on seagrass, are also very abundant. Common epiphytic species occurring on the grass blades include coralline red algae, hydrozoans, worms, amphipods, and gastropods. The grass beds provide food and refuge for invertebrates and fish through all or part of their life cycles. Many of these species are commercially important, including tarpon, snook, bonefish, spiny lobster, and stone crab. The shallow grass flats also provide feeding grounds for numerous wading birds, manatees, and sea turtles. Small pods of porpoise can frequently be observed swimming leisurely through park waters.

Since 1991, large-scale algal blooms and associated massive seagrass and sponge dieoffs have been repeatedly occurring in Florida Bay (Matthews 1993). Scientists suspect that hypersaline conditions in the bay are responsible for the dieoffs and blooms. Reduced freshwater input due to canalization of the Everglades, reduced rainfall, and lack of direct hurricane impacts resulted in elevated salinity levels in the bay in recent years. Although algal blooms are generally observed southwest of the park, they may be present in park waters occasionally for short periods but are currently not thought to be a significant problem in this area (M. Durako, pers. comm.). There has been some loss of seagrass on the tops of shallow banks. Researchers at Florida Marine Research Institute are currently investigating this to determine if it is a natural occurrence or related to the large-scale seagrass die-off occurring in other parts of Florida Bay.

The major impact to the seagrass community is associated with boating activity. Cumulative impacts from propeller scarring by boaters have resulted in a significant amount of seagrass destruction. When a boat propeller hits the seafloor, seagrass is cut, roots are torn up, and varying amounts of sediment are dug up, leaving the shallow grass beds scarred by long narrow barren trenches. Recovery of these prop scars can take from 2 to 10 years (Nielsen 1990). Sargent et al. (1991) found that all of the seagrass banks in the park had some degree of damage, varying between light and severe. Scarring is particularly abundant along the edges of channels and on the banks closest to the bridge, where boat traffic is heaviest.

**Marine tidal swamp.** The marine tidal swamp found in the park is in excellent condition. There are several forms of tidal swamp. Fringe forests border shorelines and tidal creeks and are inundated daily by tides. The wide band of tidal swamp surrounding the southern end of Lignumvitae Key is an excellent example of fringe forest. It is approximately 1000 feet wide.

The seaward half is dominated by red mangroves and the landward half is dominated by black mangroves. Numerous tidal creeks meander through the tidal swamp. A large embayment on the southwest shoreline is slowly becoming isolated from open waters as mangroves have expanded across the mouth of the embayment. The eastern shoreline is bordered with a narrow band of fringe mangrove forest, varying in width between 50 and 100 feet. Because the western shoreline is directly exposed to strong winter winds and grades rapidly up to rockland hammock, mangrove vegetation is not well established.

The northeast portion of Lower Matecumbe Key, which is under park ownership, is bordered on its north side with fringe mangrove forest. Mangroves have also colonized the canal shoreline. White crowned pigeons (*Columba leucocephala*) and black whiskered vireos (*Vireo altiloquus*) are two of the designated bird species that use this area. A canal system was dredged on the landward side of the mangroves. In addition, there are two areas where the mangroves appear to have been dredged to create additional passageways through the tidal swamp. Several natural creeks meander through the forest. The largest creek, referred to as "The Wheelditch", is frequently traversed by boaters. To make it safer to navigate through and encourage its use over another inappropriate route through shallow a shallow seagrass bed, park staff periodically trims the lateral branches of the mangroves.

The majority of marine tidal swamp community in this park occurs on Shell Key. With the exception of the submerged portions of the island, the entire key consists of overwash mangrove forest. This community is characterized as being frequently overwashed by tides and consequently having high rates of organic export and nutrient import (Odum et al. 1982). The tallest stand of mangroves is located on the north and east sides of the key and along the tidal creek located on the west side of the island. In this area, red mangroves are the dominant trees and canopy height is 20 to 30 feet tall. Landward of the red mangroves, the tidal swamp is dominated by black mangroves. The interior lagoon is lined with small red mangroves. The island once supported a large active bird rookery. In 1989, up to 100 birds Used Shell Key as a rookery (FGFWFC, 1991). Species included snowy egrets (*Egretta thulla*), brown pelicans (*Pelecanus occidentalis*), and an unidentified dark wader. White crowned pigeons also actively nest on the island (P. Well, pers. comm.).

**Marine unconsolidated substrate.** The unconsolidated substrate of Lignumvitae Key SBS occurs in shallow subtidal waters bordering the shoreline of the islands and in the interior lagoon of Shell Key, along the edges of navigational channels, and at the bottom of some of the deeper channels. Although this community has a sparse cover of epifaunal animals and plants, the sediment supports a large population of infaunal organisms that are not readily visible, such as worms, mollusks, isopods, and amphipods. It is often important feeding grounds for bottom feeding fish, invertebrates, shorebirds and wading birds. This community may have increased in recent years due to loss of seagrass from boating damage and seagrass die-off.

**Ruderal and developed.** Development on the site is minor, consisting of the historic Matheson house, one residence for the park manager, utility buildings, and docks. Ruderal land consists of the landscaped area around the Matheson house that was cleared historically and is maintained as such.

## **Designated Species**

Designated species are those which are listed by the Florida Natural Areas Inventory (FNAI), U.S. Fish and Wildlife Service (USFWS), Florida Fish and Wildlife Conservation Commission (FFWCC), and the Florida Department of Agriculture and Consumer Services (FDA) as endangered, threatened or of special concern. Addendum 6 contains a list of the designated species and their designated status for this park. Management measures will be addressed later in this plan.

There are nine designated plants and 37 designated animals known to occur within the different communities of the park.

Lignumvitae Key was named for the endangered lignum vitae tree (*Guaiacum sanctum*), which is relatively abundant on the island. This species is generally found as a small tree in the understory of high hammock in relatively low abundance. On the island, numerous large specimens can be found, particularly in the higher portions of the hammock. Other designated plants in the park include: joewood (*Jacquinia keyensis*), West Indian Mahogany (*Swietenia mahagoni*), milkbark (*Drypetes diversifolia*), and Florida thatch palm (*Thrinax radiata*).

The rockland hammock supports several designated invertebrates including several color variations of the Florida tree snail (*Liguus fasciatus*) and a rare butterfly, the Florida purple wing (*Eunica tatila*). Both invertebrates are ranked as species of special concern by Florida Fish and Wildlife Conservation Commission. There are at least five color forms of the Florida tree snail found on the island. Two of these, *l. f. simpsoni* and *l. f. lignumvitae* are endemic to the island and constitute approximately 90 percent of the population. Six other color forms, *l. f. dryas*, *l. f. delicatus*, *l. f. subcrenatus*, *l. f. graphicus*, *l. f. pseudopictus*, and *l. f. roseatus* have been reported to occur on the island. The numbers of Florida purple wing observed on Lignumvitae are considered the largest known concentration in the Upper Keys. In 1997, the endangered Schaus' swallowtail (*Heraclides aristodemus ponceanus*) was reintroduced to Lower Matecumbe Key by research entomologist Thomas Emmel. The current and long-term status of this designated species at the site will need to be monitored to determine the success of the reintroduction.

The diverse and relatively undisturbed habitats of the park provide foraging, roosting, and nesting grounds for numerous designated species of birds. The white crowned pigeon forages on seeds in the rockland hammock of Lignumvitae Key and Lower Matecumbe Key and nests on mangrove islands such as Shell Key. Wading birds forage in the shallow grass flats and roost in the mangroves, including reddish egret (*Egretta rufescens*), little blue heron (*E. caerulea*), and tricolored heron (*E. tricolor*). Snowy egrets (*Egretta thula*) and brown pelicans (*Pelecanus occidentalis*) have historically nested on Shell Key.

Two endangered rodents, Key Largo woodrat (*Neotoma floridana smalli*) and the Key Largo cottonmouse (*Peromyscus gossypinus allapaticola*), were introduced to Lignumvitae Key from Key Largo in 1972 before state ownership of the site. Although the cottonmouse never became established, the woodrat appeared to become well established, as evident by numerous stick nests observed throughout the hammock. In the late 1980s, staff observed that the population appeared to decline. However, a survey conducted in 1990 by district biology (Duquesnel,



1990) concluded that no woodrats or cotton mice remained on the island.

In the submerged areas of the park, the West Indian manatee (*Trichechus manatus latirostris*), loggerhead turtles (*Caretta caretta*), green turtles (*Chelonia mydas*), and hawksbill turtles (*Eretmochelys imbricata*) are occasional visitors to the park. However, there is no suitable nesting habitat in the park for sea turtles.

### **Special Natural Features**

The large and relatively undisturbed rockland hammock on Lignumvitae Key is unique in character relative to other hammocks in the Keys. This hammock occurs on the highest ground in the Keys and is considered one of the highest quality tropical forests in Florida. Nine species of trees have been recognized as national champions. National champions for Lignumvitae Key include poisonwood, darling plum (*Reynosa septentrionalis*), bolly (*Guapira discolor*), black ironwood (*Krugiodendron ferreum*), crabwood (*Ateramnus lucidus*), torchwood (*Amyris elemifera*), Florida thatch palm, Florida boxwood (*Schaefferia frutescens*), and shortleaf fig (*Ficus citrifolia*). Large solution holes create interesting topographic relief within the hammock and provide a fresh water source for wildlife. The climax forest is in excellent condition with minimal intrusion by exotic vegetation. There have been 38 species of butterflies identified in the park, credited in part to the Division's prohibiting of spraying insecticides. Several of these are somewhat rare, including the Florida purple wing, the white peacock (*Anartia jatrophae*), the malchite (*Siproeta stelenes*), the Antillean blue (*Hemiargus ceranunus*), the dainty yellow (*Nathalis iole*), and the tropical checkered skipper (*Pyrgus syrictus*). The highly endangered Schaus' swallowtail, which was reported to be present on Lower Matecumbe Key in the 1930s and 1940s, was reintroduced to that key in 1997.

The extensive seagrass beds surrounding the islands are also considered to be a special natural feature. This community is rich in floral and faunal diversity including several species of commercially important fish. The grassbeds support a large and diverse concentration of wading birds, which can also be observed roosting on Shell Key. The beauty of the flats is enjoyed daily by flats anglers, as well as people traveling through the Keys and crossing over Teatable and Indian Key Channel bridges. The well-developed hardbottom community bordering Lignumvitae Key and Indian Key is also special features. It is quite unique to find such a diversity and abundance of hard and soft corals immediately adjacent to the shoreline and in such good condition.

### **Cultural Resources**

Lignumvitae Key has not been subjected to a comprehensive, scientific cultural resources survey at any level. It has been visited and studied by archaeologists since at least the 1940s, when John Goggin first recorded a burial mound. Four cultural resources pertaining to the park are recorded in the Florida Site File. These include a burial mound (8Mo 00013), a stone structure (8Mo 00014), a stone wall (8Mo 01446), and the key in general (8Mo 00210). The burial mound is about 30 meters in diameter and one meter in elevation. Local lore thought of it as a Spanish ruin. None of the recorded resources has been definitively associated with specific culture or time periods. The Matheson house has not been recorded, a significant omission from the official record. The island is listed on the National Register of Historic Places.

An Indian midden may also occur on the island. Scattered shell tools have been found on a

slightly elevated and cleared area in the mangroves.

Occupation of the island dates to the Glades cultural period. There is evidence that Calusa were already present in the Matecumbe region of the Keys in the early 1500s when the Spanish arrived. While Calusa were probably numerous further north in the Everglades region, Tequesta almost certainly controlled the Keys and would have lived in the area of Lignumvitae.

Lignumvitae Key has had several different names in the past, a reflection of its past occupation by man. In 1760, the island was mapped as "Cayo de la Lena" which translates roughly as Isle of Wood. Shortly afterwards in 1763, the name was changed to Jenkinson Island during English control of south Florida. When Florida became a territory in 1821, residents associated with the wrecking community of Indian Key in the 1830s called this island "Lignurd Veto". At some point after this the island was renamed Lignumvitae Key. During the 1830s, the island was probably used by members of the Indian Key community for planting areas for crops such as sisal. Between 1888 and 1919 Thomas and Edward Hine established a coconut grove or planting area in the hammock, but apparently constructed no structures.

Twentieth century construction activity occurred mainly before the 1950s. In 1920, a large house, several workers' houses, and cistern were constructed on the east side of the island when the island was owned by the Matheson's. The Matheson house and cleared grounds have been stabilized while under management by the Division of Recreation and Parks. Several exotic plants, which were historically present, are maintained as well. Three pieces of the heavy equipment used by the Matheson's to create the trail system remain in the hammock. These include a 1936 Dodge dump truck, a rock crusher, and a large bulldozer. When the island was acquired by Matheson in 1919, the planting area created by the Hines continued to be maintained by the Matheson caretakers. They also added other exotic plantings to the area and fenced it with wire.

## **RESOURCE MANAGEMENT PROGRAM**

### **Special Management Considerations**

#### **Timber Management Analysis**

Chapters 253 and 259, Florida Statutes, require an assessment of the feasibility of managing timber in land management plans for parcels greater than 1,000 acres and if the lead agency determines that timber management is not in conflict with the primary management objectives of the land.

During the development of this plan, an analysis was made regarding the feasibility of timber management activities for this site. It was then determined that the primary management objectives of the unit could be met without conducting timber management activities for this 5-year management plan cycle. Timber management will be reevaluated during the next 5-year revision of this management plan.

#### **Additional Considerations**

Special management for butterflies consists of leaving unmowed borders between the landscaped clearing and the hammock in order to provide grassy habitat for the multiple

resident and migratory species of butterflies.

### **Management Needs and Problems**

This park is an excellent example of an undeveloped Florida Keys ecosystem, well represented by a diversity of upland, wetland, and submerged natural communities. Despite a long history of settlement, there is little evidence of human disturbance to the natural communities of the island. The primary management needs for the unit are therefore to prevent new disturbances or alterations to the environment, and provide interpretation of the unique natural and cultural resources. The original Matheson trails are currently used in the interpretative program on the island.

Some problems on Lignumvitae Key do need to be addressed however. Although there are no large monocultures of invasive non-native vegetation, exotic plants continue to occur on the island in small amounts since seeds are dispersed by birds, wind, and tides. Exotic removal is currently conducted by staff on an occasional basis. Regular inspection for and removal of exotics on the island as well as control of historically introduced exotics is also necessary. Extensive exotic removal is needed on the recently acquired property on Lower Matecumbe Key.

Flotsam in the mangroves is a continual problem. In addition, trash, some of which is toxic, needs to be removed from several solution holes. The dumping was apparently done in the early 1970s. Sediment testing conducted in 1991 found elevated levels of some heavy metals and pesticides. Fortunately, the impacted area is small and contained. The oil fueled generator that provides electricity to the island needs to be replaced by a wind or solar powered energy source. Oil leaks and spills during transport, storage, and fueling has caused some contamination to the site and continues to be a serious pollution hazard. In addition, the loud noise associated with the generator is an intrusion to the otherwise quiet island.

Park staff has been concerned since the 1980s that many of the lignumvitae trees were dying, unhealthy, or slow to reproduce. Some research on this matter has been conducted by park and district staff as well as university researchers. Research regarding the status and condition of lignumvitae trees on the island needs to be continued. In the past, staff has selectively trimmed hammock vegetation to increase light penetration through the canopy. This was recommended by University of Florida IFAS researcher Dr. R. Baranowski (1983) who found that infestations could be greatly reduced by opening some of the canopy above the lignumvitae trees. This management measure was used with success by park staff on a number of lignumvitae trees along the trail and near the clearing. Park management plans to continue this effort.

A seagrass protection program has been established by the park manager in an attempt to reduce or eliminate boat groundings and prop scarring in seagrass beds. Staff currently responds to boat groundings, contact law enforcement agencies as necessary, and educates boaters. The park has put a lot of effort into protecting the grass beds by better delineating navigational channels and restricting motorized vessels from shallow grassbeds. Mooring buoys have been installed in the nearshore waters behind the western shorelines of Lignumvitae Key and Shell Key to prevent anchor damage in seagrass. Since 1993, variable amounts of funding have been received from the Area of State Concern Restoration Trust Fund to purchase and install regulatory signs for this purpose. Educational brochures were also produced and continue to be

distributed locally. Although these efforts appear to have decreased the severity of the problem, boat groundings continue to occur. Unfortunately, funding for this type of program has been discontinued. In addition, law enforcement is insufficient in the area.

The Matheson house and associated grounds will be preserved and stabilized as will the rock wall. Currently the staff manually removes underbrush or trees that begin to grow on or in close proximity to the walls to prevent further deterioration. The application of herbicides on these foundations is currently prohibited. Restroom facilities located beneath the Matheson house must be removed. A new facility using the most environmentally sensitive technology will be required in a separate location. Stabilization of the dump truck and other heavy equipment may be desirable. The primary management need for the prehistoric cultural resources is protection from vandalism.

### **Management Objectives**

The resources administered by the Division of Recreation and Parks are divided into two principal categories: natural resources and cultural resources. The Division's primary objective in natural resource management is to maintain and restore, to the extent possible, to the conditions that existed before the ecological disruptions caused by man. The objective for managing cultural resources is to protect these resources from human-related and natural threats. This will arrest deterioration and help preserve the cultural resources for future generations to enjoy.

The primary objective of the park is to preserve the excellent quality of its natural communities. The habitat currently being the most impacted is the seagrass beds. The park must continue to manage the marine habitat through education, channel marking, and restriction of certain areas to motorized traffic. The effects of these efforts should be evaluated on a periodic basis and revised as necessary. Restoration of prop scars needs to be conducted in highly disturbed areas to accelerate recovery processes. Dredged areas of the banks near the highway need to be topographically and vegetatively restored. The park is currently in the process of doing a preliminary evaluation of seagrass bed condition and of conducting a pilot restoration project. A method for calculating boat-grounding damage that appropriately reflects the value of seagrass habitat and is consistent with other managing agencies must be developed and implemented. Additional funding and staffing for management of this resource is needed. In addition, the area needs to be regularly patrolled by a law enforcement officer to respond adequately to boat groundings.

Another objective of the park is to eliminate or minimize exotic vegetation from the natural areas. This requires periodic inspections through the park, especially on the seaward edge of the uplands and the perimeter of the historical agricultural plot.

All debris must be removed from the solution holes and properly disposed of to minimize contamination of the sediment and groundwater. In addition, trash accumulating on the shoreline needs to be picked up and disposed. This has been done in the past utilizing volunteers.

Research regarding the status and condition of *lignumvitae* trees on the island needs to be continued. As a safeguard against loss of this species on the key, park staff should continue periodic trimming around several selected trees. Others must be left unaltered so that

comparisons can be made. In addition, park staff needs to continue to propagate small numbers of *lignumvitae* seeds and later plant them along the upper edge of the clearing. This has already been done somewhat. Seeds must be collected from a minimum of ten different trees to maintain genetic diversity.

Management objectives for the cultural resources of the park should include a coordinated comprehensive cultural resources survey. Other management objectives concern the continued maintenance of the Matheson house, trails, grounds, rock wall, and other historic structures. Stabilization of the concrete reinforcement in the Matheson house is needed. The restroom facilities located beneath the house need to be relocated. Removing these extraneous facilities will advance planning for restoration of the house. Wastewater treatment for the new restroom facilities must use the most environmentally appropriate technology to minimize degradation of nearshore waters. For this site, a waterless composting toilet system may be the best choice. There are plans to develop a landbase and office for *Lignumvitae* staff on the newly acquired property on Lower Matecumbe Key. Transferring the office out of the Matheson house will reduce daily wear on it and allow the interior of the structure to be restored to a more original condition. Park management also needs to continue to protect the prehistoric burial mound. Additional research may be needed to verify presence of a midden on the key. Only minor shell fragments have been observed on the sediment surface of the site.

### **Management Measures for Natural Resources**

#### **Hydrology**

No management measures regarding hydrology are necessary at this time.

#### **Prescribed Burning**

The objectives of prescribed burning are to create those conditions that are most natural for a particular community, and to maintain ecological diversity within the unit's natural communities. To meet these objectives, the unit is partitioned into burn zones, and burn programs are implemented for each zone. These programs are periodically reviewed and maintained in the unit's burn plan. All prescribed burns are conducted under permit from the Department of Agriculture and Consumer Services, Division of Forestry (DOF).

No prescribed burning is required. This park does not contain any fire dependent communities.

#### **Designated Species Protection**

The welfare of designated species is an important concern of the Division. In many cases, these species will benefit most from proper management of their natural communities. At times, however, additional management measures are needed because of the poor condition of some communities, or because of unusual circumstances which aggravate the particular problems of a species.

Field observations from park staff have indicated that there appears to be an increase in dead *lignumvitae* trees and a decrease in new recruitment of seedlings. Because this tree is a designated species and the namesake of the island, the status of their population needs to be monitored. One possible cause for the decline in *lignumvitae* trees is an increasingly closed canopy and dark understory. This species prefers somewhat open canopy as typically is found following a hurricane. There has not been a major hurricane in the area since Hurricane Donna in 1960. Another possible cause may be increased stress and death due to scale infestation. Research conducted in the early 1980s found that some of the *lignumvitae* trees were infested

with a parasitic scale, *Toumeyella lignumvitae*. The magnitude of scale infestation and its biological impact on *lignumvitae* trees needs to be determined. An incomplete census conducted by park staff in the 1980s found 600 trees to occur in the northern part of the hammock. In 1996, district biology staff surveyed the entire island to document species abundance, condition, size structure, and presence of scale. When surveying the island in transect belts 578 live trees were observed. Survey results did not indicate that there were an excessive number of dead trees. Of the live trees encountered, 80 percent of the trees were ranked in good or better condition. Some seedling production was evident but may be low (61 seedlings observed). *Toumeyella* scale was observed on 38 percent of the trees. This intensity of infestation is lower than that reported by park staff in 1983 (54 - 65 percent). This survey must be repeated to determine trends in population size and structure, and the impact of scale.

Other designated plants on the island are best protected by continuing to remove exotic vegetation. Keeping the island posted and having staff on site will discourage poaching. The Florida tree snail is a food source for the Key Largo woodrat. Since this endangered woodrat was introduced to the island in the 1970s and thrived for some time, it may have impacted the population of this snail. Research regarding the status of its population on the island would be beneficial. In addition, a more intense survey for woodrats may be warranted.

Schaus' swallowtails were released on Lower Matecumbe Key in 1997 by Dr. Thomas Emmel. This is considered a reintroduction to the site since the species was recorded on the key in the 1930s and 1940s. The success of this reintroduction is carefully monitored by the researchers (Emmel 1997).

There are at least two designated species of wading birds that previously nested on Shell Key, snowy egrets and brown pelicans. Nesting was last documented on the island in 1989. It is not known why the rookery has ceased. However, wading bird colonies are known to shift locations, particularly on mangrove islands (M. Robson, pers. comm.). To encourage the return of the rookery park management should keep it as free as possible from human disturbance. This will require keeping the island well posted and by having law enforcement presence in the area to intercept intruders.

### **Exotic Species Control**

Exotic species are those plants or animals that are not native to Florida, but were introduced as a result of human-related activities. Exotics have fewer natural enemies and may have a higher survival rate than do native species, as well. They may also harbor diseases or parasites that significantly impact non-resistant native species. Thus, the policy of the Division is to remove exotic species from native natural communities.

Because there is not an excessive number of non-native plants on *Lignumvitae* Key, the park should strive to remove all exotics as they are found to prevent their expansion, with the exception of those selected to remain for historical purposes. Special attention should be given to the cork tree that has become established along the eastern shoreline adjacent to supratidal scrub mangrove community. Although coconuts were historically planted on the island, their distribution continues to increase in the hammock. Effort should be made to minimize expansion of this exotic species by removing coconuts from the hammock floor. Exotic removal must be conducted on Lower Matecumbe Key to prevent further encroachment into the hammock. Black rats in the past have been observed on the island, primarily around the park

infrastructure and on the boats. Recently they have only been observed on the boats. Trapping needs to be conducted until all black rats are removed. A detailed exotic removal plan is currently being developed by DRP staff and will be available at the park and district office.

### **Problem Species**

Problem species are defined as native species whose habits create specific management problems or concerns. Occasionally, problem species are also a designated species, such as alligators. Management must devise measures that balance designated species protection with problem species control.

There are currently no problem species in the park.

### **Management Measures for Cultural Resources**

The management of cultural resources is often complicated because these resources are irreplaceable and extremely vulnerable to disturbances. The advice of historical and archaeological experts is required in this effort. Approval from Department of State, Division of Historical Resources (DHR) must be obtained before taking any actions, such as development or site improvements, that could affect or disturb the cultural resources on state lands. A statement of DHR's policies and procedures for the management and protection of cultural resources is contained in Addendum 7.

Actions that require permits or approval from DHR include development, site excavations or surveys, disturbances of sites or structures, disturbances of the substrate, and any other actions that may affect the integrity of the cultural resources. These actions could damage evidence that would someday be useful to researchers attempting to interpret the past.

Management measures for the cultural resources on Lignumvitae Key include continuing maintenance and preservation of historical structures. Bathroom and office facilities should be moved out of the Matheson house to restore the house more closely to its original structure. Any additional actions will be conducted as determined necessary by the Division of Historical Resources. No additional management measures are needed for the prehistoric sites.

### **Research Needs**

#### **Natural Resources**

Any research or other activity that involves the collection of plant or animal species on park lands requires a collecting permit from the Department of Environmental Protection. Additional permits from the Florida Fish and Wildlife Conservation Commission, the Department of Agriculture and Consumer Services, or the U.S. Fish and Wildlife Service may also be required.

Additional research is needed on the impact of Toumeyella scale on the lignumvitae trees and on the tree's status on the island. Some work is being conducted by park and district staff but more intense research by a university would be beneficial.

A population study on marsh rabbits, rodents, and reptiles would be of interest. Park staff has noticed a decrease in incidental observations of these animals. In fact, no woodrats or marsh rabbits have been sited at the park for several years. Although this could be associated with normal wildlife fluctuations, surveys would be necessary to verify their status.

Research on seagrass restoration methods continues to be useful to the park since an extensive

amount of prop scarred bottom is in need of repair. Although seagrass can revegetate naturally, it is a slow process that could be accelerated with active restoration projects. Florida Bay research, particularly regarding algal blooms and seagrass dieoff, would also provide beneficial information to the park. District 5 and park staff are members of the Seagrass Environmental Problem Solving Team and the Seagrass Outreach Partnership, and actively participate in both meetings and fieldwork.

At present, seven research projects are ongoing. They are: DRP, District 5 – bats; Florida International University – terrestrial ecosystem; The Nature Conservancy – Lignumvitae trees; Monroe County Mosquito Control – mosquitoes; University of Florida – Schaus swallowtail butterfly distribution; University of South Florida – native trees in tropical hammocks; and Florida International University – leaf traits/litter fall.

### **Cultural Resources**

A comprehensive cultural resources survey should be conducted in cooperation with the Division of Historical Resources.

### **Resource Management Schedule**

A priority schedule for conducting all management activities for the purposes for which these lands were acquired, and to enhance the resource values is contained in Addendum 8. Cost estimates for conducting priority management activities are based on the most cost effective methods and recommendations currently available (see Addendum 8).

### **Land Management Review**

A land management review of this park was conducted on January 24, 2000. The land management review team report, including the DRP response to that report, is contained in Addendum 9.



## **LAND USE COMPONENT**

### **INTRODUCTION**

Land use planning and park development decisions for the state park system are based on the dual responsibilities of the Division of Recreation and Parks. These responsibilities are to preserve representative examples of original natural Florida and its cultural resources, and to provide outdoor recreation opportunities for Florida's citizens and visitors.

The general planning and design process begins with an analysis of the natural and cultural resources of the unit, then proceeds through the creation of a conceptual land use plan that culminates in the actual design and construction of park facilities. Input to the plan is provided by experts in environmental sciences, cultural resources, park operation and management, through public workshops, and environmental groups. With this approach, the Division's objective is to provide quality development for resource-based recreation throughout the state with a high level of sensitivity to the natural and cultural resources at each park.

This component of the unit plan includes a brief inventory of the external conditions and the recreational potential of the unit. Existing uses, facilities, special conditions on use, and specific areas within the park that will be given special protection, are identified. The land use component then summarizes the current conceptual land use plan for the park, identifying the existing or proposed activities suited to the resource base of the park. Any new facilities needed to support the proposed activities are described and located in general terms.

### **EXTERNAL CONDITIONS**

An assessment of the conditions that exist beyond the boundaries of the unit can identify any special development problems or opportunities that exist because of the unit's unique setting or environment. This also provides an opportunity to deal systematically with various planning issues such as location, adjacent land uses and the park interaction with other facilities.

#### **Existing Use of Adjacent Lands**

Lignumvitae Key Botanical State Park is located in the Middle Keys, about one and a half miles north of Lower Matecumbe Key and U.S. Highway 1. Shell Key State Preserve is located about one mile east of Lignumvitae Key, and approximately one mile north of Upper Matecumbe Key. The Lignumvitae Key Submerged Land Management Area is an addition to the Division's lease to include a large open water area within the park boundary. Both of the island sites are accessible only by boat. Across the U.S. Highway 1 causeway, to the south, lies Indian Key State Historic Site. The Indian Key fill site along the U.S. Highway 1 causeway is leased from the Florida Department of Transportation. An interpretive kiosk at this site provides information on the parks in the Lignumvitae Island Complex, and refers visitors to a nearby private marina which offers boat trips to Lignumvitae Key and Indian Key.

Upper Matecumbe Key is heavily developed with mixed commercial and residential uses. Lower Matecumbe Key is less developed, with a greater proportion of land in residential use. Intensive recreational boating and fishing activities occur in the waters surrounding Lignumvitae Key and Shell Key.

#### **Planned Use of Adjacent Lands**

Continued development is anticipated, especially on the undeveloped portions of Upper and Lower Matecumbe Key. Potential effects of future population growth in the Middle Keys include increased visitation, increased boating activities near the units, and increased traffic

congestion on U.S. Highway 1. Potential concerns with additional boating activities include increased water pollution and destruction of natural features. Division of Recreation and Parks staff will continue to work with the new city, Monroe County, the Department of Community Affairs and other planning and resource management agencies, to coordinate its park management and development efforts with all applicable land use and resource management guidelines and regulations.

## **PROPERTY ANALYSIS**

Effective planning requires a thorough understanding of the unit's natural and cultural resources. This section describes the resource characteristics and existing uses of the property. The unit's recreation resource elements are examined to identify the opportunities and constraints they present for recreational development. Past and present uses are assessed for their effects on the property, compatibility with the site, and relation to the unit's classification.

### **Recreation Resource Elements**

This section assesses the unit's recreation resource elements those physical qualities that, either singly or in certain combinations, supports the various resource-based recreation activities. Breaking down the property into such elements provides a means for measuring the property's capability to support individual recreation activities. This process also analyzes the existing spatial factors that either favor or limit the provision of each activity.

Lignumvitae Key is the slightly larger of the two islands. The island is the only readily accessible Florida Key that is still in its natural state. Lignumvitae Key was chosen as the state's first botanical site because of its rare and delicate ecosystem. It evolved over many centuries on exposed corals, building up land and forest together, capturing species from the coast of Florida and from the Caribbean. A subtropical hardwood hammock covering about 80 percent of the island is one of the best remaining examples of this natural community. The largest trees have trunks more than two feet in diameter and stand as tall as 70 or 80 feet. A mangrove community on the eastern and southern fringes of the island occupies about 15 percent of the site and transition zone areas compromise the remaining 5 percent. A dock on the eastern side of the island provides the only designated public access to the site. The historic Matheson House, near the eastern side of the island, serves a visitor center for the unit.

Shell Key is primarily a mangrove island. This mangrove community is regularly inundated by tidal waters of the Gulf. Shell Key has remained undisturbed because of its mangrove-lowland character. It is significant as a marine nursery.

The property under Division management includes an area on Lower Matecumbe Key, known as the Klopp Tract. Uplands of the property front on U.S. Highway 1, and contain disturbed uplands and navigable canals. The purpose for the Division's acceptance of management authority for the Klopp Tract in 1995 was to protect and restore natural vegetative communities to the disturbed areas while providing a small development area for public access and park operations facilities for the three park units nearby.

The management boundary of the Lignumvitae Island complex also includes approximately 10,000 acres of submerged land. The majority of the submerged land management boundary is on the Gulf side, but a portion of the management boundary extends across the highway to the Atlantic and includes the submerged land around Indian Key State Historic Site. This special management area was created under the direction of the Governor and Cabinet, as a measure to

protect seagrasses and other aquatic resources. Management techniques currently being used in this area include reduced speed zones, prohibition of motor boats in water less than three feet deep, buffer zones for bird roosting, nesting and feeding areas, and marked channels. Mooring buoys are available in some areas to protect seagrass beds from anchor damage.

### **Archaeological and Historical Features**

The Tequesta Native Americans lived in the Keys, and used Lignumvitae as a burial place. Preliminary investigations of the burial mound on the southwest side of the island revealed the presence of human bones believed to be around 1,000 years old.

The most notable historic features were developed during the period the island was owned by the Matheson family from 1919 to 1953. The Matheson House built in 1919, was constructed from Key Largo limestone and South Florida slash pine, also known as Dade County pine. A 12,000-gallon cistern, adjacent to the house, provided the island's only source of drinking water. The historic Matheson House has been renovated, and now serves as a visitor center for the botanical site. The surrounding grounds are managed to resemble their appearance during the Matheson Period.

The oldest evidence of structures found on Lignumvitae Key are the two foundations and a rock wall, which predate any available written records on the Key. The two foundations apparently were small buildings located on opposite sides of the island. The other structure is a 3,000-foot rock wall. Since no documentation can be located explaining the origins of the structures, it is still a puzzle by whom, why, and when the structures were built.

Shell Key has no known archaeological features. Some pilings from a small stilt house, thought to be a fish camp constructed during the 1930s or 1940s, are located on Shell Key.

### **Assessment of Use**

All legal boundaries, significant natural features, structures, facilities, roads, and trails existing in the unit are delineated on the base map (see Base Map). Specific uses made of the unit are briefly described in the following sections.

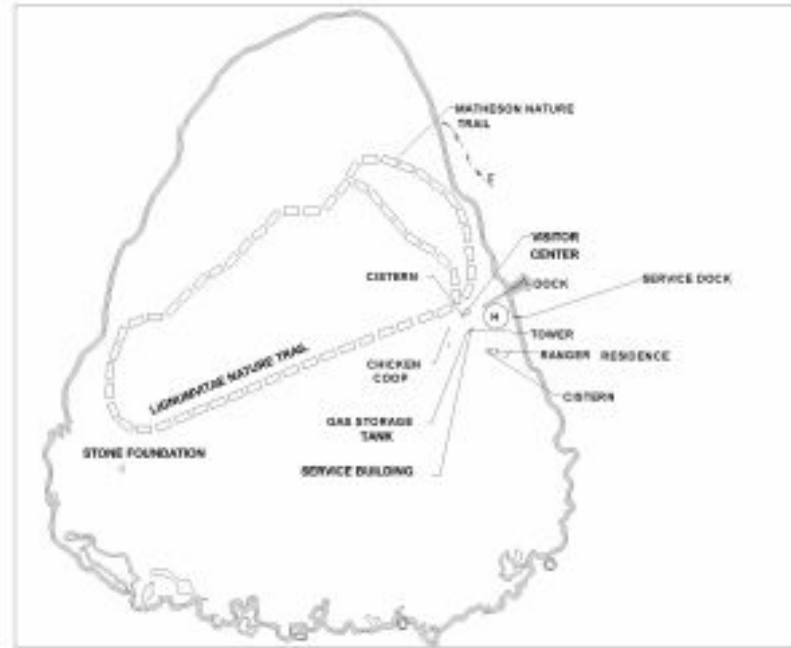
#### **Past Uses**

William H. Bethel, a Bahamian, lived on Lignumvitae Key and cultivated limes, pineapples, watermelons, and sisal when the island was surveyed in 1873. In 1888, brothers Thomas and Edward Hine acquired the island to raise their crops in sinkholes, a Bahamian technique called "potholing" or "kettle farming."

William Matheson from Coconut Grove purchased Lignumvitae Key in 1919, and built the historic Matheson House the same year. The key remained in family ownership until 1953 when his son, Hugh Matheson, died.

Nelson Pearson, J. Abney Cox, and E.C. Lunsford bought Lignumvitae Key in 1953. In the 1960s, attempts were made by one owner to link the island to U.S. Highway 1. Civil opposition

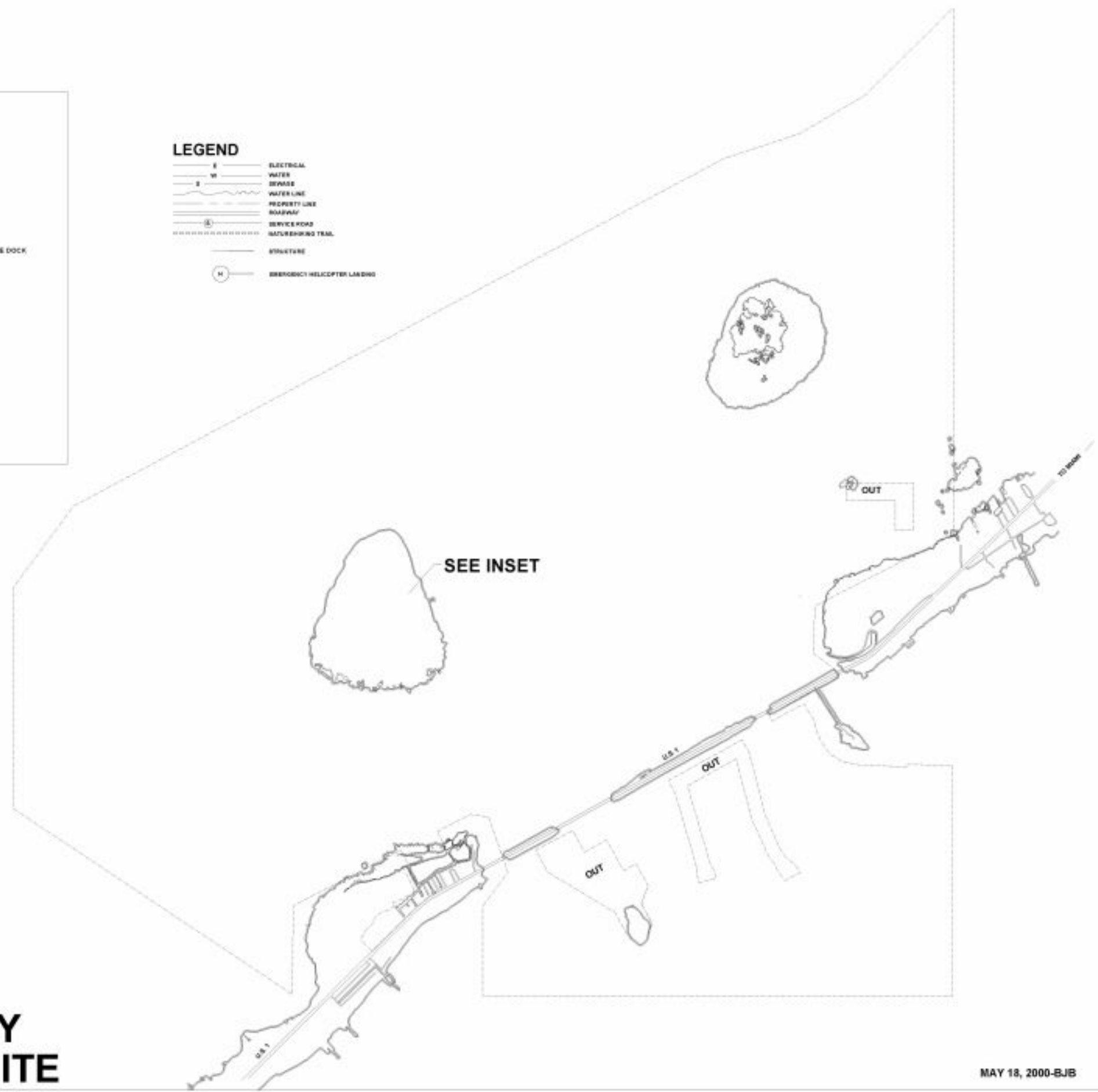
# BASE MAP



INSET

## LEGEND

	ELECTRICAL
	WATER
	SEWER
	WATER LINE
	PROPERTY LINE
	ROADWAY
	SERVICE ROAD
	NATURE TRAIL
	STRUCTURE
	HELICOPTER LANDING



# LIGNUMVITAE KEY STATE BOTANICAL SITE

blocked the construction of a causeway from Indian Key Fill to the east side of the key.

Shell Key has had very limited human use because of its mangrove-lowland character. Consequently, it remains an undisturbed mangrove community.

### **Recreational Uses**

The present recreational use at Lignumvitae Key Botanical State Park includes a guided tour that commences from the Matheson House visitor center. A nature trail of about one and a half miles provides ranger-led access to the hardwood forest of the island. Because of the rich cultural and natural resources of the site, all other public access is restricted. Access to the site is by way of private boats or charter boats from nearby marinas. Currently, the Division contracts ferry service with a nearby private marina through a nonexclusive special use permit. Boating, sport fishing, snorkeling, and diving are popular recreational activities which occur within the submerged land surrounding the Lignumvitae Island Complex, although canoing and kayaking activities are now the fastest-growing off-shore recreational use in the Keys, a trend that is being observed in the area of this park by management staff. There is no authorized public recreational use of Shell Key.

### **Other Uses**

Submerged land within the boundary of the state historic site has historically been used for a variety of commercial activities, including lobstering, stone crabbing, commercial sportfishing, tropical fish collecting, commercial bait fishing and sponging. The Division will consult with legal council to determine whether these activities can be regulated under Chapter 62-D, Florida Administrative Code, and will take appropriate actions if the rule is found to be applicable.

### **Protected Zones**

A protected zone is an area of high sensitivity or outstanding character from which most types of development are excluded as a protective measure. Generally, facilities requiring extensive land alteration or resulting in intensive resource use, such as parking lots, camping areas, shops or maintenance areas, are not permitted in protected zones. Facilities with minimal resource impacts, such as trails, interpretive signs and boardwalks are generally allowed. All decisions involving the use of protected zones are made on a case-by-case basis after careful site planning and analysis.

At Lignumvitae Key Botanical State Park, the entire island has been designated as a protected zone because of the sensitivity of the natural and cultural resources. At Shell Key State Preserve, the entire island has been designated as a protected zone because of the sensitivity of the undisturbed mangrove habitat. The submerged land management area and all mangrove wetlands located on Lower Matecumbe Key are also designated as protected zones.

### **Existing Facilities**

#### **Recreational**

Matheson House Visitor Center  
Nature Trail (1.5 mi.)

### **Support**

Ranger residence  
Cisterns (2)  
Shop  
Generator shed  
Public dock (470 ft.)  
Service dock

There are no facilities on Shell Key or on the Klopp Tract located on Lower Matecumbe Key.

## **CONCEPTUAL LAND USE PLAN**

The following narrative represents the current conceptual land use proposal for this unit. As new information is provided regarding the environment, cultural resources, recreational use, and as new land is acquired, the conceptual land use plan may be amended to address the new conditions (see Conceptual Land Use Plan). A detailed development plan for the park and a site plan for specific facilities will be developed based on this conceptual land use plan, as funding becomes available.

During the development of the unit management plan, the Division assesses potential impacts of proposed uses on the resources of the property. Uses that could result in unacceptable impacts are not included in the conceptual land use plan. Potential impacts are more thoroughly identified and assessed through the site planning process once funding is available for the development project. At that stage, design elements, such as sewage disposal and stormwater management, and design constraints, such as designated species or cultural site locations, are more thoroughly investigated. Advanced wastewater treatment or best available technology systems are applied for on-site sewage disposal. Stormwater management systems are designed to minimize impervious surfaces to the greatest extent feasible, and all facilities are designed and constructed using best management practices to avoid impacts and to mitigate those that cannot be avoided. Federal, state and local permit and regulatory requirements are met by the final design of the projects. After new facilities are constructed, the park staff monitors conditions to ensure that impacts remain within acceptable levels.

### **Potential Uses and Proposed Facilities**

The existing public uses of Lignumvitae Key Botanical State Park are appropriate and should continue. The acquisition of the Klopp Tract provides the opportunity to develop a much-needed public access land base and park support area for the three units of the state park system located between Upper and Lower Matecumbe Keys.

The restroom that was a modern addition to the lower portion of the Matheson House should be removed and that area of the house restored to its historic form. A public restroom using appropriate technology should be constructed a short distance from the house to replace the removed facility. Any modifications to the historic structure or new excavations for the recommended improvements will be coordinated with the Department of State, Division of Historic Resources, to ensure that the historic integrity and other cultural resources of the site are maintained.

The support facilities on Lignumvitae Key constructed during the 1970s, were not designed using principles of sustainable design. Renovations on the ranger residence could reduce energy requirements and exhaust emissions from the diesel generator. A photovoltaic system and a bank of batteries should be considered for use as the primary source of electricity, with the existing generator retained as a backup. Composting toilet systems or biogas conversion systems should replace both existing septic tank systems on the island.

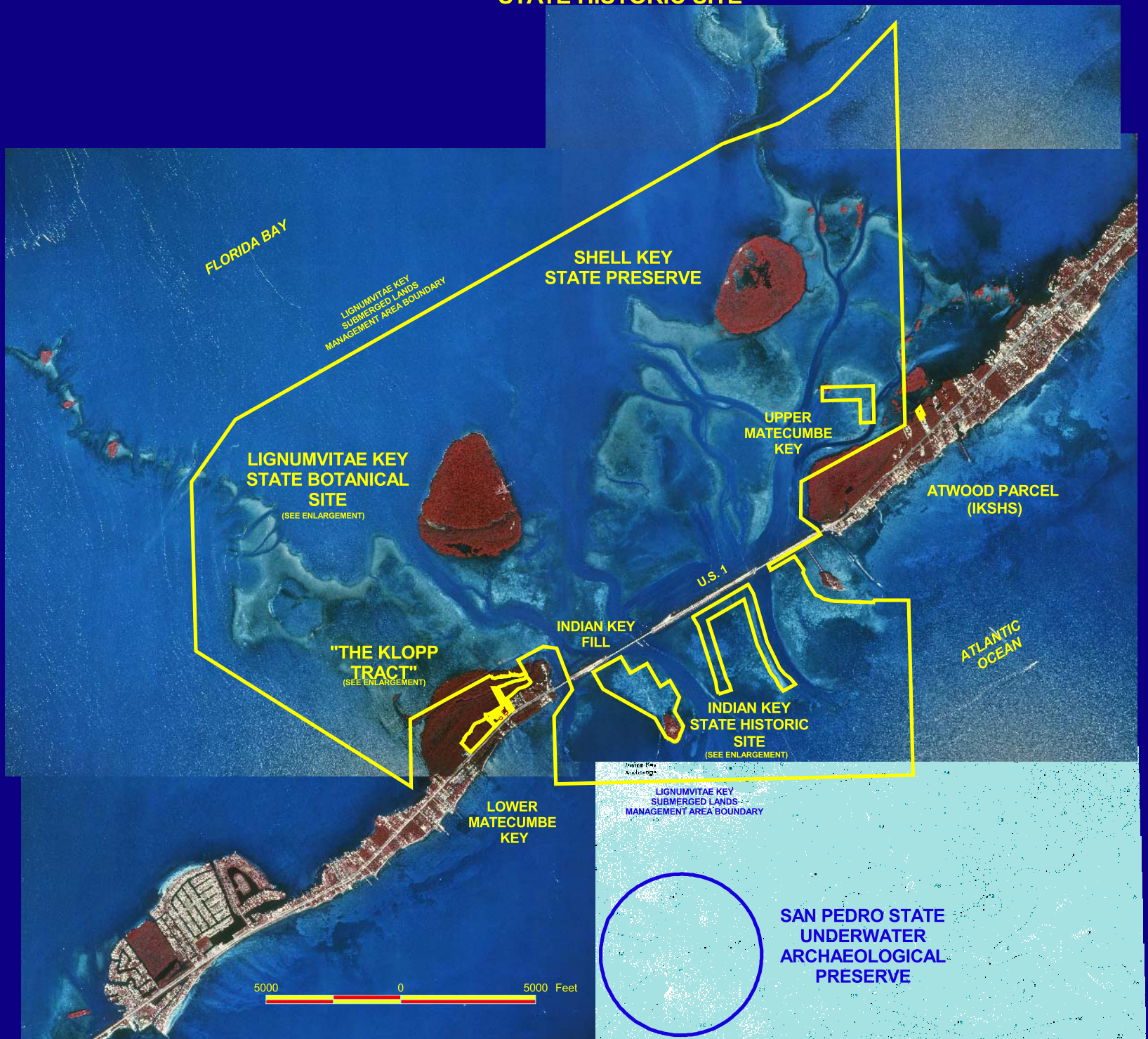
Land base facilities are recommended for construction on the Klopp Tract. Parking for up to 30 vehicles, a small picnic area, a small visitor center and a dock with fueling capabilities for up to 3 ferries and 4 agency boats are recommended to be located near the eastern end of the property to utilize the existing manmade canal system connecting to Florida Bay. The visitor center and land base facilities should be designed in the architectural character of the historic town on Indian Key, to enhance the interpretive programs of that park unit. Environmentally sensitive,



**CONCEPTUAL LAND USE PLAN  
LIGNUMVITAE KEY  
STATE BOTANICAL SITE**



**CONCEPTUAL LAND USE PLAN  
INDIAN KEY  
STATE HISTORIC SITE**



**CONCEPTUAL LAND USE PLANS  
INDIAN KEY STATE HISTORIC SITE  
LIGNUMVITAE KEY STATE BOTANICAL SITE**



# CONCEPTUAL LAND USE PLAN



site design, building technologies and best available technology for sewage disposal should be incorporated in the development of these facilities.

The state botanical site, Indian Key Historic State Park, Shell Key Preserve State Park and the San Pedro Underwater Archaeological State Park are all managed by the same Division staff. Two staff residences and a standard shop complex with administrative offices are also needed for operation of these park units. The shop and residence facilities should be located a short distance to the west of the proposed visitor services area. All state and local development regulations will be met through the site planning and design processes of the proposed improvements. Again, advanced wastewater treatment or other appropriate technology will be used for sewage disposal at this site, if connection to a local municipal sewage collection system is not possible.

### **Facilities Development**

Preliminary cost estimates for the following list of proposed facilities are provided in Addendum 8. These cost estimates are based on the most cost-effective construction standards available at this time. The preliminary estimates are provided to assist the Division in budgeting future park improvements, and may be revised as more information is collected through the planning and design processes.

#### **Lignumvitae Key**

Matheson House – restroom removal  
Medium restroom  
Engineering study for power generation and sewage disposal improvements  
Residence electrical system renovation  
Residence sewage disposal renovation

#### **Land Base**

Small visitor center	Equipment shelter (4 bay)
Dock w/fuel storage	Flammable storage building
Small picnic shelters (2)	Utilities
Parking (30 vehicles)	Fencing, gates, flagpoles
Residences (2)	Landscaping
Shop (4 bay)	Entrance drive (.1 mi.)
Administrative office	

### **Existing Use and Optimum Carrying Capacity**

Carrying capacity is an estimate of the number of users a recreation resource or facility can accommodate and still provide a high quality recreational experience and preserve the natural values of the site. The carrying capacity of a unit is determined by identifying the land and water requirements for each recreation activity at the unit, and then applying these requirements to the unit's land and water base. Next, guidelines are applied which estimate the physical capacity of the unit's natural communities to withstand recreational uses without significant degradation. This analysis identifies a range within which the carrying capacity most appropriate to the specific activity, the activity site, and the unit's classification is selected (see Table 1).

The optimum carrying capacity for this park is a preliminary estimate of the number of users the unit could accommodate after the current conceptual development program has been implemented. When developed, the proposed new facilities would approximately increase the unit's carrying capacity as shown in Table 1.

**TABLE 1**  
**Existing Use and Optimum Carrying Capacity**

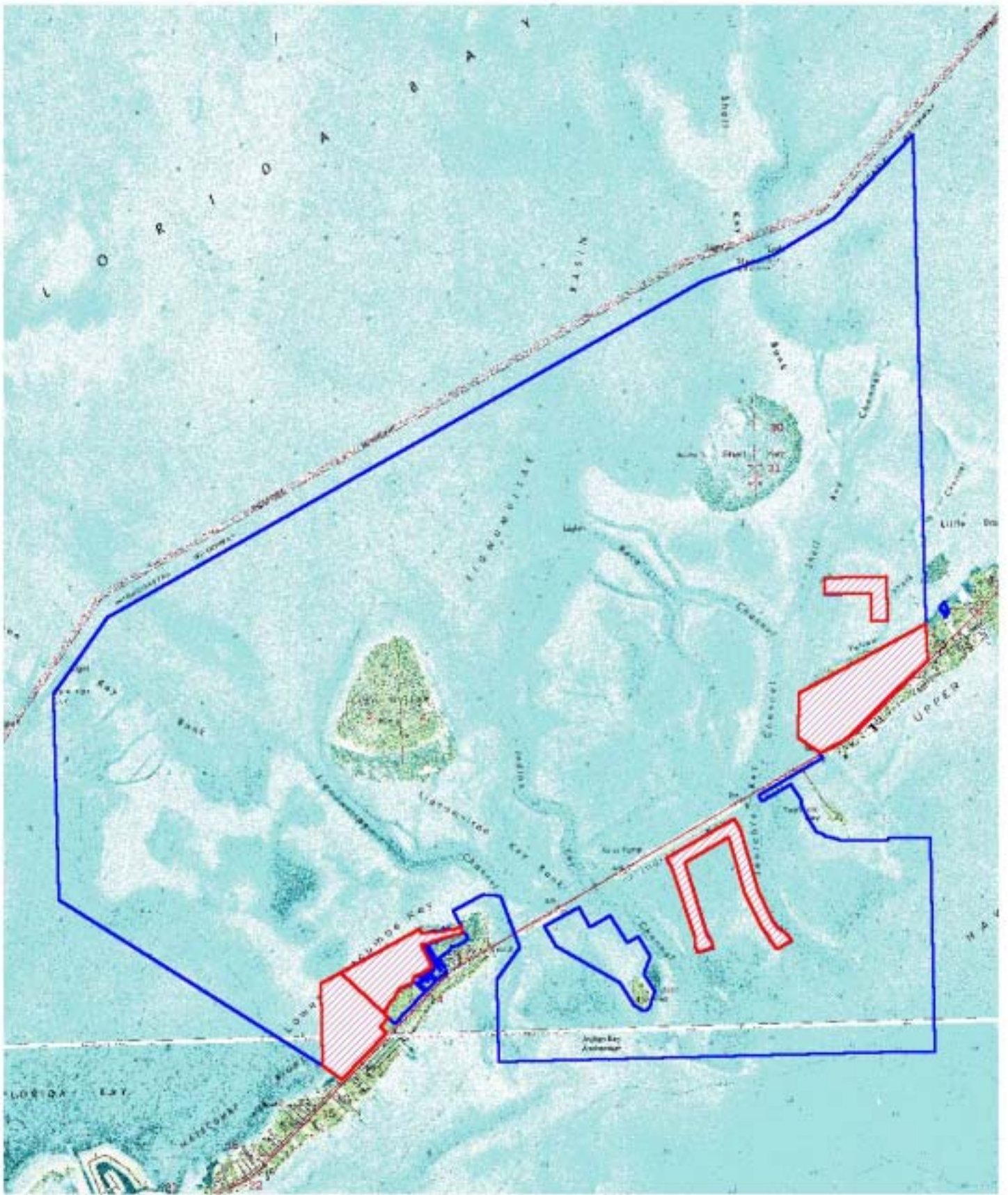
<b>Activity/Facility</b>	<b>Existing Capacity</b>		<b>Proposed Additional Capacity</b>		<b>Existing Optimum Capacity</b>	
	<b>One Time</b>	<b>Daily</b>	<b>One Time</b>	<b>Daily</b>	<b>One Time</b>	<b>Daily</b>
<b>Matheson House Visitor Center and Trails</b>	25	50			25	50
<b>Land Base Visitor Center*</b>			50	200	50	200
<b>TOTALS</b>	<b>25</b>	<b>50</b>	<b>50</b>	<b>200</b>	<b>75</b>	<b>250</b>

No additional visitation to Lignumvitae Key proper is recommended by this plan. The proposed land base capacity includes visitors to Lignumvitae Key and Indian Key. Therefore, the net additional capacity for the Lignumvitae Key SBS, as a unit, is 50 visitors at one time, 200 visitors daily: the recommended maximum visitation by park or concession operated tour boat for Indian Key.


#### **Optimum Boundary**



As additional needs are identified through park use, development, research, and as adjacent land uses change on private properties, modification of the unit's optimum boundary may occur for the enhancement of natural and cultural resources, recreational values and management efficiency. At this time, no lands are considered surplus to the needs of the park.

Two parcels of the CARL Florida Keys Ecosystems acquisition project, two submerged lands parcels, as well as the surrounded mangrove wetlands north of US 1 on, Lower Matecumbe Key are recommended for addition to the botanical site (see Optimum Boundary Map). These additions are proposed to bring additional undeveloped uplands, mangrove wetlands and grass beds under the management authority of the Division of Recreation and Parks. Consolidation of these areas will improve the management staff's ability to protect fragile resources and enforce existing rules and regulations.



LIGNUMVITAE KEY  
BOTANICAL STATE PARK

  
 3000 3000 6000  
 Prepared By:  
 Florida Department of Environmental Protection  
 Bureau of Recreation and Parks  
 Office of Park Planning  
 Date: December 10, 1999 - AE  
 Printed: June 15, 2001  
 ARC VIEW DRAFT

 Optimum boundary.shp  
 Park boundary(097)

OPTIMUM BOUNDARY MAP

**ADDENDUM 1**  
**ACQUISITION HISTORY**  
**AND**  
**LEASE AGREEMENT NUMBER 2534**

# LIGNUMVITAE KEY BOTANICAL STATE PARK

## ACQUISITION HISTORY

---

### **Purpose of Acquisition**

The State of Florida acquired Lignumvitae Key Botanical State Park to preserve, develop, operate, and maintain the property for public outdoor recreational, park, conservation, and related purposes.

### **Sequence of Acquisition**

On March 2, 1971, the Board of Trustees of the Internal Improvement Trust Fund (Trustees) obtained title to the property which became Lignumvitae Key Botanical State Park. The initial purchase was funded by Land Acquisition Trust Fund program. On June 8, 1971, the Trustees leased Lignumvitae Key to the Department of Environmental Protection, Division of Recreation and Parks (DRP), under Lease No. 2534. The lease is for a period of ninety-nine (99), and it will expire on June 8, 2070.

Since the establishment of Lignumvitae Key Botanical State Park in 1971, the Trustees have acquired additional parcels and added them to site. Consequently, the park is comprised of 232.83 upland acres and 10,247.96 wetland-submerged acres, for a total of 10,480.79 acres.

### **Title Interest**

The Trustees hold fee simple title to Lignumvitae Key Botanical State Park.

### **Outstanding Reservations**

The lease stipulates that all the property be utilized for public outdoor recreation and related purposes. Following is a listing of outstanding rights, reservations, and encumbrances that apply to Lignumvitae Key Botanical State Park.

**A copy of the Trustees Lease Agreement # 2534 is available upon request.**

**LIGNUMVITAE KEY BOTANICAL STATE PARK**

**ACQUISITION HISTORY**

---

<b><u>INSTRUMENT:</u></b>	Warranty Deed
<b><u>INSTRUMENT HOLDER:</u></b>	E.C. and L.B. Lunsford, et al
<b><u>BEGINNING DATE:</u></b>	March 2, 1971
<b><u>ENDING DATE:</u></b>	No ending date is given.
<b><u>OUTSTANDING RIGHTS, USES, ETC.:</u></b>	The said property shall be kept essentially in its natural state, without undue disturbance of plant and animal populations, except for access by authorized person, for health and safety requirements, and for reasonable interpretation of the property's natural and scenic qualities.

**ADDENDUM 2**

**REFERENCES CITED**

# LIGNUMVITAE KEY BOTANICAL STATE PARK

## REFERENCES CITED

---

- Baranowski, R.M. 1983. The phenology of *Toumeylla* sp. and its association with *Guaiacum sanctum*. Final Report to the State of Florida, Department of Natural Resources, Division of Recreation and Parks. Homestead, Florida: University of Florida, IFAS, Agricultural Research and Education Center.
- Duquesnel, J. 1990. Extinction of translocated populations, the Key Largo woodrat (*Neotoma Floridana smalli*) and cotton mouse (*Peromyscus gossypinus allapaticola*), on Lignumvitae Key, Florida. DEP unpublished report.
- Emmel, T.C. 1997. Breeding and reintroduction of the endangered Schaus swallowtail. Final report for Research Work Order No. 179. U.S. Fish and Wildlife Service, Department of the Interior. 34 pp.
- Florida Game and Fresh Water Fish Commission. 1996. Florida's Endangered Species, Threatened Species, and Species of Special Concern, Official Lists. 14 pp.
- Florida Game and Fresh Water Fish Commission. 1991. Florida Atlas of Breeding Sites for Herons and Their Allies - Update 1986 - 1989. 147 pp.
- Hoffmeister, J.E. 1974. Land from the Sea. Coral Gables, University of Miami Press. 143 pp.
- Howard, R.W. 1996. Scale Insects. Landscape and Nursery Digest. V30 (8): 54-56.
- Jutro, P.R. 1975. Lignumvitae Key: The history, natural history, and politics of the preservation of a unique natural area. Unpublished Doctoral Thesis. Cornell University. 356 pp.
- Matthews, T. 1993. Algal blooms: a symptom of degradation of Florida Bay. DNR Resource Management Notes 5(2): 13-14.
- Nielsen, A. 1990. Lignumvitae Key Aquatic Preserve Management Plan. DNR. Tallahassee, FL 156 pp.
- Odum, W.E., C.C. McIvor, and T.J. Smith, III. 1982. The ecology of the mangroves of south Florida: a community profile. Wildlife Service Office of Biological Services, Washington, DC, US Fish. FWS/OBS-81/24. 144 pp.
- Sargent, F.J., T.J. Leary, D.W. Crewz, and C.R. Kruer. 1995. Scarring of Florida's Seagrasses: Assessment and Management Options. FDEP FMRI Technical Report TR-1 43 pp.
- United States Department of Agriculture. Natural Resources Conservation Service. 1995. Soil Survey of Monroe County, Keys Area, Fl 72 pp.
- United States Environmental Protection Agency. Water quality protection program for the Florida Keys National Marine Sanctuary. 1992. Phase I and II reports. Contract No. 68-C8-0105.
- Wanless, H.R. 1989. The inundation of our coastlines. *Sea Frontiers* 35(5): 264-271.
- Wilson, E.O. and T. Eisner. 1968. Lignumvitae - relict island. *Natural History* V10.



**ADDENDUM 3**  
**SOIL DESCRIPTIONS**

# LIGNUMVITAE KEY BOTANICAL STATE PARK

## SOIL DESCRIPTIONS

---

**(2) Pennekamp gravelly muck** - This soil is on tropical hammocks in the uplands of the Upper Keys. About 10 percent of the surface of the soil is covered with stones that are dominantly 10 to 20 inches in diameter. Soil, where it occurs, is 4 to 16 inches. Individual areas are subject to rare flooding from hurricanes and other tropical storms. Elevations are dominantly 5 to 15 feet above sea level. The Pennekamp soil is well drained. It has a seasonal high water table at a depth of 3.5 to 5.0 feet during the wet periods of most years. Permeability is moderately rapid. Most areas of this soil support native vegetation and are used as habitat for woodland wildlife.

**(4) Rock outcrop - Tavernier complex, tidal** - This map unit is in mangrove swamps and coastal rock barrens throughout the keys. Individual areas are subject to daily flooding by tides. Elevations are less than two feet above sea level. Approximately 60 percent of this map unit consists of areas of exposed bedrock. These areas are dominantly one to four inches above the surface of the surrounding soil and range from approximately two feet to more than 200 feet in diameter. The Tavernier soil is very poorly drained. The seasonal high water table is at or near the surface during much of the year. Permeability is rapid. Most areas of this map unit support native vegetation and are used as habitat for wetland wildlife.

**(5) Islamorada muck, tidal** - This soil is dominantly on the Upper Keys in mangrove swamps. Individual areas are subject to daily flooding by tides. The depth to bedrock is 20 to 50 inches. Elevations are dominantly at or below sea level. The Islamorada soil is very poorly drained. The seasonal high water table is at or near the surface much of the year. Permeability is rapid. Most areas of this soil support native vegetation and are used as habitat for wetland wildlife.

**(6) Key Largo muck, tidal** - This soil is dominantly on the Upper Keys but can occur throughout the Keys. It is in mangrove swamps. The soil is very poorly drained. The depth to bedrock is 50 to 90 inches. The seasonal high water table is at or near the surface during much of the year. Permeability is rapid. Most areas support native vegetation and are used as habitat for wetland wildlife.

**ADDENDUM 4**

**FNAI NATURAL COMMUNITIES DESCRIPTIONS**

## LIGNUMVITAE KEY BOTANICAL STATE PARK

### FNAI NATURAL COMMUNITY DESCRIPTIONS

---

**(3) COASTAL BERM.** - (synonyms: shell ridge, coastal levee, coastal forest, buttonwood embankment, and mangrove hammock). Coastal Berm applies to a variety of plant associations that develop on ridges of storm deposited sand, shells, and debris. These associations include dense thickets of large shrubs and small trees, hammocks, or sparse shrubby vegetation with spiny xerophytic plants. Typical plants include cabbage palm, cocoplum, sea grape, marsh elder, beach orach, greenbrier, prickly pear cactus, evening primrose, dropseed, poison ivy, marshhay, Spanish bayonet, bay cedar, wax myrtle, live oak, muhly grass, sea purslane, tall wiregrass, salt myrtle, sea oats, beach morning glory, sea oxeye, stinging nettle, love vine, prickly apple, snowberry, varnish leaf, stoppers, coral bean, privet, strangler fig, and wild coffee. Many animals typical of Beach Dune likewise inhabit Coastal Berm.

Coastal Berm is generally a ridge of storm-deposited marine debris that is parallel to the shore, occasionally occurring in a series with alternating swales. Such storm ridges are usually found along low-energy coastlines, and are often surrounded by mangrove or salt marsh communities. Coastal Berm may be difficult to differentiate from Indian-constructed Shell Mound or wind-deposited Coastal Strand or Maritime Hammock. It is often associated with and may grade into Tidal Swamp (mangroves) or Overwash Plain. It may also be confused with dredge spoil. Its coastal location subjects Coastal Berm to maritime influences similar to that experienced by Coastal Strand.

**(4) COASTAL ROCK BARREN.** - (synonyms: littoral rock pavement, algal barren, cactus barren, rocky flat). Coastal Rock Barren is an ecotonal community occurring along rocky coastlines in the Florida Keys. They are generally characterized as flat rocklands with much exposed and eroded limestone and are sparsely vegetated with stunted, xeric and halophytic shrubs, cacti, algae, and herbs. Typical plants include white mangrove, black mangrove, red mangrove, buttonwood, caper tree, sea grape, bay cedar, cat's claw, lantana, forestiera, stoppers, nickerbean, glasswort, sea purslane, shore grass, seashore dropseed, railroad vine, sea oxeye, prickly apple, milkpeas, prickly pear cactus, Spanish bayonet, and saltwort.

Soils, in they can be called that, generally consist of calcareous marls and organic debris within solution depressions and crevices in the coralline limestone pavement. The proximity of Coastal Rock Barren to coastal waters makes them subject to inundations by saltwater during storms and perhaps during extreme high tides. Rainfall generally forms pools and puddles on the surface, percolating slowly, if at all, through crevices in the highly consolidated substrate. Most freshwater is probably absorbed rapidly by the scattered plants, or is lost to evaporation or runoff.

Plants of Coastal Rock Barren are adapted to high insolation levels, salt spray, occasional inundations by saltwater, and other tropical marine influences. Because of their insular location, their frequent association with wetlands, and their general sparsely distributed vegetation, fire is highly unlikely in Coastal Rock Barren.

Coastal Rock Barren often occurs in a continuum between Marine Consolidated Substrate and Rockland Hammock or Pine Rockland. It may also be associated with and grade into Marl Prairie. Coastal Rock Barren often has species compositions that are similar to those of some Coastal Berm and Shell Mound communities. It often exhibits zonation patterns, typically grading seaward into rocky shore or buttonwood, and mangrove association, and inland into thorn scrub, then cactus hammock, then Maritime Hammock. Where the slope rises noticeably, the entire sequence of transition zones may be condensed into a few yards. Where the slope is imperceptible, these zones may become intermingled over several acres.

## LIGNUMVITAE KEY BOTANICAL STATE PARK

### FNAI NATURAL COMMUNITY DESCRIPTIONS

---

Coastal Rock Barren is a very rare community, occurring as tiny patches scattered along some shorelines in the Florida Keys. Because it occurs on sites near water in a region undergoing intensive resort development, Coastal Rock Barren is rapidly disappearing. Existing sites should be diligently protected from development, cactus poaching, and visitor overuse. They may also be affected by offshore dredging and beach nourishment activities which would increase sediment loads and possibly convert them to coralline Beach Dune.

**(12) ROCKLAND HAMMOCK.** - (synonyms: tropical hammock, hardwood hammock).

Rockland Hammock is characterized as a hardwood forest on upland sites in regions where limestone is very near the surface and is often exposed. These forest have high species diversity and are often dominated by trees 60 feet or taller. Typical plants include live oak, gumbo-limbo, wild tamarind, stoppers, pigeon plum, false mastic, poisonwood, mahogany, inkwood, marlberry, lancewood, strangler fig, wild coffee, busic, black ironwood, paradise tree, satin leaf, redbay, cabbage palm, laurel oak, tallowwood, prickly ash, hackberry, guiana-plum, shortleaf fig, cat's claw, soapberry, sea grape, coffee colubrina, soldierwood, geiger tree, wild pine, Spanish moss, ferns, coonties, poison ivy, greenbrier, and fox grape. Typical animals include tree snail, Schaus swallowtail, white-crowned pigeon, woodrat, and cottonmouse.

Rockland Hammocks occur on high ground that does not normally flood, but they are often dependent upon high water tables to maintain reservoirs in solution features of the limestone and to keep humidity levels high. The dense canopy minimizes temperature fluctuations by reducing soil warming during the day and heat loss at night. Mesic conditions are further developed by the hammock's rounded profile, which deflects winds, thus limiting desiccation during dry periods and reducing interior storm damage.

Rockland Hammocks are frequently located within wetlands that serve as essential firebreaks. They are susceptible to fire when the water table drops more than two feet below ground surface or the soil moisture content is less than 35%. Although Rockland Hammock can reestablish within 25 years after a fire, maximum development of structure and diversity probably requires more than 100 fire-free years.

Rockland Hammock is the advanced successional stage of Pine Rockland. It grades into Coastal Rock Barren and Marl Prairies. It may also intergrade with Shell Mounds or Sinkholes and be difficult to separate from them.

Rockland Hammock is a rare community that requires protection from fire, canopy disruption, and ground water reduction. Many plants and animals of Rockland Hammocks must also be protected from collectors. Rockland Hammock is prime development property and is disappearing rapidly.

**(56/68) ESTUARINE AND MARINE COMPOSITE SUBSTRATE.** - Marine and Estuarine Composite Substrates consist of a combination of Natural Communities such as "beds" of algae and seagrasses or areas with small patches of consolidated and unconsolidated bottom with or without sessile floral and faunal populations.

Composite Substrates may be dominated by any combination of marine and estuarine sessile flora or fauna, or mineral substrate type. Typical combinations of plants, animals and substrates representing Composite Substrates include soft and stony corals with sponges on a hard bottom such as a limerock outcrop; psammophytic algae and seagrasses scattered over a sand bottom; and patch reefs throughout a coralgal bottom. Any of the remaining Marine and Estuarine

## LIGNUMVITAE KEY BOTANICAL STATE PARK

### FNAI NATURAL COMMUNITY DESCRIPTIONS

---

Natural Communities can grade into Composite Substrate communities.

Although Composite Substrates can occur in any marine or estuarine area in Florida, some combinations are common while others are extremely rare. Combinations of Consolidated and Unconsolidated Substrate components offer the greatest opportunity for diversity, and should be high priority areas for protection. Management requirements are negligible providing the composite community is adequately protected.

Protection efforts will vary slightly based on components of the Composite Substrate community. Generally, degradation of physical and chemical water quality parameters should be prevented, as well as mechanical disturbance from anchoring, dredging, trawling and similar activities.

**(57/69) ESTUARINE AND MARINE CONSOLIDATED SUBSTRATE**. - (synonyms: hard bottom, rock bottom, limerock bottom, coquina bottom, and relic reef). Marine and Estuarine Consolidated Substrates are Mineral Based Natural Communities generally characterized as expansive, relatively open areas of subtidal, intertidal, and supratidal zones which lack dense populations of sessile plant and animal species. Consolidated Substrates are solidified rock or shell conglomerates and include coquina, limerock or relic reef materials. These communities may be sparsely inhabited by sessile, planktonic, epifaunal, and pelagic plants and animals but house few infaunal organisms (i.e., animals living within the substrate).

The three kinds of Consolidated Substrate Communities occurring in Florida are of limited distribution. Coquina, which is a limestone composed of broken shells, corals and other organic debris, occurs primarily along the east coast, in marine areas in the vicinity of St. Johns and Flagler Counties.

Limerock substrates occur as outcrops of bedded sedimentary deposits consisting primarily of calcium carbonate. This Consolidated Substrate is more widespread than coquina substrate and can be found in a patchy distribution under both marine and estuarine conditions from north Florida to the lower-most keys in Monroe County. Relic reefs, the skeletal remains of formerly living reefs, are more limited in distribution than limerock outcrops but more common than coquina substrate.

Consolidated Substrates are important in that they form the foundation for the development of other Marine and Estuarine Natural communities when conditions become appropriate. Consolidated Substrate Communities are easily destroyed through siltation or placement of fill, and deliberate removal by actions such as blasting or nondeliberate destruction by forces such as vehicular traffic.

Another type of disturbance involves the accumulation of toxic levels of heavy metals, oils, and pesticides in Consolidated Substrates. Significant amounts of these components in the sediments will kill the infauna, thereby eliminating a food source for certain fishes, birds and other organisms. A film of pollutants engulfing Consolidated Substrates can render these areas unsuitable for colonization by marine and estuarine flora and fauna. Such problems occur in some of the major port cities, in areas where there is heavy industrial development, and along major shipping channels where oil spills are likely to occur.

**(59/71) ESTUARINE AND MARINE SEAGRASS BED**. - (synonyms: seagrass meadows, grass beds, grass flats). Marine and Estuarine Seagrass Beds are Floral Based Natural

## LIGNUMVITAE KEY BOTANICAL STATE PARK

### FNAI NATURAL COMMUNITY DESCRIPTIONS

---

Communities typically characterized as expansive stands of vascular plants. This community occurs in subtidal (rarely intertidal) zones, in clear, coastal waters where wave energy is moderate. Seagrasses are not true grasses. The three most common species of seagrasses in Florida are turtle grass, manatee grass, and shoal grass. Nearly pure stands of any one of these species can occur, but mixed stands are also common. Species of *Halophila* may be intermingled with other seagrasses, but species of this genus are considerably less common than turtle grass, manatee grass and shoal grass. Widgeon grass can also be found occurring with the previously listed seagrasses although they occur primarily under high salinities while widgeon grass occurs in areas of lower salinity.

Attached to the seagrass leaf blades are numerous species of epiphytic algae and invertebrates. Together, seagrasses and their epiphytes serve as important food sources for manatees, marine turtles, and many fish, including spotted sea trout, spot, sheepshead, and redfish. The dense seagrasses also serve as shelter or nursery grounds for many invertebrates and fish, including marine snails, clams, scallops, polychaete worms, pink shrimp, blue crab, starfish, sea urchins, tarpon, bonefish, seahorses, pompano, jack, permit, snapper, grunt, mullet, barracuda, filefish, and cowfish.

Marine and Estuarine Seagrass Beds occur most frequently on Unconsolidated Substrates of marl, muck or sand, although they may also occur on other Unconsolidated Substrates. The dense blanket of leaf blades reduces the wave-energy on the bottom and promotes settling of suspended particulates. The settled particles become stabilized by the dense roots and rhizomes of the seagrasses. Thus, Marine and Estuarine Seagrass Beds are generally areas of soil accumulation.

Other factors affecting the established and growth of Seagrass Beds include water temperature, salinity, wave-energy, tidal activity, and available light. Generally, seagrasses are found in waters with temperatures ranging from between 20' and 30'C (68'-86'F). Seagrasses occur most frequently in areas with moderate current velocities, as opposed to either low or high velocities. Although Marine and Estuarine Seagrass Beds are most commonly submerged in shallow subtidal zones, they may be exposed for brief periods of time during extreme low tides.

One of the more important factors influencing seagrass communities is the amount of solar radiation reaching the leaf blades. In general, the water must be fairly clear because turbidity blocks essential light necessary for photosynthesis. The rapid growth rate of seagrass under optimum conditions rivals that of most intensive agricultural practices, without energy input from man.

Marine and Estuarine Seagrass Beds are often associated with and grade into Unconsolidated Substrate, Coral Reefs, Tidal Swamps, and Tidal Marshes, but may also be associated with any other Marine and Estuarine Natural Community.

Marine and Estuarine Seagrass Beds are extremely vulnerable to human impacts. Many have been destroyed through dredging and filling activities or have been damaged by sewage outfalls and industrial wastes. In these instances, the Seagrass Beds are either physically destroyed, or succumb as a result of decreased solar radiation resulting from increased water turbidity. Seagrass Beds are also highly vulnerable to oil spills. Low concentrations of oil are known to greatly reduce the ability of seagrasses to photosynthesize. Extreme high temperatures also have adverse impacts on Seagrass Beds. The area surrounding power plant outfalls, where water temperatures may exceed 35'C (95'F), has been found to be lethal to seagrasses. Marine

## LIGNUMVITAE KEY BOTANICAL STATE PARK

### FNAI NATURAL COMMUNITY DESCRIPTIONS

---

and Estuarine Seagrass Beds are susceptible to long term scarring cuts from boat propellers, anchors and trawls. Such gouges may require many years to become revegetated. When protected from disturbances, seagrasses have the ability to regenerate and recolonize areas. Additionally, some successful replantings of Seagrass Beds have been conducted. However, the best management is to preserve and protect Marine and Estuarine Seagrass Beds in their natural state.

**(64/76) ESTUARINE AND MARINE TIDAL SWAMP**. - (synonyms: mangrove forest, mangrove swamp, mangrove islands). Marine and Estuarine Tidal Swamps are Floral Based Natural Communities characterized as dense, low forests occurring along relatively flat, intertidal and supratidal shorelines of low wave energy along southern Florida. The dominant plants of Tidal Swamp Natural Communities are red mangrove, black mangrove, white mangrove and buttonwood. These four species occasionally occur in zones which are defined by varying water levels, with red mangrove occupying the lowest zone, black mangrove the intermediate zone, and white mangrove and buttonbush the highest zone. Other vascular plants associated with Tidal Swamps include salt grass, black needlerush, spike rush, glasswort, Gulf cordgrass, sea purslane, saltwort and sea oxeeye. Typical animals of the Tidal Swamp include mangrove water snake, brown pelican, white ibis, osprey, bald eagle, and a variety of shorebirds, herons, egrets, and raccoon. Also included are sponges, oysters, marine worms, barnacles, mangrove tree crabs, fiddler crabs, mosquitos, and numerous other invertebrates. Fishes are likewise diverse in this community. Those most frequently occurring include black-tipped shark, lemon shark, nurse shark, bonnet-head shark, rays, tarpon, ladyfish, bonefish, menhaden, sardines, lookdown, permit, snapper, sheepshead, porgies, pinfish, and mullet.

Several variations of Tidal Swamps are generally recognized. These include (1) overwash swamps found on islands which are frequently inundated by the tides; (2) narrow fringe swamps located along waterways; (3) riverine swamps found in floodplains; (4) basin swamps growing in depressions slightly inland from the water; (5) hammock swamps, similar to basin swamps but growing at a slightly higher elevation; and (6) scrub swamp growing over hard substrates such as limestone marl.

Tidal Swamps occur in flat coastal areas. The soils are generally saturated with brackish water at all times, and at high tides these same soils are usually inundated with standing water. Mangroves grow on a wide variety of soils ranging from sands to muds. In older Tidal Swamps the sands and muds are usually covered by a layer of peat which has built up from detritus (decaying plant material).

The prop roots of red mangroves, the extensive pneumatophores (aerial roots) of black mangroves and the dense root mats of the white mangrove serve to entrap sediments and recycle nutrients from upland areas and from tidal import. This process serves in "island formation" and is a part of the successional process involved in land formation in south Florida. These root structures also provide substrate for the attachment of and shelter for numerous marine and estuarine organisms.

Temperature, salinity, tidal fluctuation, substrate and wave energy are five physical factors influencing the size and extent of Tidal Swamps. Mangroves require an annual average water temperature above 19°C (66°F) to survive. They do not tolerate temperatures below freezing or temperatures which fluctuate widely over the course of a year. Salt water is a key element in reducing competition from other plants and allowing mangroves to flourish. In addition, mangroves have adapted to the salt water environment by either excluding or excreting salt



## LIGNUMVITAE KEY BOTANICAL STATE PARK

### FNAI NATURAL COMMUNITY DESCRIPTIONS

---

from plant tissues. Mangroves can survive in freshwater but are usually not found in large stands under such conditions in nature because they succumb to competition.

Tidal Swamps are closely associated with and often grade into Seagrass Beds, Unconsolidated Substrates, Tidal Marshes, Shell Mounds, Coastal Berms, Maritime Hammocks, and other coastal communities. Seagrass Beds and Unconsolidated Substrates are usually found in the subtidal regions surrounding Tidal Swamps. Tidal Marshes are often found along the inland boundary of the Tidal Swamps. Tropical hardwood species occupy Coastal Berm and Shell Mound communities which are often surrounded by mangroves. In Florida, Tidal Swamps occur along both coasts, buffered by barrier island formations. Tidal Swamps are most extensive from Cedar Key southward along the Gulf coast and from Ponce de Leon Inlet southward along the east coast. The most luxuriant growth occurs in the Ten-Thousand Island areas of southwest Florida.

The Marine and Estuarine Tidal Swamp communities are significant because they function as nursery grounds for most of the state's commercially and recreationally important fish and shellfish. These Natural Communities are also the breeding grounds for substantial populations of wading birds, shorebirds, and other animals. The continuous shedding of mangrove leaves and other plant components produce as much as 80% of the total organic material available in the aquatic food web. Additionally, Tidal Swamps help protect other inland communities by absorbing the brunt of tropical storms and hurricanes.

Tidal Swamps have been and continue to be areas of environmental concern because many acres were destroyed through diking and flooding, ditching for mosquito control, and dredging and filling activities. Fortunately, specific legal protection for mangrove swamps was adopted by the state in 1985. Today, mangroves continue to face such problems as destruction from oil spills and changes in the quantity, quality and timing of the fresh water input as the adjacent uplands are developed or otherwise altered. Reducing estuarine salinity and flushing chemical pollutants from adjacent uplands have resulted in the destruction of some Tidal Swamp areas and the invasion of non-mangrove species.

The combination of these factors has resulted in a decrease in the number of acres of Tidal Swamps and a reduction in available nursery grounds and valuable habitat for native wildlife. Mangrove swamps can be replanted by man; however, long term monitoring has not been conducted to determine if restored sites function as the original community did. The best management practice is to prevent further destruction of existing Tidal Swamps and maintain a natural flow of fresh water into these areas.

**(65/77) ESTUARINE AND MARINE UNCONSOLIDATED SUBSTRATE.** - (synonyms: beach, shore, sand bottom, shell bottom, sand bar, mud flat, tidal flat, soft bottom, coralgal substrate, marl, gravel, pebble, calcareous clay). Marine and Estuarine Unconsolidated Substrates are Mineral Based Natural Communities generally characterized as expansive, relatively open areas of subtidal, intertidal, and supratidal zones which lack dense populations of sessile plant and animal species. Unconsolidated Substrates are unconsolidated material and include coralgal, marl, mud, mud/sand, sand or shell. This community may support a large population of infaunal organisms as well as a variety of transient planktonic and pelagic organisms (e.g., tube worms, sand dollars, mollusks, isopods, amphipods, burrowing shrimp, and an assortment of crabs).

In general, Marine and Estuarine Unconsolidated Substrate Communities are the most

## LIGNUMVITAE KEY BOTANICAL STATE PARK

### FNAI NATURAL COMMUNITY DESCRIPTIONS

---

widespread communities in the world. However, Unconsolidated Substrates vary greatly throughout Florida, based on surrounding parent material. Unconsolidated sediments can originate from organic sources, such as decaying plant tissues (e.g., mud) or from calcium carbonate depositions of plants or animals (e.g., coralgall, marl and shell substrates). Marl and coralgall substrates are primarily restricted to the southern portion of the state. The remaining four kinds of Unconsolidated Substrate, mud, mud/sand, sand, and shell, are found throughout the coastal areas of Florida. While these areas may seem relatively barren, the densities of infaunal organisms in subtidal zones can reach the tens of thousands per meter square, making these areas important feeding grounds for many bottom feeding fish, such as redfish, flounder, spot, and sheepshead. The intertidal and supratidal zones are extremely important feeding grounds for many shorebirds and invertebrates.

Unconsolidated Substrates are important in that they form the foundation for the development of other Marine and Estuarine Natural Communities when conditions become appropriate. Unconsolidated Substrate Communities are associated with and often grade into Beach Dunes, Tidal Marshes, Tidal Swamps, Grass Beds, Coral Reefs, Mollusk Reefs, Worm Reefs, Octocoral Beds, Sponge Beds, and Algal Beds.

Unconsolidated Substrate Communities which are composed chiefly of sand (e.g., sand beaches) are the most important recreational areas in Florida, attracting millions of residents and tourists annually. This community is resilient and may recover from recreational disturbances. However, this community is vulnerable to compaction associated with vehicular traffic on beaches and disturbances from dredging activities and low dissolved oxygen levels, all of which can cause infaunal organisms to be destroyed or to migrate out of the area. Generally these areas are easily recolonized either by the same organisms or a series of organisms which eventually results in the community returning to its original state once the disturbance has ceased. In extreme examples, such as significant alterations of elevation, there is potential for serious long-term impacts from this type of disturbance.

Another type of disturbance involves the accumulation of toxic levels of heavy metals, oils, and pesticides within Unconsolidated Substrates. Significant amounts of these compounds in the sediments will kill the infaunal organisms, thereby eliminating a food source for certain fishes, birds, and other organisms. Such problems occur in some of the major port cities, in areas where there is heavy industrial development, and along major shipping channels where oil spills are likely to occur.

**(81/82) RUDERAL AND DEVELOPED.** - Ruderal areas are characterized by having the natural substrate or the biological community overwhelmingly altered as a result of human activity. Native vegetation is sparse and is often replaced by weedy or exotic species. These areas require a long-term restoration effort.

Developed areas consist of natural biological communities that have been replaced or nearly replaced by structures or permanently cleared areas such as roads, visitor facilities, campgrounds, recreation areas, parking lots or concessions.

**ADDENDUM 5**  
**PLANT AND ANIMAL LIST**

LIGNUMVITAE KEY BOTANICAL STATE PARK

PLANTS

COMMON NAME	SCIENTIFIC NAME	PRIMARY HABITAT (for designated species)
-------------	-----------------	---

**Pteridophytes**

Giant leather fern	<i>Acrostichum danaeifolium</i>	
--------------------	---------------------------------	--

**Angiosperms – Monocots**

False sisal *	<i>Agave decipiens</i>	
Sisal hemp *	<i>Agave sisalana</i>	
Carpetgrass *	<i>Axonopus</i> sp.	
Signal grass *	<i>Brachiaria subquadripara</i>	
Coastal sandbur	<i>Cenchrus incertus</i>	
Dildo cactus, barb-wire cactus	<i>Cereus pentagonus</i>	
Finger grass	<i>Chloris petraea</i>	
Coconut palm*	<i>Cocos nucifera</i>	
Umbrella sedge	<i>Cyperus globulosus</i>	
Cowhorn orchid *	<i>Cyrtopodium punctatum</i>	
Crowfoot grass, Egyptian grass*	<i>Dactyloctenium aegyptium</i>	
Crab grass	<i>Digitaria diversiflora</i>	
Saltgrass	<i>Distichlis spicata</i>	
Butterfly orchid	<i>Encyclia tampensis</i>	
Gophertail lovegrass	<i>Eragrostis ciliaris</i>	
Fringe rush	<i>Fimbristylis castanea</i>	
Shoal grass	<i>Halodule wrightii</i>	
Spider lily	<i>Hymenocallis latifolia</i>	
Peppergrass	<i>Lepidium virginicum</i>	
Key grass	<i>Monanthochloe littoralis</i>	
African ground orchid *	<i>Oeceoclades maculata</i>	
Mule-ear orchid, dingy-flowered oneidium	<i>Oncidium luridum</i>	
Prickly-pear cactus	<i>Opuntia stricta</i>	
Seashore paspalum, knot grass	<i>Paspalum distichum</i>	
Salt joint grass	<i>Paspalum setaceum</i>	
Date palm *	<i>Phoenix dactylifera</i>	
Natal grass *	<i>Rhynchelytrum repens</i>	
Bowstring hemp*	<i>Sansevieria hyacinthoides</i>	
Greenbrier	<i>Smilax havanensis</i>	
Coastal dropseed, seashore dropseed	<i>Sporobolus virginicus</i>	
Manatee grass	<i>Syringodium filiformis</i>	
Turtle grass	<i>Thalassia testudinum</i>	
Twisted or spiraled air plant, silvery wild pine	<i>Tillandsia circinata</i>	
Spanish-moss	<i>Tillandsia usneoides</i>	

**Angiosperms – Dicots**

Indian mallow	<i>Abutilon permolle</i>	
---------------	--------------------------	--

\* Non-native Species

LIGNUMVITAE KEY BOTANICAL STATE PARK

PLANTS

COMMON NAME	SCIENTIFIC NAME	PRIMARY HABITAT (for designated species)
Ageratum, blue-mist flower	<i>Ageratum littorale</i>	
Woman's tongue *	<i>Albizia lebbek</i>	
Chaff flower	<i>Alternanthera ramosissima</i>	
Coastal ragweed	<i>Ambrosia hispida</i>	
Torchwood	<i>Amyris elemifera</i>	
Pond apple	<i>Annona glabra</i>	
Marlberry	<i>Ardisia escallonioides</i>	
Mexican poppy*	<i>Argemone mexicana</i>	
Argythamnia	<i>Argythamnia blodgettii</i>	12
Crabwood	<i>Ateramnus lucidus</i>	
Sand atriplex	<i>Atriplex arenaria</i>	
Black mangrove	<i>Avicennia germinans</i>	
Salt bush, groundsel, sea myrtle	<i>Baccharis halimifolia</i>	
Saltwort	<i>Batis maritima</i>	
Samphire	<i>Blutaparon vermiculare</i>	
Red spiderling	<i>Boerhavia diffusa</i>	
Sea ox-eye, sea ox-eye daisy	<i>Borrichia aborescens</i>	
Sea oxeye	<i>Borrichia frutescens</i>	
Pitted bluestem *	<i>Bothriochloa pertusa</i>	
Bahama strong bark	<i>Bouerreria ovata</i>	
Saffron-plum	<i>Bumelia celastrina</i>	
Gumbo limbo	<i>Bursera simaruba</i>	
Gray nicker-bean	<i>Caesalpinia bonduc</i>	
Wild cinnamon	<i>Canella winterana</i>	12
Jamaica caper	<i>Capparis cynophallophora</i>	
Limber caper, bay-leaved caper tree	<i>Capparis flexuosa</i>	
Goatweed, water hyssop	<i>Capraria biflora</i>	
Bird pepper, cayenne pepper	<i>Capsicum annuum</i> var. <i>minimum</i>	
Balloon vine, heart seeds*	<i>Cardiospermum halicacabum</i>	
Papaya *	<i>Carica papaya</i>	
Natal plum*	<i>Carissa macrocarpa</i>	
Seven-year apple	<i>Casasia clusiifolia</i>	
Australian pine*	<i>Casuarina litorea</i> ( <i>C. equisetifolia</i> )	
Madagascar periwinkle*	<i>Catharanthus roseus</i>	
Day jessamine *	<i>Cestrum diurnum</i>	
Sand dune spurge	<i>Chamaesyce bombensis</i>	
Garber's spurge	<i>Chamaesyce garberi</i>	3, 12, 81
Hairy spurge	<i>Chamaesyce hirta</i>	
Eyebane	<i>Chamaesyce ophthalmica</i>	
Blackweed	<i>Chamaesyce prostrata</i>	
Snowberry	<i>Chiococca alba</i>	
Fiddlewood	<i>Citharexylum fruticosum</i>	
Key lime*	<i>Citrus aurantiifolia</i>	
Pigeon plum, tie-tongue	<i>Coccoloba diversifolia</i>	
Seagrape	<i>Coccoloba uvifera</i>	
Day flower	<i>Commelina erecta</i> var. <i>Augustifolia</i>	

\* Non-native Species

LIGNUMVITAE KEY BOTANICAL STATE PARK

PLANTS

COMMON NAME	SCIENTIFIC NAME	PRIMARY HABITAT (for designated species)
Silver buttonwood	<i>Conocarpus erecta</i> var. <i>Sericea</i>	
Buttonwood	<i>Conocarpus erecta</i>	
Cordia	<i>Cordia globosa</i>	
Geiger tree *	<i>Cordia sebestena</i>	
Rattlebox	<i>Crotalaria pumila</i>	
Hairnet vine, leafless cynanchum	<i>Cynanchum scoparium</i>	
Coin vine	<i>Dalbergia brownei</i>	
Virgate mimosa	<i>Desmanthus virgatus</i> var. <i>Depressus</i>	
False-mint	<i>Dicliptera assurgens</i>	
Milkbark	<i>Drypetes diversifolia</i>	12
Guiana plum	<i>Drypetes lateriflora</i>	
White stopper	<i>Eugenia axillaris</i>	
Spanish stopper	<i>Eugenia foetida</i>	
Surinam cherry *	<i>Eugenia uniflora</i>	
Fennel	<i>Eupatorium frustratum</i>	
Bitter bush	<i>Eupatorium odoratum</i>	
Seaside gentian	<i>Eustoma exaltatum</i>	
Creeping morning-glory	<i>Evolvulus convolvuloides</i>	
Inkwood	<i>Exothea paniculata</i>	
Strangler fig	<i>Ficus aurea</i>	
Weeping fig*	<i>Ficus benjamina</i>	
Shortleaf fig	<i>Ficus citrifolia</i>	
Laurel fig *	<i>Ficus microcarpa</i>	
Blanket flower	<i>Gaillardia pulchella</i>	
Milk pea	<i>Galactia striata</i>	
Madre de Cacao*	<i>Gliricidia sepium</i>	
Chewstick	<i>Gouania lupuloides</i>	
Lignum vitae	<i>Guaiacum sanctum</i>	12
Blolly	<i>Guapira discolor</i>	
Everglades velvetseed	<i>Guettarda elliptica</i>	
Firebush, scarletbush	<i>Hamelia patens</i>	
Scorpion tail	<i>Heliotropium angiospermum</i>	
Seaside heliotrope	<i>Heliotropium curassavicum</i>	
Bladder mallow	<i>Herissantia crispa</i>	
Wild hibiscus	<i>Hibiscus pilosus</i>	
Mahoe*	<i>Hibiscus tiliaceus</i>	
Doctor vine	<i>Hippocratea volubilis</i>	
Sky blue morning glory	<i>Jacquemontia pentantha</i>	
Joewood	<i>Jacquinia keyensis</i>	3, 4
Chandalier plant*	<i>Kalanchoe tubiflora</i>	
Black ironwood	<i>Krugiodendron ferreum</i>	
White mangrove	<i>Languncularia racemosa</i>	
Wild lantana, wild sage	<i>Lantana involucrata</i>	
Sea lavender, marsh rosemary	<i>Limonium carolinianum</i> var. <i>Carolinianum</i>	
Capeweed, creeping charlie, frog-fruit	<i>Lippia nodiflora</i>	
Christmas berry	<i>Lycium carolinianum</i>	

\* Non-native Species

LIGNUMVITAE KEY BOTANICAL STATE PARK

PLANTS

COMMON NAME	SCIENTIFIC NAME	PRIMARY HABITAT (for designated species)
False mallow	<i>Malvastrum corchorifolium</i>	
Mango *	<i>Mangifera indica</i>	
Wild dilly	<i>Manilkara bahamensis</i>	12, 3
Sapodilla *	<i>Manilkara zapota</i>	
Mastic	<i>Mastichodendron foetidissimum</i>	
Mayten	<i>Maytenus phyllanthoides</i>	
Poisonwood	<i>Metopium toxiferum</i>	
Indian mulberry *	<i>Morinda citrifolia</i>	
Cheeseweed	<i>Morinda royoc</i>	
Orange jasmine *	<i>Murraya paniculata</i>	
Myrsine	<i>Myrsine floridana</i>	
Lancewood	<i>Nectandra coriacea</i>	
Oleander *	<i>Nerium oleander</i>	
Passionflower	<i>Passiflora multiflora</i>	
Corky-stemmed passionflower	<i>Passiflora suberosa</i>	
Devil's backbone *	<i>Pedilanthus tithymaloides</i>	
Copperpod, yellow poinciana *	<i>Peltophorum pterocarpum</i>	
Wild allamanda	<i>Pentalinon luteum (Urechites lutea)</i>	
Phyllanthus	<i>Phyllanthus amarus</i>	
Ground cherry	<i>Physalis pubescens</i>	
Jamaica dogwood	<i>Piscidia piscipula</i>	
Cockspur, pull-&-hold-back vine	<i>Pisonia aculeata</i>	
Blackbead	<i>Pithecellobium keyense</i>	
Cat's claw	<i>Pithecellobium unguis-cati</i>	
Marsh fleabane	<i>Pluchea odorata</i>	
Wild plumbago	<i>Plumbago scandens</i>	
Rustweed	<i>Polypremum procumbens</i>	
Purslane *	<i>Portulaca oleracea</i>	
Hairy purslane, pink purslane	<i>Portulaca pilosa</i>	
Wild coffee	<i>Psychotria nervosa</i>	
Mock bishopweed	<i>Ptilimnium capillaceum</i>	
White indigo-berry	<i>Randia aculeata</i>	
Darling plum, red ironwood	<i>Reynosa septentrionalis</i>	
Red mangrove	<i>Rhizophora mangle</i>	
Castor bean *	<i>Ricinus communis</i>	
Rougeberry, rouge plant	<i>Rivina humilis</i>	
Annual glasswort	<i>Salicornia bigelovii</i>	
Woody glasswort, glasswort	<i>Salicornia virginica</i>	
Pineland pimpernel	<i>Samolus valerandi</i>	
Soapberry	<i>Sapindus saponaria</i>	
Milkweed vine, white vine *	<i>Sarcostemma clausum</i>	
South Florida boxwood	<i>Schaefferia frutescens</i>	
Brazilian pepper *	<i>Schinus terebinthifolius</i>	
Gulf graytwig	<i>Schoepfia chrysophylloides</i>	
Sea purslane	<i>Sesuvium portulacastrum</i>	
Teaweed, broomweed	<i>Sida acuta</i>	
Bahama nightshade,		

\* Non-native Species

**LIGNUMVITAE KEY BOTANICAL STATE PARK  
PLANTS**

<b>COMMON NAME</b>	<b>SCIENTIFIC NAME</b>	<b>PRIMARY HABITAT (for designated species)</b>
cankerberry	<i>Solanum bahamense</i>	
Potato tree	<i>Solanum erianthum</i>	
Necklace-pod	<i>Sophora tomentosa</i>	
Blue porterweed	<i>Stachytarpheta jamaicensis</i>	
Pencil flower	<i>Stylosanthes hamata</i>	
Sea blite	<i>Suaeda linearis</i>	
Bay-cedar	<i>Suriana maritima</i>	
West Indian mahogany	<i>Swietenia mahagoni</i>	12
Tamarind *	<i>Tamarindus indicus</i>	
Portia *	<i>Thespesia populnea</i>	
Florida thatch palm	<i>Thrinax radiata</i>	12
Soldier-bush	<i>Tournefortia volubilis</i>	
Brittleweed, mexican daisy *	<i>Tridax procumbens</i>	
Waltheria	<i>Waltheria indica</i>	
Hog-plum, tallowwood	<i>Ximenia americana</i>	
Wild lime	<i>Zanthoxylumfagara</i>	

\* Non-native Species





LIGNUMVITAE KEY BOTANICAL STATE PARK

ANIMALS

COMMON NAME	SCIENTIFIC NAME	PRIMARY HABITAT (for all species)
-------------	-----------------	--------------------------------------

FISH

Sargeant major	<i>Abudefduf saxatilis</i>	71, 69, 77
Lined sole	<i>Achirus lineatus</i>	71, 69, 77
Bonefish	<i>Albula vulpes</i>	71, 69, 77
Reef silverside	<i>Allanetta harringtonensis</i>	71, 69, 77
Anchovies	<i>Anchoa</i> spp.	71, 69, 77
Porgies	<i>Archosargus</i> spp.	71, 69, 77
Sea catfish	<i>Arius felis</i>	71, 69, 77
Hardhead silverside	<i>Atherinomorus stipes</i>	71, 69, 77
Silver perch	<i>Bairdiella chrysura</i>	71, 69, 77
Gobies	<i>Bathygobius</i> sp.	71, 69, 77
Blennie	<i>Blennius</i> sp.	71, 69, 77
Dragonet	<i>Callionymus paracirradiatus</i>	71, 69, 77
Jacks	<i>Caranx</i> spp.	71, 69, 77
Snook	<i>Centropomus undecimalis</i>	71, 69, 77
Pikeblenny	<i>Chaenopsis</i> spp.	71, 69, 77
Atlantic spadefish	<i>Chaetodipterus faber</i>	71, 69, 77
Burrfish	<i>Chilomycterus schoepfi</i>	71, 69, 77
Hardhead halfbeak	<i>Chridorus atherinoides</i>	71, 69, 77
Spotted seatrout	<i>Cynoscion nubilosu</i>	71, 69, 77
Sheepshead minnow	<i>Cyprinodon variegatus</i>	71, 69, 77
Southern stingray	<i>Dasyatis americana</i>	71, 69, 77
Ladyfish	<i>Elops saurus</i>	71, 69, 77
Jewfish	<i>Epinephalus itajara</i>	71, 69, 77
Silver blenny	<i>Eucinostomus gula</i>	71, 69, 77
Goldspotted killifish	<i>Flordichthys carpio</i>	71, 69, 77
Nurse shark	<i>Ginglymostoma curratum</i>	71, 69, 77
Skilletfish	<i>Gobiesox strumosus</i>	71, 69, 77
Gobies	<i>Gobiosoma</i> spp.	71, 69, 77
Grunts	<i>Haemulon</i> spp.	71, 69, 77
Slippery dick	<i>Halichoeres bivittatus</i>	71, 69, 77
Scaled sardine	<i>Harengula pensacolatae</i>	71, 69, 77
Dwarf seahorses	<i>Hippocampus zosterae</i>	71, 69, 77
Needlefish	<i>Hyporhamphus un fasciatus</i>	71, 69, 77
Hogfish	<i>Lachnolaimus maximus</i>	71, 69, 77
Cowfish	<i>Lactophrys quadricornis</i>	71, 69, 77
Trunkfish	<i>Lactophrys trigonus</i>	71, 69, 77
Pinfish	<i>Lagodon rhomboides</i>	71, 69, 77
Rainwater killifish	<i>Lucania parva</i>	71, 69, 77
Snappers	<i>Lutjanus</i> spp.	71, 69, 77
Tarpon	<i>Megalops atlantica</i>	71, 69, 77
Southern kingfish	<i>Menticirrhus americanus</i>	71, 69, 77
Fringed pipefish	<i>Micrognathus crinigerus</i>	71, 69, 77
Gobies	<i>Microgobius</i> spp.	71, 69, 77
Filefish	<i>Monocanthus ciliatus</i>	71, 69, 77
Mullet	<i>Mugil</i> spp.	71, 69, 77

\* Non-native Species

LIGNUMVITAE KEY BOTANICAL STATE PARK

ANIMALS

COMMON NAME	SCIENTIFIC NAME	PRIMARY HABITAT (for all species)
Gag grouper	<i>Mycteroperca microlepis</i>	71, 69, 77
Lemon shark	<i>Negeprion brevirostris</i>	71, 69, 77
Leatherjacket	<i>Oligoplites zaurus</i>	71, 69, 77
Atlantic thread herring	<i>Opisthonema oglinum</i>	71, 69, 77
Gulf toadfish	<i>Opsanus beta</i>	71, 69, 77
Pigfish	<i>Orthopristis chrysoptera</i>	71, 69, 77
Blennies	<i>Paraclinus</i> spp.	71, 69, 77
Sailfin molly	<i>Poecilia latipinna</i>	71, 69, 77
Searobin	<i>Prionotus</i> spp.	71, 69, 77
Smalltooth sawfish	<i>Pristis pectinata</i>	71, 69, 77
Cobia	<i>Rachycentron canadum</i>	71, 69, 77
Mangrove rivulus	<i>Rivulus marmoratus</i>	71, 69, 77
Parrotfish	<i>Scarus</i> spp.	71, 69, 77
Red drum	<i>Sciaenops ocellata</i>	71, 69, 77
Scorpionfish	<i>Scorpaena</i> spp.	71, 69, 77
Lookdown	<i>Selene vomer</i>	71, 69, 77
Parrotfish	<i>Sparisoma</i> spp.	71, 69, 77
Southern puffer	<i>Sphoeroides nephalus</i>	71, 69, 77
Barracuda	<i>Sphyraena barracuda</i>	71, 69, 77
Bonnethead	<i>Sphyrna tiburo</i>	71, 69, 77
Key blenny	<i>Starksia starki</i>	71, 69, 77
Tonguefish	<i>Symphurus plagiusa</i>	71, 69, 77
Dusky pipefish	<i>Syngnathus floridae</i>	71, 69, 77
Inshore lizardfish	<i>Synodus foetens</i>	71, 69, 77
Florida pompano	<i>Trachinotus carolinus</i>	71, 69, 77
Permit	<i>Trachinotus falcatus</i>	71, 69, 77

AMPHIBIANS

Greenhouse frog *	<i>Eleutherodactylus planirostris planirostris</i>	12
Green tree frog	<i>Hyla cinerea</i>	12

REPTILES

Atlantic loggerhead	<i>Caretta caretta</i>	71
Atlantic green turtle	<i>Chelonia mydas</i>	71
Hawksbill turtle	<i>Eretmochelys imbricata</i>	71
Keys mud turtle	<i>Kinosternon bauri bauri</i>	12
Mangrove terrapin	<i>Malaclemys terrapin rhizophorarum</i>	76
Florida box turtle	<i>Terrapene carolina bauri</i>	12
Green anole	<i>Anolis carolinensis carolinensis</i>	12
Cuban anole *	<i>Anolis sagrei</i>	12, 81
Southeastern five-lined skink	<i>Eumeces inexpectatus</i>	12
Reef gecko	<i>Sphaerodactylus notatus notatus</i>	12
Southern black racer	<i>Coluber constrictor priapus</i>	12
Eastern indigo snake	<i>Drymarchon corais couperi</i>	12, 76
Corn snake	<i>Elaphe guttata</i>	12

\* Non-native Species

LIGNUMVITAE KEY BOTANICAL STATE PARK

ANIMALS

COMMON NAME	SCIENTIFIC NAME	PRIMARY HABITAT (for all species)
-------------	-----------------	--------------------------------------

Yellow rat snake	<i>Elaphe obsoleta quadrivittata</i>	12
Rough green snake	<i>Opheodrys eastivus</i>	12

BIRDS

Common loon	<i>Gavia immer</i>	71
Brown pelican	<i>Pelecanus occidentalis</i>	76, 69, 71
Double-crested cormorant	<i>Phalacrocorax auritus</i>	76
Magnificent frigatebird	<i>Fregata magnificens</i>	76
Great white heron	<i>Ardea herodias occidentalis</i>	76, 71, 4
Cattle egret *	<i>Bubulcus ibis</i>	76, 71, 4
Green heron	<i>Butorides striatus</i>	76, 71, 4
Great egret	<i>Casmerodius albus</i>	76, 71, 4
Little blue heron	<i>Egretta caerulea</i>	76, 71, 4
Reddish egret	<i>Egretta rufescens</i>	76, 71, 4
Snowy egret	<i>Egretta thula</i>	76, 71, 4
Tricolor heron	<i>Egretta tricolor</i>	76, 71, 4
Yellow-crowned night heron	<i>Nycticorax violaceus</i>	76, 71, 4
Roseate spoonbill	<i>Ajaia ajaja</i>	76, 71, 4
White ibis	<i>Eudocimus albus</i>	76, 71, 4
Blue-winged teal	<i>Anas discors</i>	71
Lesser scaup	<i>Aythya affinis</i>	71
Red-breasted merganser	<i>Mergus serrator</i>	71
Sharp-shinned hawk	<i>Accipiter striatus</i>	12, migratory
Broad-winged hawk	<i>b. Platyterus</i>	12, migratory
Swainson's hawk	<i>b. Swainsoni</i>	12, migratory
Red-shouldered hawk	<i>Buteo lineatus</i>	12, 76
Northern harrier	<i>Circus cyaneus</i>	12, 4, migratory
Bald eagle	<i>Haliaeetus leucocephalus</i>	12, 76, 4
Osprey	<i>Pandion haliaetus</i>	76, 3
Peregrine falcon	<i>Falco peregrinus tundrius</i>	12, 4, migratory
American kestrel	<i>Falco sparverius</i>	12, 4, migratory
Aora rail	<i>Porzana carolina</i>	76
Killdeer	<i>Charadrius vociferus</i>	4, 76
Black-bellied plover	<i>Pluvialis squatarola</i>	77
Black-necked stilt	<i>Himantopus mexicanus</i>	77
Spotted sandpiper	<i>Actitis macularia</i>	77
Ruddy turnstone	<i>Arenaria interpres</i>	77
Sanderling	<i>Calidris alba</i>	77
Least sandpiper	<i>Calidris minutilla</i>	77
Willet	<i>Catoptrophorus semipalmatus</i>	77
Dowitcher	<i>Limodromus scolopaceus</i>	77
Lesser yellowlegs	<i>Tringa flavipes</i>	77
Great yellowlegs	<i>Tringa melanoleuca</i>	77
Herring gull	<i>lLarus argentatus</i>	77
Laughing gull	<i>lLarus atricilla</i>	77
Ring-billed gull	<i>lLarus delawarensis</i>	77

\* Non-native Species

LIGNUMVITAE KEY BOTANICAL STATE PARK

ANIMALS

COMMON NAME	SCIENTIFIC NAME	PRIMARY HABITAT (for all species)
Least tern	<i>Sterna antillarum</i>	77
Common tern	<i>Sterna hirundo</i>	77
Royal tern	<i>Sterna maxima</i>	77
White-crowned pigeon	<i>Columba leucocephala</i>	12, 76
Ground-dove	<i>Columbina passerina</i>	3, 81
Mourning dove	<i>Zenaida macroura</i>	3, 81
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	12, 76
Black-billed cuckoo	<i>Coccyzus erythrophthalmus</i>	12, 76
Mangrove cuckoo	<i>Coccyzus minor</i>	12, 76
Smooth-billed ani *	<i>Crotophaga ani</i>	81
Chuck-will's-widow	<i>Caprimulgus carolinensis</i>	12
Whip-poor-will	<i>Caprimulgus vociferus</i>	12
Common nighthawk	<i>Chordeiles minor</i>	12
Chimmey swift	<i>Chaetura pelagica</i>	migratory
Ruby-throated hummingbird	<i>Archilochus colburis</i>	81
Belted kingfisher	<i>Ceryle alcyon</i>	76
Pileated woodpecker	<i>Dryocopus pileatus</i>	12
Red-bellied woodpecker	<i>Melanerpes carolinus</i>	12
Eastern wood pewee	<i>Contopus virens</i>	12
Great crested flycatcher	<i>Myiarchus crinitus</i>	12
Eastern phoebe	<i>Sayornis phoebe</i>	12, 81
Gray kingbird	<i>Tyrannus dominicensis</i>	76, 81
Eastern kingbird	<i>Tyrannus tyrannus</i>	81
Barn swallow	<i>Hirundo rustica</i>	81, migratory
Purple martin	<i>Progne subis</i>	81
Fish crow	<i>Corvus ossifragus</i>	76, 12, 81
Gray catbird	<i>Dumetella carolinensis</i>	12, 81
Mockingbird	<i>Mimus polyglottos</i>	12, 81
Brown thrasher	<i>Toxostoma rufum</i>	12, 81
Gray-cheeked thrush	<i>Catharus minimus</i>	migratory
Blue-gray gnatcatcher	<i>Poliophtila caerulea</i>	3, 12, 81
Ruby-crowned kinglet	<i>Regulus calendula</i>	migratory
American robin	<i>Turdus migratorius</i>	migratory
Cedar waxwing	<i>Bombycilla cedrorum</i>	81
Loggerhead shrike	<i>Lanius ludovicianus</i>	3, 4, 81
Black-whiskered vireo	<i>Vireo altiloquus</i>	12, 76
Yellow-throated vireo	<i>Vireo flavifrons</i>	12, 76
White-eyed vireo	<i>Vireo griseus</i>	12, 76
Red-eyed vireo	<i>Vireo olivaceus</i>	12, 76
Solitary vireo	<i>Vireo solitarius</i>	12, 76
Bahama bananaquit	<i>Coereba flaveola</i>	76, migratory
Red-winged blackbird	<i>Agelaius phoeniceus</i>	76
Black-throated blue warbler	<i>Dendroica caerulescens</i>	3, 12, 76
Yellow-rumped warbler	<i>Dendroica coronata</i>	3, 12, 64, 76
Prairie warbler	<i>Dendroica discolor</i>	3, 12, 76, 81
Yellow-throated warbler	<i>Dendroica dominica</i>	3, 12, 76
Magnolia warbler	<i>Dendroica magnolia</i>	3, 12, 76

\* Non-native Species

LIGNUMVITAE KEY BOTANICAL STATE PARK

ANIMALS

COMMON NAME	SCIENTIFIC NAME	PRIMARY HABITAT (for all species)
Palm warbler	<i>Dendroica palmarum</i>	3, 12, 76, 81
Yellow warbler	<i>Dendroica petechia</i>	3, 12, 76
Blackpoll warbler	<i>Dendroica striata</i>	3, 12, 64
Cape may warbler	<i>Dendroica tigrina</i>	3, 12, 76
Bobolink	<i>Dolichonyx oryriverous</i>	76, 81
Common yellowthroat	<i>Geothlypis trichas</i>	3, 12, 76, 81
Worm-eating warbler	<i>Helmitheros vermivorous</i>	3, 12, 76
Northern oriole	<i>Icterus galbula</i>	12
Black and white warbler	<i>Mniotilta varia</i>	3, 12, 76
Brown-headed cowbird	<i>Molothrus ater</i>	12, 81
Northern parula	<i>Parula americana</i>	3, 12, 76
Summer tanager	<i>Piranga rubra</i>	12
Prothonotary warbler	<i>Protonotaria citrea</i>	3, 12, 76
Common grackle	<i>Quiscalus quiscula</i>	76, 81
Ovenbird	<i>Seiurus aurocapillus</i>	3, 12
Louisiana waterthrush	<i>Seiurus motacilla</i>	3, 12, 76
Northern waterthrush	<i>Seiurus noveboracensis</i>	3, 12, 76
American redstart	<i>Setophaga ruticilla ruticilla</i>	3, 12, 76
Cardinal	<i>Cardinal cardinalis</i>	12
Savannah sparrow	<i>Passerculus sandwichensis</i>	12, 81
Painted bunting	<i>Passerina ciris</i>	12, 81
Indigo bunting	<i>Passerina cyanea</i>	12, 81
Rose-breasted grosbeak	<i>Pheucticus ludovicianus</i>	12
Chipping sparrow	<i>Spizella passerina</i>	12, 81
House sparrow	<i>Passer domesticus</i>	12, 81

MAMMALS

Opossum	<i>Didelphis virginiana</i>	12
Raccoon	<i>Procyon lotor</i>	76, 12, 81
Black rat*	<i>Rattus rattus</i>	12, 81
Marsh rabbit	<i>Sylvilagus palustris</i>	64
West indian manatee	<i>Trichechus manatus</i>	71
Bottle-nosed dolphin	<i>Tursiops truncatus</i>	71, 77

INVERTEBRATES

Tube sponge	<i>Aplysina cauliformis</i>	69, 71
Chicken liver sponge	<i>Chondrilla nucula</i>	69, 71
Heavenly sponge	<i>Dysidea etherea</i>	69, 71
Vase sponge	<i>Ircinia campana</i>	69, 71
Stinker sponge	<i>Ircinia fasciculata</i>	69, 71
Cake sponge	<i>Ircinia strobilina</i>	69, 71
Loggerhead sponge	<i>Sphaciospongia vesparia</i>	69, 71
Fire sponge	<i>Tedania iquis</i>	69, 71
Agassiz' sea cucumber	<i>Actinopyga agassizi</i>	71, 69
Long-spined urchin	<i>Diadema antillarum</i>	71, 69

\* Non-native Species

LIGNUMVITAE KEY BOTANICAL STATE PARK

ANIMALS

COMMON NAME	SCIENTIFIC NAME	PRIMARY HABITAT (for all species)
Thorny starfish	<i>Echinaster</i> sp.	71, 69
Green rock-boring urchin	<i>Echinometria</i> sp.	71, 69
Florida sea cucumber	<i>Holothura floridana</i>	71, 69
Variiegated urchin	<i>Lytechinus variegatus</i>	71, 69
Sea biscuit	<i>Meoma ventricosa</i>	71, 69
Cushion star	<i>Oreaster reticulata</i>	71, 69
Sea egg	<i>Tripneustes ventricosus</i>	71, 69
Pale anemone	<i>Aiptasia pallida</i>	69
Ringed anemone	<i>Bartholomea annulata</i>	69
Upside-down jellyfish	<i>Cassiopeia xamachana</i>	71, 77
Pink-tipped anemone	<i>Condylactis gigantea</i>	69
Golfball coral	<i>Favia fragum</i>	69
Rose coral	<i>Manicinia areolata</i>	69
Sea rod	<i>Plexaura</i> sp.	69
Small finger coral	<i>Porites furcata</i>	69, 71
Sea plume	<i>Pseudopterogorgia</i> sp.	69
Sea whip	<i>Pterogorgia</i> sp.	69
Starlet coral	<i>Siderastrea radians</i>	69
Lobed star coral	<i>Solenastrea hyades</i>	69
Lug worm	<i>Arenicola cristata</i>	76, 77
Long bristle eunice	<i>Eunice longicerrata</i>	76, 77
Orange bristle worm	<i>Eurythoe</i> sp.	76, 77
Green bristle worm	<i>Hermodice</i> sp.	76, 77
Clam worms	<i>Nereis</i> sp.	76, 77
Shaggy parchment tube worm	<i>Onuphis magna</i>	76, 77
Burrowing scale worms	<i>Sthenelais</i> sp.	76, 77
Terebellid worms	<i>Terebellides stroemi</i>	76, 77
Atlantic strawberry cockle	<i>Americardia media</i>	77, 69, 71
Dove shells	<i>Anachis</i> sp.	77, 69, 71
Ark shells	<i>Anadara</i> sp.	77, 69, 71
Sea hare	<i>Aplysia dactylomela</i>	71, 69
Star shells	<i>Astraea</i> sp.	77, 69, 71
Pen shell	<i>Atrina</i>	77, 69, 71
Blackhorn snail	<i>Batillaria minima</i>	76, 4, 77, 69
Bittium	<i>Bittium varium</i>	77, 69, 71
Caecum	<i>Caecum</i> sp.	77, 69, 71
Broad-ribbed Cardita	<i>Carditamera floridana</i>	77, 69, 71
Ladderhorn snail	<i>Cerithidea scalariformis</i>	76, 4, 77, 69
Ceriths	<i>Cerithium</i> sp.	77, 69, 71
Cross-barred Venus	<i>Chione cancellata</i>	77, 69, 71
Tiger lucine	<i>Codakia orbicularis</i>	77, 69, 71
Slipper shells	<i>Crepidula</i> sp.	77, 69, 71
Tritons	<i>Cymatum</i> sp.	77, 69, 71
Tulip snail	<i>Fasiolaria tulipa</i>	77, 69, 71
Common egg cockle	<i>Laevicardium laevigatum</i>	77, 69, 71
Florida tree snail	<i>Liguus fasciatus</i>	77, 69, 71
Periwinkle	<i>Littorina</i> spp.	76, 4, 77, 69

\* Non-native Species

LIGNUMVITAE KEY BOTANICAL STATE PARK

ANIMALS

COMMON NAME	SCIENTIFIC NAME	PRIMARY HABITAT (for all species)
Pennsylvania lucine	<i>Lucina pennsylvanica</i>	77, 69, 71
Saltmarsh snail	<i>Melampus coffeus</i>	76, 4, 77, 69
Northern mussel	<i>Modulus modulus</i>	77, 69, 71
Bleeding tooth	<i>Nerita</i> spp.	76, 4, 77, 69
Octopus	<i>Octopus briareus</i>	71, 69
Predatory snail	<i>Pisania tincta</i>	76, 4, 77, 69
Florida horse conch	<i>Pleuroploca gigantea</i>	77, 69, 71
Rissoina	<i>Rissoina</i> sp.	77, 69, 71
Queen conch	<i>Strombus gigas</i>	77, 69, 71
Sunrise tellin	<i>Tellina radiata</i>	77, 69, 71
Vase shell	<i>Vasum</i> sp.	77, 69, 71
Gulf fritillary	<i>Agraulis vanillae</i>	81
White peacock	<i>Anartia jatrophae</i>	81, 76
Statira	<i>Aphrissa statira</i>	76, 4
Florida white	<i>Appias drusilla</i>	12
Monk	<i>Asbolis capucinus</i>	81
Great southern white	<i>Ascia monuste</i>	4, 81
Eastern pigmy blue	<i>Brephidium pseudofoea</i>	4
Queen	<i>Danaus gilippus</i>	3, 4
Monarch	<i>Danaus plexippus</i>	81
Julia	<i>Dryas iulia</i>	4, 81
Florida purplewing	<i>Enuica tatila</i>	12
Zestos skipper	<i>Epargyreus zestos</i>	12
Dusky wing	<i>Erynnis zarucco</i>	81
Euptychia	<i>Euptychia areolata</i>	76
Fairy yellow	<i>Eurema daira</i>	81
Little yellow	<i>Eurema lisa</i>	81
Zebra longwing	<i>Heliconius charitonius</i>	81, 12
Antillean blue	<i>Hemiargus ceraunus</i>	81
Miami blue	<i>Hemiargus thomasi</i>	4, 81
Schaus' swallowtail	<i>Heraclides aristodemus ponceanus</i>	12, 81
West Indian buckeye	<i>Junonia evarete</i>	81, 4, 12
Cassius blue	<i>Leptotes cassius</i>	4, 81
Ruddy dagger wing	<i>Marpesia petreus</i>	12
Dwarf yellow	<i>Nathalis iole</i>	81
Obscure skipper	<i>Panoquina panoquinoides</i>	76
Giant swallowtail	<i>Papilio cresphontes</i>	81, 12
Mangrove skipper	<i>Phocides pigmalion</i>	4, 76, 81
Orange giant sulfur	<i>Phoebis agarithe</i>	4, 81
Cloudless giant sulphur	<i>Phoebis sennae</i>	4, 81
Cuban crescentspot	<i>Phyciodes frisia</i>	81, 12
Phaon crescentspot	<i>Phyciodes phaon</i>	81
Hammock skipper	<i>Polygonus leo</i>	4, 12, 81
Malachite	<i>Siproeta stelenes</i>	81
Coumella hairstreak	<i>Strymor columella</i>	4
Long-tailed hairstreak	<i>Strymor martialis</i>	81
Gray hairstreak	<i>Strymor melinus</i>	81

\* Non-native Species



LIGNUMVITAE KEY BOTANICAL STATE PARK

ANIMALS

COMMON NAME	SCIENTIFIC NAME	PRIMARY HABITAT (for all species)
Lilac-banded longtail	<i>Urbanus dorantes</i>	81
Long-tailed skipper	<i>Urbanus proteus</i>	12, 81, 4
Copepod	<i>Acartia</i> spp.	71
Pistol shrimp	<i>Alpheus</i> spp.	71
Mangrove tree crab	<i>Aratus pisonni</i>	76
Blue crab	<i>Callinectes sapidus</i>	71
Barnacle	<i>Chthamalus stellatus</i>	76
Hermit crab	<i>Clibanarius</i> sp.	4, 76, 77
Crab	<i>Cyclograpsus</i> sp.	71
Tubicolous amphipod	<i>Cymadus compta</i>	76, 77, 71
Scud amphipod	<i>Gammarus mucronatus</i>	76, 77, 71
Searoach	<i>Ligia</i> spp.	76
Stone crab	<i>Menippe mercenaria</i>	76, 69
Shore crab	<i>Pachygrapsus</i> spp.	71
Hermit crab	<i>Pagurus</i> spp.	4, 76, 77
Shore shrimp	<i>Palaemonetes</i> spp.	71
Spiny lobster	<i>Panulirus argus</i>	69, 71, 76
Pink shrimp	<i>Penaeus duorarum</i>	71
Cleaning shrimp	<i>Periclimenes</i> spp.	71
Mantis shrimp	<i>Pseudosquilla</i> sp.	71
Marsh crab	<i>Sesarma</i> sp.	76
Wood borer	<i>Sphaerom terebans</i>	76
Shrimp	<i>Synalpheus fritzmuelleri</i>	71
Fiddler crab	<i>Uca</i> spp.	76, 77

\* Non-native Species



## NATURAL COMMUNITY HABITAT DESIGNATION

---

### TERRESTRIAL

- 1 Beach Dune
- 2 Bluff
- 3 Coastal Berm
- 4 Coastal Rock Barren
- 5 Coastal Strand
- 6 Dry Prairie
- 7 Maritime Hammock
- 8 Mesic Flatwoods
- 9 Coastal Grasslands
- 10 Pine Rockland
- 11 Prairie Hammock
- 12 Rockland Hammock
- 13 Sandhill
- 14 Scrub
- 15 Scrubby Flatwoods
- 16 Shell Mound
- 17 Sinkhole
- 18 Slope Forest
- 19 Upland Glade
- 20 Upland Hardwood Forest
- 21 Upland Mixed Forest
- 22 Upland Pine Forest
- 23 Xeric Hammock

### PALUSTRINE

- 24 Basin Marsh
- 25 Basin Swamp
- 26 Baygall
- 27 Bog
- 28 Bottomland Forest
- 29 Depression Marsh
- 30 Dome
- 31 Floodplain Forest
- 32 Floodplain Marsh
- 33 Floodplain Swamp
- 34 Freshwater Tidal Swamp
- 35 Hydric Hammock
- 36 Marl Prairie
- 37 Seepage Slope
- 38 Slough
- 39 Strand Swamp
- 40 Swale
- 41 Wet Flatwoods
- 42 Wet Prairie

### LACUSTRINE

- 43 Clastic Upland Lake
- 44 Coastal Dune Lake
- 45 Coastal Rockland Lake
- 46 Flatwood/Prairie Lake
- 47 Marsh Lake
- 48 River Floodplain Lake
- 49 Sandhill Upland Lake
- 50 Sinkhole Lake
- 51 Swamp Lake

### RIVERINE

- 52 Alluvial Stream
- 53 Blackwater Stream
- 54 Seepage Stream
- 55 Spring-Run Stream

### ESTUARINE

- 56 Estuarine Composite Substrate
- 57 Estuarine Consolidated Substrate
- 58 Estuarine Coral Reef
- 59 Estuarine Grass Bed
- 60 Estuarine Mollusk Reef
- 61 Estuarine Octocoral Bed
- 62 Estuarine Sponge Bed
- 63 Estuarine Tidal Marsh
- 64 Estuarine Tidal Swamp
- 65 Estuarine Unconsolidated Substrate
- 66 Estuarine Worm Reef

### MARINE

- 67 Marine Algal Bed
- 68 Marine Composite Substrate
- 69 Marine Consolidated Substrate
- 70 Marine Coral Reef
- 71 Marine Grass Bed
- 72 Marine Mollusk Reef
- 73 Marine Octocoral Bed
- 74 Marine Sponge Bed
- 75 Marine Tidal Marsh
- 76 Marine Tidal Swamp
- 77 Marine Unconsolidated Substrate
- 78 Marine Worm Reef

### SUBTERRANEAN

## NATURAL COMMUNITY HABITAT DESIGNATION

---

**79** Aquatic Cave  
**80** Terrestrial Cave

### MISCELLANEOUS

**81** Ruderal  
**82** Developed

**MTC** Many Types  
Of Communities

**OF** Overflying

**ADDENDUM 6**  
**DESIGNATED SPECIES LIST**

**RANK EXPLANATIONS**  
**FOR FNAI GLOBAL RANK, FNAI STATE RANK, FEDERAL STATUS,**  
**AND STATE STATUS**

---

The Nature Conservancy and the Natural Heritage Program Network (of which FNAI is a part) define an element as any exemplary or rare component of the natural environment, such as a species, natural community, bird rookery, spring, sinkhole, cave, or other ecological feature. An element occurrence (EO) is a single extant habitat that sustains or otherwise contributes to the survival of a population or a distinct, self-sustaining example of a particular element.

Using a ranking system developed by The Nature Conservancy and the Natural Heritage Program Network, the Florida Natural Areas Inventory assigns two ranks to each element. The global rank is based on an element's worldwide status; the state rank is based on the status of the element in Florida. Element ranks are based on many factors, the most important ones being estimated number of Element occurrences, estimated abundance (number of individuals for species; area for natural communities), range, estimated adequately protected EOs, relative threat of destruction, and ecological fragility.

Federal and State status information is from the U.S. Fish and Wildlife Service; and the Florida Game and Freshwater Fish Commission (animals), and the Florida Department of Agriculture and Consumer Services (plants), respectively.

**FNAI GLOBAL RANK DEFINITIONS**

- G1 = Critically imperiled globally because of extreme rarity (5 or fewer occurrences or less than 1000 individuals) or because of extreme vulnerability to extinction due to some natural or man-made factor.
- G2 = Imperiled globally because of rarity (6 to 20 occurrences or less than 3000 individuals) or because of vulnerability to extinction due to some natural or man-made factor.
- G3 = Either very rare and local throughout its range (21-100 occurrences or less than 10,000 individuals) or found locally in a restricted range or vulnerable to extinction of other factors.
- G4 = apparently secure globally (may be rare in parts of range)
- G5 = demonstrably secure globally
- GH = of historical occurrence throughout its range, may be rediscovered (e.g., ivory-billed woodpecker)
- GX = believed to be extinct throughout range
- GXC = extirpated from the wild but still known from captivity or cultivation
- G#? = tentative rank (e.g., G2?)
- G#G# = range of rank; insufficient data to assign specific global rank (e.g., G2G3)
- G#T# = rank of a taxonomic subgroup such as a subspecies or variety; the G portion of the rank refers to the entire species and the T portion refers to the specific subgroup; numbers have same definition as above (e.g., G3T1)
- G#Q = rank of questionable species - ranked as species but questionable whether it is species or subspecies; numbers have same definition as above (e.g., G2Q)
- G#T#Q = same as above, but validity as subspecies or variety is questioned.
- GU = due to lack of information, no rank or range can be assigned (e.g., GUT2).
- G? = not yet ranked (temporary)
- S1 = Critically imperiled in Florida because of extreme rarity (5 or fewer occurrences or less than 1000 individuals) or because of extreme vulnerability to extinction due to some natural or man-made factor.
- S2 = Imperiled in Florida because of rarity (6 to 20 occurrences or less than 3000

**RANK EXPLANATIONS**  
**FOR FNAI GLOBAL RANK, FNAI STATE RANK, FEDERAL STATUS,**  
**AND STATE STATUS**

---

- individuals) or because of vulnerability to extinction due to some natural or man-made factor.
- S3 = Either very rare and local throughout its range (21-100 occurrences or less than 10,000 individuals) or found locally in a restricted range or vulnerable to extinction of other factors.
- S4 = apparently secure in Florida (may be rare in parts of range)
- S5 = demonstrably secure in Florida
- SH = of historical occurrence throughout its range, may be rediscovered (e.g., ivory-billed woodpecker)
- SX = believed to be extinct throughout range
- SA = accidental in Florida, i.e., not part of the established biota
- SE = an exotic species established in Florida may be native elsewhere in North America
- SN = regularly occurring, but widely and unreliably distributed; sites for conservation hard to determine
- SU = due to lack of information, no rank or range can be assigned (e.g., SUT2).
- S? = not yet ranked (temporary)

**LEGAL STATUS**

- N = Not currently listed, nor currently being considered for listing, by state or federal agencies.

**FEDERAL (Listed by the U. S. Fish and Wildlife Service - USFWS)**

- LE = Listed as Endangered Species in the List of Endangered and Threatened Wildlife and Plants under the provisions of the Endangered Species Act. Defined as any species which is in danger of extinction throughout all or a significant portion of its range.
- PE = Proposed for addition to the List of Endangered and Threatened Wildlife and Plants as Endangered Species.
- LT = Listed as Threatened Species. Defined as any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.
- PT = Proposed for listing as Threatened Species.
- C = Candidate Species for addition to the list of Endangered and Threatened Wildlife and Plants. Defined as those species for which the USFWS currently has on file sufficient information on biological vulnerability and threats to support proposing to list the species as endangered or threatened.
- E (S/A) = Endangered due to similarity of appearance.
- T (S/A) = Threatened due to similarity of appearance.

**STATE**

**Animals (Listed by the Florida Fish and Wildlife Conservation Commission - FFWCC)**

- LE = Listed as Endangered Species by the FFWCC. Defined as a species, subspecies, or isolated population which is so rare or depleted in number or so

**RANK EXPLANATIONS  
FOR FNAI GLOBAL RANK, FNAI STATE RANK, FEDERAL STATUS,  
AND STATE STATUS**

---

- restricted in range of habitat due to any man-made or natural factors that it is in immediate danger of extinction or extirpation from the state, or which may attain such a status within the immediate future.
- LT = Listed as Threatened Species by the FFWCC. Defined as a species, subspecies, or isolated population which is acutely vulnerable to environmental alteration, declining in number at a rapid rate, or whose range or habitat is decreasing in area at a rapid rate and as a consequence is destined or very likely to become an endangered species within the foreseeable future.
- LS = Listed as Species of Special Concern by the FFWCC. Defined as a population which warrants special protection, recognition, or consideration because it has an inherent significant vulnerability to habitat modification, environmental alteration, human disturbance, or substantial human exploitation which, in the foreseeable future, may result in its becoming a threatened species.

**Plants** (Listed by the Florida Department of Agriculture and Consumer Services - FDACS)

- LE = Listed as Endangered Plants in the Preservation of Native Flora of Florida Act. Defined as species of plants native to the state that are in imminent danger of extinction within the state, the survival of which is unlikely if the causes of a decline in the number of plants continue, and includes all species determined to be endangered or threatened pursuant to the Federal Endangered Species Act of 1973, as amended.
- LT = Listed as Threatened Plants in the Preservation of Native Flora of Florida Act. Defined as species native to the state that are in rapid decline in the number of plants within the state, but which have not so decreased in such number as to cause them to be endangered.





LIGNUMVITAE KEY BOTANICAL STATE PARK

DESIGNATED SPECIES

PLANTS

COMMON NAME/ <i>SCIENTIFIC NAME</i>	<u>DESIGNATED SPECIES STATUS</u>		
	FDA	USFWS	FNAI
Argythamnia <i>Argythamnia blodgettii</i>	E		G2, S2
Wild cinnamon <i>Canella winterana</i>	E		G4G5, S2
Garber's spurge <i>Chamaesyce garberi</i>	E	T	G1, S1
Milkbark <i>Drypetes diversifolia</i>	E		G3G4, S2
Lignum vitae <i>Guaiacum sanctum</i>	E		G4G5, S2
Joewood <i>Jacquinia keyensis</i>	T		G4, S3
Wild dilly <i>Manilkara bahamensis</i>	T		G4Q, S3
West Indian mahogany <i>Swietenia mahagoni</i>	E		G3G4, S2
Florida thatch palm <i>Thrinax radiata</i>	E		G4G5, S3



LIGNUMVITAE KEY BOTANICAL STATE PARK

DESIGNATED SPECIES

ANIMALS

COMMON NAME/ SCIENTIFIC NAME	DESIGNATED SPECIES STATUS		
	FFWCC	USFWS	FNAI
Roseate spoonbill <i>Ajaia ajaja</i>	SSC		G5S2S3
Mangrove tree crab <i>Aratus pisonni</i>			G4, S3S4
Great white heron <i>Ardea herodias occidentalis</i>			G5T2, S2
Atlantic loggerhead <i>Caretta caretta</i>	T	T	G3, S3
Great egret <i>Casmerodius albus</i>			G5, S4
Snook <i>Centropomus undecimalis</i>	SSC		
Atlantic green turtle <i>Chelonia mydas</i>	E	E	G3, S2
Mangrove cuckoo <i>Coccyzus minor</i>			G5, S3
White-crowned pigeon <i>Columba leucocephala</i>	T	T	G3, S3
Prairie warbler <i>Dendroica discolor</i>			G5T3, S3
Yellow-throated warbler <i>Dendroica dominica</i>			G5, T3Q, S2S3
Eastern indigo snake <i>Drymarchon corais couperi</i>	T	T	G4T3, S3
Little blue heron <i>Egretta caerulea</i>	SSC		G5, S4
Reddish egret <i>Egretta rufescens</i>	SSC		G4, S2
Snowy egret <i>Egretta thula</i>	SSC		G5, S4
Tricolor heron <i>Egretta tricolor</i>	SSC		G5, S4
Florida purplewing <i>Enuica tatila</i>			G4T1, SU
Hawksbill turtle <i>Eretmochelys imbricata</i>	E	E	G3, S2
White ibis <i>Eudocimus albus</i>	SSC		G5S4
Peregrine falcon <i>Falco peregrinus tundrius</i>	E	T	G4S2
American kestrel <i>Falco sparverius</i>	T	C2	G5T3T4, S3

LIGNUMVITAE KEY BOTANICAL STATE PARK

DESIGNATED SPECIES

ANIMALS

COMMON NAME/ SCIENTIFIC NAME	DESIGNATED SPECIES STATUS		
	FFWCC	USFWS	FNAI
Magnificent frigatebird <i>Fregata magnificens</i>			G5, S1
Bald eagle <i>Haliaeetus leucocephalus</i>	T	T	G4S3
Miami blue <i>Hemiargus thomasi</i>		3C	G3T2
Schaus' swallowtail <i>Heraclides aristodemus ponceanus</i>	E	E	G4T1, S1
Keys mud turtle <i>Kinosternon bauri bauri</i>	E		G5T2Q, S2
Florida tree snail <i>Liguus fasciatus</i>	SSC		G3T2, S1
Mangrove terrapin <i>Malaclemys terrapin rhizophorarum</i>			G5T2?, S2?
Yellow-crowned night heron <i>Nycticorax violaceus</i>			G5, S3?
Osprey <i>Pandion haliaetus</i>	SSC		G5S3S4
Brown pelican <i>Pelecanus occidentalis</i>	SSC		G4, S3
Mangrove rivulus <i>Rivulus marmoratus</i>	SSC		G5, S3
Louisiana waterthrush <i>Seiurus motacilla</i>			G5, S3
American redstart <i>Setophaga ruticilla ruticilla</i>			5,S3
Key blenny <i>Starksia starki</i>	SSC		G1G3, S1
Least tern <i>Sterna antillarum</i>	T		G4, S3
Royal tern <i>Sterna maxima</i>			G5, S3
West Indian manatee <i>Trichechus manatus</i>	E	E	G2?S2?
Black-whiskered vireo <i>Vireoaltiloquus</i>			G5, S3

**ADDENDUM 7**  
**CULTURAL MANAGEMENT STATEMENT**  
**DEPARTMENT OF STATE**  
**DIVISION OF HISTORICAL RESOURCES**

**MANAGEMENT PROCEDURES FOR  
ARCHAEOLOGICAL AND HISTORICAL SITES AND PROPERTIES  
ON STATE -- OWNED OR CONTROLLED LANDS  
(Revised August, 1995)**

---

**A. GENERAL DISCUSSION**

Archaeological and historic sites are defined collectively in 267.021(3), F.S., as "historic properties" or "historic resources." They have several essential characteristics that must be recognized in a management program.

First of all, they are a finite and non-renewable resource. Once destroyed, presently existing resources, including buildings, other structures, shipwreck remains, archaeological sites and other objects of antiquity, cannot be renewed or revived. Today, sites in the State of Florida are being destroyed by all kinds of land development, inappropriate land management practices, erosion, looting, and to a minor extent even by well-intentioned professional scientific research (e.g., archaeological excavation). Measures must be taken to ensure that some of these resources will be preserved for future study and appreciation.

Secondly, sites are unique because individually they represent the tangible remains of events that occurred at a specific time and place.

Thirdly, while sites uniquely reflect localized events, these events and the origin of particular sites are related to conditions and events in other times and places. Sites can be understood properly only in relation to their natural surroundings and the activities of inhabitants of other sites. Managers must be aware of this "systemic" character of historic and archaeological sites. Also, it should be recognized that archaeological sites are time capsules for more than cultural history; they preserve traces of past biotic communities, climate, and other elements of the environment that may be of interest to other scientific disciplines.

Finally, the significance of sites, particularly archaeological ones, derives not only from the individual artifacts within them, but equally from the spatial arrangement of those artifacts in both horizontal and vertical planes. When archaeologists excavate, they recover, not merely objects, but also a record of the positions of these objects in relation to one another and their containing matrix (e.g., soil strata). Much information is sacrificed if the so-called "context" of archaeological objects is destroyed or not recovered, and this is what archaeologists are most concerned about when a site is threatened with destruction or damage. The artifacts themselves can be recovered even after a site is heavily disturbed, but the context -- the vertical and horizontal relationships -- cannot. Historic structures also contain a wealth of cultural (socio-economic) data that can be lost if historically sensitive maintenance, restoration or rehabilitation procedures are not implemented, or if they are demolished or extensively altered without appropriate documentation. Lastly, it should not be forgotten that historic structures often have associated potentially significant historic archaeological features that must be considered in land management decisions.

**MANAGEMENT PROCEDURES FOR  
ARCHAEOLOGICAL AND HISTORICAL SITES AND PROPERTIES  
ON STATE -- OWNED OR CONTROLLED LANDS  
(Revised August, 1995)**

---

**B. STATUTORY AUTHORITY**

Chapter 253, Florida Statutes ("State Lands") directs the preparation of "single-use" or "multiple-use" land management plans for all state-owned lands and state-owned sovereignty submerged lands. In this document, 253.034(4), F.S., specifically requires that "all management plans, whether for single-use or multiple-use properties, shall specifically describe how the managing agency plans to identify, locate, protect and preserve, or otherwise use fragile non-renewable resources, such as archaeological and historic sites, as well as other fragile resources..."

Chapter 267, Florida Statutes is the primary historic preservation authority of the state. The importance of protecting and interpreting archaeological and historic sites is recognized in 267.061(1)(a), F.S.:The rich and unique heritage of historic properties in this state, representing more than 10,000 years of human presence, is an important legacy to be valued and conserved for present and future generations. The destruction of these nonrenewable historic resources will engender a significant loss to the state's quality of life, economy, and cultural environment. It is therefore declared to be state policy to:

1. Provide leadership in the preservation of the state's historic resources; [and]
2. Administer state-owned or state-controlled historic resources in a spirit of stewardship and trusteeship;...

Responsibilities of the Division of Historical Resources in the Department of State pursuant to 267.061(3), F.S., include the following:

1. Cooperate with federal and state agencies, local Governments, and private organizations and individuals to direct and conduct a comprehensive statewide survey of historic resources and to maintain an inventory of such responses.
2. Develop a comprehensive statewide historic preservation plan.
3. Identify and nominate eligible properties to the National Register of Historic Places and otherwise administer applications for listing properties in the National Register of Historic Places.
4. Cooperate with federal and state agencies, local governments, and organizations and individuals to ensure that historic resources are taken into consideration at all levels of planning and development.
5. Advise and assist, as appropriate, federal and state agencies and local governments in carrying out their historic preservation responsibilities and programs.
6. Carry out on behalf of the state the programs of the National Historic Preservation Act of 1966, as amended, and to establish, maintain, and administer a state historic preservation program meeting the requirements of an approved program and fulfilling the responsibilities of state historic preservation programs as provided in subsection 101(b) of that act.
7. Take such other actions necessary or appropriate to locate, acquire, protect,



**MANAGEMENT PROCEDURES FOR  
ARCHAEOLOGICAL AND HISTORICAL SITES AND PROPERTIES  
ON STATE -- OWNED OR CONTROLLED LANDS  
(Revised August, 1995)**

---

- preserve, operate, interpret, and promote the location, acquisition, protection, preservation, operation, and interpretation of historic resources to foster an appreciation of Florida history and culture. Prior to the acquisition, preservation, interpretation, or operation of a historic property by a state agency, the Division shall be provided a reasonable opportunity to review and comment on the proposed undertaking and shall determine that there exists historic authenticity and a feasible means of providing for the preservation, interpretation and operation of such property.
8. Establish professional standards for the preservation, exclusive of acquisition, of historic resources in state ownership or control.
  9. Establish guidelines for state agency responsibilities under subsection (2).

Responsibilities of other state agencies of the executive branch, pursuant to 267.061(2), F.S., include:

1. Each state agency of the executive branch having direct or indirect jurisdiction over a proposed state or state-assisted undertaking shall, in accordance with state policy and prior to the approval of expenditure of any state funds on the undertaking, consider the effect of the undertaking on any historic property that is included in, or eligible for inclusion in, the National Register of Historic Places. Each such agency shall afford the division a reasonable opportunity to comment with regard to such an undertaking.
2. Each state agency of the executive branch shall initiate measures in consultation with the division to assure that where, as a result of state action or assistance carried out by such agency, a historic property is to be demolished or substantially altered in a way that adversely affects the character, form, integrity, or other qualities that contribute to [the] historical, architectural, or archaeological value of the property, timely steps are taken to determine that no feasible and prudent alternative to the proposed demolition or alteration exists, and, where no such alternative is determined to exist, to assure that timely steps are taken either to avoid or mitigate the adverse effects, or to undertake an appropriate archaeological salvage excavation or other recovery action to document the property as it existed prior to demolition or alteration.
3. In consultation with the division [of Historical Resources], each state agency of the executive branch shall establish a program to locate, inventory, and evaluate all historic properties under the agency's ownership or control that appear to qualify for the National Register. Each such agency shall exercise caution to assure that any such historic property is not inadvertently transferred, sold, demolished, substantially altered, or allowed to deteriorate significantly.
4. Each state agency of the executive branch shall assume responsibility for the preservation of historic resources that are owned or controlled by such agency. Prior to acquiring, constructing, or leasing buildings for the purpose of carrying out agency responsibilities, the agency shall use, to the maximum extent feasible, historic properties available to the agency. Each agency shall undertake,

**MANAGEMENT PROCEDURES FOR  
ARCHAEOLOGICAL AND HISTORICAL SITES AND PROPERTIES  
ON STATE -- OWNED OR CONTROLLED LANDS  
(Revised August, 1995)**

---

- consistent with preservation of such properties, the mission of the agency, and the professional standards established pursuant to paragraph (3)(k), any preservation actions necessary to carry out the intent of this paragraph.
5. Each state agency of the executive branch, in seeking to acquire additional space through new construction or lease, shall give preference to the acquisition or use of historic properties when such acquisition or use is determined to be feasible and prudent compared with available alternatives. The acquisition or use of historic properties is considered feasible and prudent if the cost of purchase or lease, the cost of rehabilitation, remodeling, or altering the building to meet compliance standards and the agency's needs, and the projected costs of maintaining the building and providing utilities and other services is less than or equal to the same costs for available alternatives. The agency shall request the division to assist in determining if the acquisition or use of a historic property is feasible and prudent. Within 60 days after making a determination that additional space is needed, the agency shall request the division to assist in identifying buildings within the appropriate geographic area that are historic properties suitable for acquisition or lease by the agency, whether or not such properties are in need of repair, alteration, or addition.
  6. Consistent with the agency's mission and authority, all state agencies of the executive branch shall carry out agency programs and projects, including those under which any state assistance is provided, in a manner which is generally sensitive to the preservation of historic properties and shall give consideration to programs and projects which will further the purposes of this section.

Section 267.12 authorizes the Division to establish procedures for the granting of research permits for archaeological and historic site survey or excavation on state-owned or controlled lands, while Section 267.13 establishes penalties for the conduct of such work without first obtaining written permission from the Division of Historical Resources. The Rules of the Department of State, Division of Historical Resources, for research permits for archaeological sites of significance are contained in Chapter 1A-32, F.A.C.

Another Florida Statute affecting land management decisions is Chapter 872, F.S. Section 872.02, F.S., pertains to marked grave sites, regardless of age. Many state-owned properties contain old family and other cemeteries with tombstones, crypts, etc. Section 872.05, F.S., pertains to unmarked human burial sites, including prehistoric and historic Indian burial sites. Unauthorized disturbance of both marked and unmarked human burial site is a felony.

**C. MANAGEMENT POLICY**

The choice of a management policy for archaeological and historic sites within state-owned or controlled land obviously depends upon a detailed evaluation of the characteristics and conditions of the individual sites and groups of sites within those

**MANAGEMENT PROCEDURES FOR  
ARCHAEOLOGICAL AND HISTORICAL SITES AND PROPERTIES  
ON STATE -- OWNED OR CONTROLLED LANDS  
(Revised August, 1995)**

---

tracts. This includes an interpretation of the significance (or potential significance) of these sites, in terms of social and political factors, as well as environmental factors. Furthermore, for historic structures architectural significance must be considered, as well as any associated historic landscapes.

Sites on privately owned lands are especially vulnerable to destruction, since often times the economic incentives for preservation are low compared to other uses of the land areas involved. Hence, sites in public ownership have a magnified importance, since they are the ones with the best chance of survival over the long run. This is particularly true of sites that are state-owned or controlled, where the basis of management is to provide for land uses that are minimally destructive of resource values.

It should be noted that while many archaeological and historical sites are already recorded within state--owned or controlled--lands, the majority of the uplands areas and nearly all of the inundated areas have not been surveyed to locate and assess the significance of such resources. The known sites are, thus, only an incomplete sample of the actual resources - i.e., the number, density, distribution, age, character and condition of archaeological and historic sites - on these tracts. Unfortunately, the lack of specific knowledge of the actual resources prevents formulation of any sort of detailed management or use plan involving decisions about the relative historic value of individual sites. For this reason, a generalized policy of conservation is recommended until the resources have been better addressed.

The generalized management policy recommended by the Division of Historical Resources includes the following:

1. State land managers shall coordinate all planned activities involving known archaeological or historic sites or potential site areas closely with the Division of Historical Resources in order to prevent any kind of disturbance to significant archaeological or historic sites that may exist on the tract. Under 267.061(1)(b), F.S., the Division of Historical Resources is vested with title to archaeological and historic resources abandoned on state lands and is responsible for administration and protection of such resources. The Division will cooperate with the land manager in the management of these resources. Furthermore, provisions of 267.061(2) and 267.13, F.S., combined with those in 267.061(3) and 253.034(4), F.S., require that other managing (or permitting) agencies coordinate their plans with the Division of Historical Resources at a sufficiently early stage to preclude inadvertent damage or destruction to known or potentially occurring, presently unknown archaeological and historic sites. The provisions pertaining to human burial sites must also be followed by state land managers when such remains are known or suspected to be present (see 872.02 and 872.05, F.S., and 1A-44, F.A.C.)
2. Since the actual resources are so poorly known, the potential impact of the managing agency's activities on historic archaeological sites may not be

**MANAGEMENT PROCEDURES FOR  
ARCHAEOLOGICAL AND HISTORICAL SITES AND PROPERTIES  
ON STATE -- OWNED OR CONTROLLED LANDS  
(Revised August, 1995)**

---

- immediately apparent. Special field survey for such sites may be required to identify the potential endangerment as a result of particular management or permitting activities. The Division may perform surveys, as its resources permit, to aid the planning of other state agencies in their management activities, but outside archaeological consultants may have to be retained by the managing agency. This would be especially necessary in the cases of activities contemplating ground disturbance over large areas and unexpected occurrences. It should be noted, however, that in most instances Division staff's knowledge of known and expected site distribution is such that actual field surveys may not be necessary, and the project may be reviewed by submitting a project location map (preferably a 7.5 minute U.S.G.S. Quadrangle map or portion thereof) and project descriptive data, including detailed construction plans. To avoid delays, Division staff should be contacted to discuss specific project documentation review needs.
3. In the case of known significant sites, which may be affected by proposed project activities, the managing agency will generally be expected to alter proposed management or development plans, as necessary, or else make special provisions to minimize or mitigate damage to such sites.
  4. If in the course of management activities, or as a result of development or the permitting of dredge activities (see 403.918(2)(6)a, F.S.), it is determined that valuable historic or archaeological sites will be damaged or destroyed, the Division reserves the right, pursuant to 267.061(1)(b), F.S., to require salvage measures to mitigate the destructive impact of such activities to such sites. Such salvage measures would be accomplished before the Division would grant permission for destruction of the affected site areas. The funding needed to implement salvage measures would be the responsibility of the managing agency planning the site destructive activity. Mitigation of historic structures at a minimum involves the preparation of measured drawings and documentary photographs. Mitigation of archaeological resources involves the excavation, analysis and reporting of the project findings and must be planned to occur sufficiently in advance to avoid project construction delays. If these services are to be contracted by the state agency, the selected consultant will need to obtain an Archaeological Research Permit from the Division of Historical Resources, Bureau of Archaeological Research (see 267.12, F.S. and Rules 1A-32 and 1A-46 F.A.C.).
  5. For the near future, excavation of non-endangered (i.e., sites not being lost to erosion or development) archaeological site is discouraged. There are many endangered sites in Florida (on both private and public lands) in need of excavation because of the threat of development or other factors. Those within state-owned or controlled lands should be left undisturbed for the present - with particular attention devoted to preventing site looting by "treasure hunters". On the other hand, the archaeological and historic survey of these tracts is encouraged in order to build an inventory of the resources present, and to assess their scientific research potential and historic or architectural significance.
  6. The cooperation of land managers in reporting sites to the Division that their field

**MANAGEMENT PROCEDURES FOR  
ARCHAEOLOGICAL AND HISTORICAL SITES AND PROPERTIES  
ON STATE -- OWNED OR CONTROLLED LANDS  
(Revised August, 1995)**

---

- personnel may discover is encouraged. The Division will help inform field personnel from other resource managing agencies about the characteristics and appearance of sites. The Division has initiated a cultural resource management training program to help accomplish this. Upon request the Division will also provide to other agencies archaeological and historical summaries of the known and potentially occurring resources so that information may be incorporated into management plans and public awareness programs (See Management Implementation).
7. Any discovery of instances of looting or unauthorized destruction of sites must be reported to the agent for the Board of Trustees of the Internal Improvement Trust Fund and the Division so that appropriate action may be initiated. When human burial sites are involved, the provisions of 872.02 and 872.05, F. S. and Rule 1A-44, F.A.C., as applicable, must also be followed. Any state agent with law enforcement authority observing individuals or groups clearly and incontrovertibly vandalizing, looting or destroying archaeological or historic sites within state-owned or controlled lands without demonstrable permission from the Division will make arrests and detain those individuals or groups under the provisions of 267.13, 901.15, and 901.21, F.S., and related statutory authority pertaining to such illegal activities on state-owned or controlled lands. County Sheriffs' officers are urged to assist in efforts to stop and/or prevent site looting and destruction.

In addition to the above management policy for archaeological and historic sites on state-owned land, special attention shall be given to those properties listed in the National Register of Historic Places and other significant buildings. The Division recommends that the Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings (Revised 1990) be followed for such sites.

The following general standards apply to all treatments undertaken on historically significant properties.

1. A property shall be used for its historic purpose or be placed in a new use that requires minimal change to the defining characteristics of the building and its site and environment.
2. The historic character of a property shall be retained and preserved. The removal of historic materials or alterations of features and spaces that characterize a property shall be avoided.
3. Each property shall be recognized as a physical record of its time, place and use. Changes that create a false sense of historical development, such as adding conjectural features or architectural elements from other buildings, shall not be undertaken.
4. Most properties change over time; those changes that have acquired historic significance in their own right shall be retained and preserved.
5. Distinctive features, finishes, and construction techniques or examples of

**MANAGEMENT PROCEDURES FOR  
ARCHAEOLOGICAL AND HISTORICAL SITES AND PROPERTIES  
ON STATE -- OWNED OR CONTROLLED LANDS  
(Revised August, 1995)**

---

- craftsmanship that characterize a historic property shall be preserved.
6. Deteriorated historic features shall be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature shall match the old in design, color, texture, and other visual qualities and, where possible, materials. Replacement of missing features shall be substantiated by documentary, physical, or pictorial evidence.
  7. Chemical or physical treatments, such as sandblasting, that cause damage to historic materials shall not be used. The surface cleaning of structures, if appropriate, shall be undertaken using the gentlest means possible.
  8. Significant archaeological resources affected by a project shall be protected and preserved. If such resources must be disturbed, mitigation measures shall be undertaken.
  9. New additions, exterior alterations, or related new construction shall not destroy materials that characterize the property. The new work shall be differentiated from the old and shall be compatible with the massing, size, scale, and architectural features to protect the historic integrity of the property and its environment.
  10. New additions and adjacent or related new construction shall be undertaken in such a manner that if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired. (see Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings [Revised 1990]).

Divisions of Historical Resources staff are available for technical assistance for any of the above listed topics. It is encouraged that such assistance be sought as early as possible in the project planning.

**D. MANAGEMENT IMPLEMENTATION**

As noted earlier, 253.034(4), F.S., states that "all management plans, whether for single-use or multiple-use properties, shall specifically describe how the managing agency plans to identify, locate, protect and preserve, or otherwise use fragile non-renewable resources, such as archaeological and historic sites..." The following guidelines should help to fulfill that requirement.

1. All land managing agencies should contact the Division and send U.S.G.S. 7.5 minute quadrangle maps outlining the boundaries of their various properties.
2. The Division will in turn identify site locations on those maps and provide descriptions for known archaeological and historical sites to the managing agency.
3. Further, the Division may also identify on the maps areas of high archaeological and historic site location probability within the subject tract. These are only probability zones, and sites may be found outside of these areas. Therefore, actual ground inspections of project areas may still be necessary.

**MANAGEMENT PROCEDURES FOR  
ARCHAEOLOGICAL AND HISTORICAL SITES AND PROPERTIES  
ON STATE -- OWNED OR CONTROLLED LANDS  
(Revised August, 1995)**

---

4. The Division will send archaeological field recording forms and historic structure field recording forms to representatives of the agency to facilitate the recording of information on such resources.
5. Land managers will update information on recorded sites and properties.
6. Land managers will supply the Division with new information as it becomes available on previously unrecorded sites that their staff locate. The following details the kind of information the Division wishes to obtain for any new sites or structures that the land managers may report:

**A. Historic Sites**

- (1) Type of structure (dwelling, church, factory, etc.).
- (2) Known or estimated age or construction date for each structure and addition.
- (3) Location of building (identify location on a map of the property, and building placement, i.e., detached, row, etc.).
- (4) General Characteristics: (include photographs if possible) overall shape of plan (rectangle, "L" "T" "H" "U", etc.); number of stories; number of vertical divisions of bays; construction materials (brick, frame, stone, etc.); wall finish (kind of bond, coursing, shingle, etc.); roof shape.
- (5) Specific features including location, number and appearance of:
  - (a) Important decorative elements;
  - (b) Interior features contributing to the character of the building;
  - (c) Number, type, and location of outbuildings, as well as date(s) of construction;
  - (d) Notation if property has been moved;
  - (e) Notation of known alterations to building.

**B. Archaeological Sites**

- (1) Site location (written narrative and mapped location).
  - (2) Cultural affiliation and period.
  - (3) Site type (midden, burial mound, artifact scatter, building rubble, etc.).
  - (4) Threats to site (deterioration, vandalism, etc.).
  - (5) Site size (acreage, square meters, etc.).
  - (6) Artifacts observed on ground surface (pottery, bone, glass, etc.).
  - (7) Description of surrounding environment.
7. No land disturbing activities should be undertaken in areas of known archaeological or historic sites or areas of high site probability without prior review by the Division early in the project planning.
  8. Ground disturbing activities may proceed elsewhere but land managers should stop disturbance in the immediate vicinity of artifact finds and notifies the

**MANAGEMENT PROCEDURES FOR  
ARCHAEOLOGICAL AND HISTORICAL SITES AND PROPERTIES  
ON STATE -- OWNED OR CONTROLLED LANDS  
(Revised August, 1995)**

---

Division if previously unknown archaeological or historic remains are uncovered. The provisions of Chapter 872, F.S., must be followed when human remains are encountered.

9. Excavation and collection of archaeological and historic sites on state lands without a permit from the Division are a violation of state law and shall be reported to a law enforcement officer. The use of metal detectors to search for historic artifacts shall be prohibited on state lands except when authorized in a 1A-32, F.A.C., research permit from the Division.
10. Interpretation and visitation which will increase public understanding and enjoyment of archaeological and historic sites without site destruction or vandalism is strongly encouraged.
11. Development of interpretive programs including trails, signage, kiosks, and exhibits is encouraged and should be coordinated with the Division.
12. Artifacts found or collected on state lands are by law the property of the Division. Land managers shall contact the Division whenever such material is found so that arrangements may be made for recording and conservation. This material, if taken to Tallahassee, can be returned for public display on a long term loan.

**C. ADMINISTERING AGENCY**

Questions relating to the treatment of archaeological and historic resources on state lands may be directed to:

Compliance Review Section  
Bureau of Historic Preservation  
Division of Historical Resources  
R.A. Gray Building  
500 South Bronough Street  
Tallahassee, Florida 32399-0250

**Contact Person:**

**Susan M. Harp**  
Historic Preservation Planner  
Telephone (904) 487-2333  
Suncom 277-2333  
FAX (904) 922-0496



**ADDENDUM 8**

**PRIORITY SCHEDULE AND COST ESTIMATES**

## LIGNUMVITAE KEY BOTANICAL STATE PARK

### PRIORITY SCHEDULE AND COST ESTIMATES

---

1. Remove exotic vegetation to eliminate its presence. ESTIMATED COST: \$3,000 annually.
2. Protect the marine seagrass beds from boating damage by continuing to improve and maintain channel markers, regulatory signs, and mooring buoys.
3. ESTIMATED COST: \$7,000 annually.
4. Restore damaged seagrass beds. ESTIMATED COST: \$20,000 annually; Division Match 25 percent: \$5,000.
5. Replace existing generator with a wind or solar powered energy source. ESTIMATED COST: \$30,000.
6. Conduct a Level I archaeological survey of the park. ESTIMATED COST: \$20,000.
7. Continue to preserve and maintain historic structures, including stabilization of the concrete reinforcement of the Matheson house and the removal of the bathroom facilities from beneath the house. ESTIMATED COST: \$100,000.
8. Minimize human disturbance to Shell Key by placing regulatory signs around the island. ESTIMATED COST: \$5,000.
9. Increase park staffing. ESTIMATED COST: \$35,000.

**TOTAL ESTIMATED RESOURCE MANAGEMENT AND PROGRAMS COST: \$365,000.**

**LIGNUMVITAE KEY BOTANICAL STATE PARK  
PRIORITY SCHEDULE AND COST ESTIMATES**

**District 5**

Item No.	Item Description	Quantity	Unit	Unit Price	District Multiplier	Estimated Cost
	<b><u>Lignumvitae Key</u></b>					
2a	Matheson House – restroom removal	1	ea.	\$ 113,400.00	1.50	\$ 20,000.00
	Medium Picnic Restroom, off-grade					\$ 170,100.00
	Engineering study: power generation and sewage disposal improvements					\$ 35,000.00
	Residence electrical system renovation					\$ 50,000.00
	Residence sewage disposal renovation					\$ 50,000.00
	<b><u>Land Base</u></b>					
76	Visitor Center w/Offices and Exhibits	1	ea.	\$ 375,000.00	1.50	\$ 562,500.00
2	Medium Picnic Restroom	1	ea.	\$ 105,000.00	1.50	\$ 157,500.00
22	Small Picnic Shelter	2	ea.	\$ 21,000.00	1.50	\$ 63,000.00
114	Nature Trail	2,600	LF	\$ 2.00	1.50	\$ 7,800.00
84	Interpretive Trail Signs	4	ea.	\$ 5,000.00	1.50	\$ 30,000.00
37	Boat Docks	8	slip	\$ 8,000.00	1.50	\$ 96,000.00
	Fuel storage and handling equip.	1				\$ 40,000.00
92	New Paved Parking (10 Car)	3	per 10 cars	\$ 10,100.00	1.50	\$ 45,450.00
11	3 Bay Shop Building	1	ea.	\$ 132,600.00	1.50	\$ 198,900.00
13	3 Bay Equipment Shelter	1	ea.	\$ 98,800.00	1.50	\$ 148,200.00
15	Flammable / Small Storage Building	1	ea.	\$ 9,600.00	1.50	\$ 14,400.00
17a	Ranger Residence (woodframe)	2	ea.	\$ 188,762.00	1.50	\$ 566,286.00
	Sign, fencing, landscape	1				\$ 50,000.00
96	Paved Road & Clearing	0.1	mile	\$ 320,000.00	1.50	\$ 48,000.00
	Sub-total					\$ 2,353,136.00
	20% contingency fees					\$ 470,627.20
	<b>Total</b>					<b>\$ 2,823,763.20</b>

**ADDENDUM 9**  
**LAND MANAGEMENT REVIEW**  
**REPORT AND DRP RESPONSE**

**Land Management Review of Lignumvitae Key Botanical State Park**

**Monroe County - Lease No. 2534**

**January 24, 2000**

**LIGNUMVITAE KEY BOTANICAL STATE PARK**  
**LAND MANAGEMENT REVIEW REPORT AND DRP RESPONSE**

---

**Review Team Determination**

---

**1. Is the land being managed for the purpose for which it was acquired?**

After completing the checklist, team members were asked to answer “yes” or “no” to this question.

**Response:** All team members agreed that the Lignumvitae Key Botanical State Park is being managed for the purpose for which it was acquired.

**2. Are actual management practices, including public access, in compliance with the management plan?**

After completing the checklist, team members were asked to answer “yes” or “no” to this question.

**Response:** Six team members agreed that actual management practices, including public access, were in compliance with the management plan for this site. One team member disagreed that actual management practices, including public access, were in compliance with the management plan for this site.

**Recommendations and checklist findings**

---

The management plan must include responses to the recommendations and checklist items that are identified below.

**Recommendations**

---

The following recommendations resulted from a discussion and vote of review team members.

1. The team recommends that Division of Recreation and Parks evaluate tour and access fees for possible increase.

**Manager’s Response:** **Disagree.** Fees, like plans, are beyond the scope of LMR. However, at this time we believe the current fees are adequate. Once the new land-based facilities are in place at the Klopp tract, fees will probably be re-evaluated.

2. The team recommends that the Division of Recreation and Parks staff should insure adequate survey and inventory work is completed in order to evaluate the health of the unique natural communities associated with this park.

**Manager’s Response:** **Disagree.** Although we do not have sufficient staff to conduct such long-term research studies, DRP supports research to develop information on the ecosystem. At least 20 completed project reports are currently available in the District files. We employ accepted management practices to protect and maintain the natural communities of the park.

**LIGNUMVITAE KEY BOTANICAL STATE PARK**  
**LAND MANAGEMENT REVIEW REPORT AND DRP RESPONSE**

---

3. The team recommends that Division of Recreation and Parks make as a priority to install passive system design for all island utilities including power generator and septic facilities.

**Manager's Response:** **Agree.** Utilities and facilities used to handle domestic wastes on the island will be reviewed. Any additional needs will be considered in the UMP process.

4. The team recommends that Division of Recreation and Parks analyze toxicity of the soil and water associated with the two solution holes historically used as dump sites and prioritize clean up.

**Manager's Response:** **Disagree.** An analysis of the sediments in one solution hole was completed in 1991. Park staff removed the old discarded trash and debris from the site. The remaining solution hole will be cleaned in a similar way.

**Checklist findings**

---

The following items received low scores on the review team checklist (see Attachment 1), which indicates that management actions were insufficient (f) or that the issue was not sufficiently addressed in the management plan (p). These items need to be addressed in the management plan update.

1. Ground Water Quality Monitoring (p)

**Manager's Response:** **Disagree.** Because of the costs associated with such monitoring, the DRP only supports monitoring when there are either known or suspected problems on park resources. However, we encourage qualified researchers and research institutions to monitor the hammocks. Sediment sampling in the solution holes after trash removal depends on available funding (see prior comments). We will review and mention, as needed, any past efforts which may have been undertaken to collect ground water quality information.

2. Inholdings/additions (p)

**Manager's Response:** **Agree.** Proposals for additions and inholdings are prepared each year by the District. Since optimum boundary reviews are always considered as a part of the park planning process, this matter does not need to be addressed in the LMR process. The UMP will contain a map identifying additions and inholdings that need to be acquired to meet optimum boundary objectives. Lands placed on the DRP inholdings/additions list are purchased, as moneys and willing sellers become available.

**LIGNUMVITAE KEY BOTANICAL STATE PARK**  
**LAND MANAGEMENT REVIEW REPORT AND DRP RESPONSE**

---

3. Managed Areas Existing Uses: Commercial fishing (p)

**Manager's Response:**           **Agree.** Commercial fishing activities in the park will be addressed in the next updated UMP. However, DRP has limited power to control such activities unless we can show that resources of the park are being threatened by the activities.

4. Managed Areas Existing Uses: Tropical Fish Collecting (p)

**Manager's Response:**           **Agree.** Tropical fish collecting as well as sponging activities in the park will be addressed in the next updated UMP. Tropical fish collecting is not allowed at John Pennekamp Coral Reef State Park.

5. Management Resources: Sanitary Facilities (f)

**Manager's Response:**           **Agree.** The sanitary facilities on the island are not adequate. General wastewater facility needs are reviewed and addressed in the UMP process. Funding needed to design and construct appropriate facilities will be pursued. However, funding is contingent on DRP and DEP budget resources and priorities and also on legislative action.

6. Management Resources: Buildings (f)

**Manager's Response:**           **Agree.** The existing infrastructure is not adequate. The potential uses and proposed facilities are addressed in the UMP along with a proposal to utilize the Klopp tract for development of additional infrastructure. Funding for recreational development will be pursued. However, funding infrastructure needs is contingent on DRP and DEP budget resources and priorities and also on legislative action.