Florida Department of
Environmental Protection
Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

Rick Scott
Governor

Jennifer Carroll
Lt. Governor

Herschel T. Vinyard Jr.
Secretary

August 20, 2012

Ms. Sine Murray
Planning Manager
Office of Park Planning
Division of Recreation and Parks
Department of Environmental Protection
3900 Commonwealth Boulevard, MS 525
Tallahassee, Florida 32399-3000

RE: Tomoka Basin State Park – Lease # 3644

Dear Ms. Murray:

The Division of State Lands, Office of Environmental Services, acting as agent for the Board of Trustees of the Internal Improvement Trust Fund, hereby approves the Tomoka Basin State Park land management plan. The next management plan update is due August 20, 2022.

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. Pursuant to the conditions of your lease, please forward copies of all permits to this office upon issuance.

Sincerely,

M. S. Gengenbach

Marianne S. Gengenbach
Office of Environmental Services
Division of State Lands

Tomoka Basin State Parks

Addison Blockhouse Historic State Park
Bulow Creek State Park
Bulow Plantation Ruins Historic State park
Tomoka State Park

APPROVED
Unit Management Plan

STATE OF FLORIDA
Department of Environmental Protection

Division of Recreation and Parks
August 17, 2012

TABLE OF CONTENTS

RESOURCE MANAGEMENT COMPONENT

LAND USE COMPONENT

IMPLEMENTATION COMPONENT

TABLES

MAPS

LIST OF ADDENDA

INTRODUCTION

This management plan encompasses the following four contiguous parks within Florida's state park system: Bulow Plantation Ruins Historic State Park, Bulow Creek State Park, Addison Blockhouse Historic State Park and Tomoka State Park (see Vicinity Map). Because the parks are contiguous, they are managed as one operational unit. Therefore, all four parks are addressed within this management plan. This approach serves to acknowledge the presence of ecological and cultural units within the larger Tomoka Basin that extend beyond the boundary of any one park. Each park will be discussed in order of its geographic location, moving north to south, beginning with Bulow Plantation Ruins Historic State Park (see Reference Map).

For the purposes of this plan, these parks will be referred to as the Tomoka Basin Parks (TBP). The total acreage for these parks is 7,340 acres, located north of the City of Ormond Beach, in Volusia County. Access to the parks is from Interstate 95; exit 268 (State Road 40) east to North Beach Street, known as Old Dixie Highway. The Vicinity Map also reflects significant land and water resources that exist near these parks.

Bulow Plantation Ruins Historic State Park was acquired by the Volusia Hammock State Park Association, and was in turn, donated to the state in 1945. Bulow Creek State Park was purchased in 1981, with funding from the Land Acquisition Trust Fund program (see Addendum 1). Subsequent acquisitions have greatly expanded the park boundaries. The Volt Tract addition that was acquired in 2000 connects the original hammock tracts along Bulow Creek to the tidal tributaries of the Tomoka Basin. Addison Blockhouse Historic State Park was donated to the state in 1939 by the Volusia Hammock State Park Association. Tomoka State Park is one of the oldest state parks in Florida's state park system. The initial acquisition was in 1946; subsequently, several parcels have been added to the park. Funding sources include The Land Acquisition Trust Fund, Conservation and Recreation Lands, Preservation 2000 Inholdings and Acquisitions program, and tax-supported contributions by the City of Ormond Beach and Volusia County.

In accordance with the lease from the Board of Trustees of the Internal Improvement Trustees (Trustees), these parks will be managed for the conservation and protection of natural, historic and cultural resources while providing resource-based public outdoor recreation. Each park is designated for single-use management. There are no legislative or executive directives that constrain the use of these properties (see Addendum 1).

PURPOSE AND SIGNIFICANCE OF THE PARK

The Tomoka Basin Parks were acquired through a variety of land acquisition programs and donations, beginning with the acquisition of Addison Blockhouse Historic State Park in 1939. The purposes of these acquisitions were to preserve, for all time, representative examples of the natural and cultural history of the State of Florida, to protect, develop, operate and maintain the properties for public outdoor recreation, conservation, historic and related purposes and to support the tourism industry of Florida.

Park Significance

- The parks provide visitors with a broad range of opportunities to experience unique natural communities and cultural sites in the lower Tomoka river basin through recreational pursuits such as backcountry camping, canoeing, kayaking, fishing, family camping, hiking, nature study, interpretive programs and picnicking.

- The parks contain a mosaic of eighteen unique natural communities, from dry scrub to cool seepage streams, providing critical habitat to imperiled plant species including the Toothed Spleenwort, Pigmypipes and Levy Pinkroot.

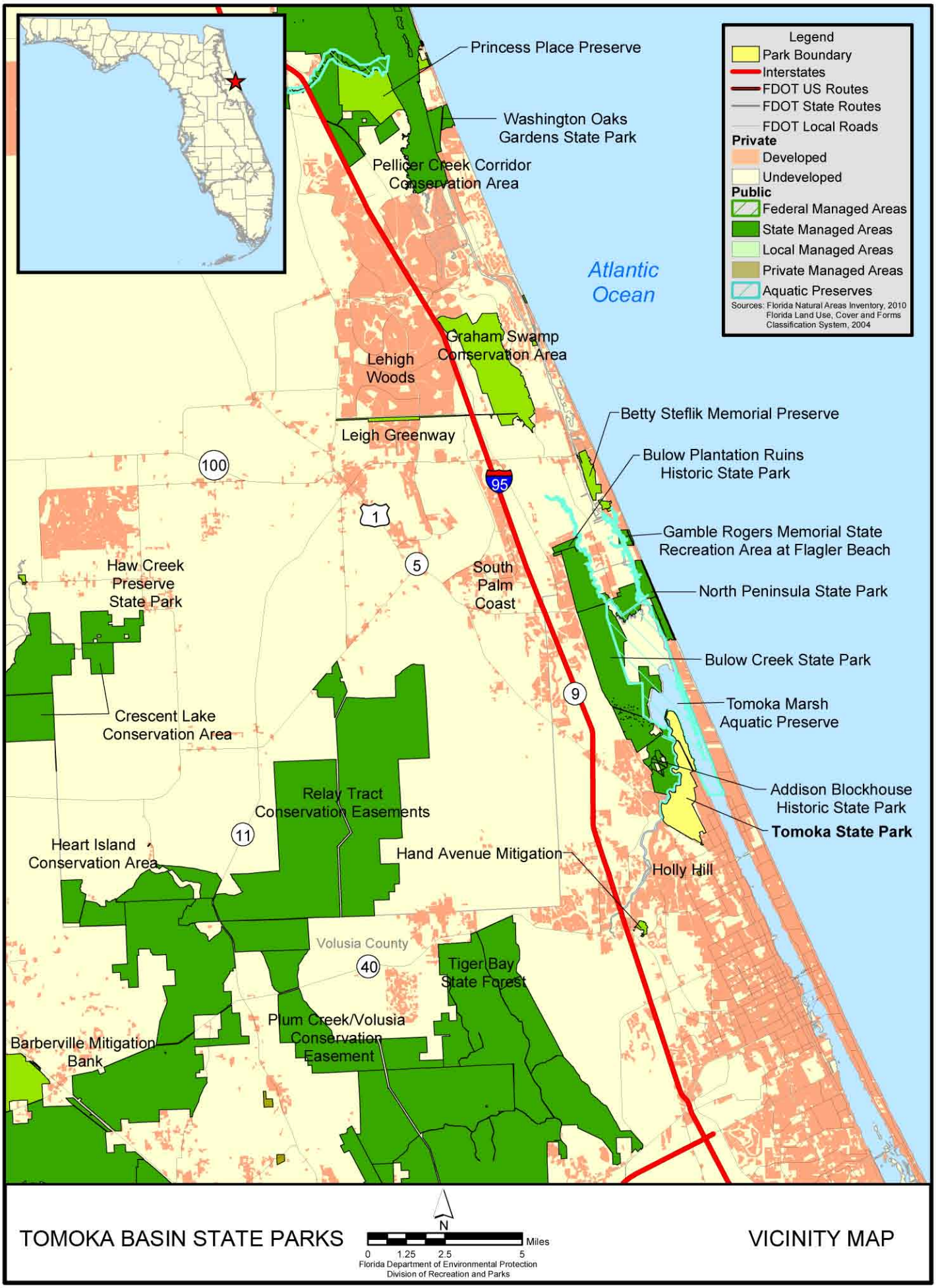
- Tomoka State Park defines a peninsula nearly 1,500 acres in area along the Tomoka River. Shell middens and other remains on the peninsula are from a Timicuan Village called Nocoroco, which dates back 7,000 years to Florida's Archaic Period.

- Within the Tomoka Basin Parks, there are 13 known early plantation sites, which date back to the Early Territorial Period. The plantations produced rice, indigo, cotton and, most notably, sugar cane. The period of impressive plantation development in the area came to an abrupt halt in 1836 at the outbreak of the Second Seminole War, when raids destroyed all of the plantations. The ruin of the sugar mill at Bulow Plantation Ruins Historic State Park is a dramatic example of both the wealth and industry of Florida's early settlers and the devastation that resulted from the wars between the settlers and the Native American population.

- The Tomoka Basin Parks provide an upland buffer that protects the quality of water entering the Halifax and Tomoka rivers, which provide valuable habitat to the imperiled West Indian Manatee and other imperiled species. The surrounding tributaries and tidal marshes provide important habitat to imperiled bird species, which include the Piping Plover, Reddish Egret, Roseate Spoonbill and Wood Stork.

- Bulow Creek State Park contains the notable Fairchild Oak, an old growth Live Oak that has a circumference of over 25 feet, and is estimated to be almost 500 years old.

Tomoka State Park and Bulow Creek State Park are classified as state parks in the DRP's unit classification system. In the management of these units of the state park system, a balance is sought between the goals of maintaining and enhancing natural conditions and providing various recreational opportunities. Natural resource management activities are aimed at management of natural systems. Development in the park is directed toward providing public access to and within the park, and to providing recreational facilities, in a reasonable balance, that are both convenient and safe.


Legend
Park Boundary
Interstates
FDOT US Routes
FDOT State Routes
FDOT Local Roads
Private
Developed
Undeveloped
Public
Federal Managed Areas
State Managed Areas
Local Managed Areas
Private Managed Areas
Aquatic Preserves
Sources: Florida Natural Areas Inventory, 2010
Florida Land Use, Cover and Forms
Classification System, 2004
Princess Place Preserve
Washington Oaks
Gardens State Park
Pellicer Creek Corridor
Conservation Area
Atlantic
Ocean
Graham Swamp
Conservation Area
Lehigh
Woods
Leigh Greenway
Betty Steflik Memorial Preserve
Bulow Plantation Ruins
Historic State Park
100
95
1
5
9
Haw Creek
Preserve
State Park
South
Palm
Coast
Gamble Rogers Memorial State
Recreation Area at Flagler Beach
North Peninsula State Park
Bulow Creek State Park
Tomoka Marsh
Aquatic Preserve
Crescent Lake
Conservation Area
Relay Tract
Conservation Easements
Addison Blockhouse
Historic State Park
Tomoka State Park
11
Heart Island
Conservation Area
Hand Avenue Mitigation
Holly Hill
Volusia County
40
Tiger Bay
State Forest
Plum Creek/Volusia
Conservation
Easement
Barberville Mitigation
Bank
TOMOKA BASIN STATE PARKS
N
0 1.25 2.5 5
Miles
Florida Department of Environmental Protection
Division of Recreation and Parks
VICINITY MAP

Legend

- Ormond Scenie Loop & Trail
- Existing Paddling Trails
- Addison Blockhouse Historic State Park
- Bulow Creek State Park
- Bulow Plantation Ruins Historic State Park
- Tomoka State Park
- Other Conservation Lands
- Tomoka Marsh Aquatic Preserve

Bulow Plantation Sugar Mill Ruins
Picnic Area & Boat Ramp
BULOW PLANTATION PLANNED DEVELOPMENT
PLANTATION ROAD
OLD KINGS ROAD
Flagler County
Volusia County
BULOW CREEK
Bulow Creek Paddling Trail
Korona Canal
Gamble Rogers Memorial State Recreation Area at Flagler Beach
North Peninsula State Park
Mound Grove
WALTER BOARDMAN LANE
HIGHBRIDGE ROAD
Cobbs Corner
ATLANTIC OCEAN
SMITH CREEK
HALIFAX PLANTATION SUBDIVISION
Fairchild Oak Use Area
Ormond Tomb Park
1,100-Acre Mosquito Impoundment
PUMPHOUSE ROAD
Dummett Sugar Mill Ruins
95
TOMOKA BASIN
Tomoka Point
Cedar Point
Museum
Marina
Family Camping Area
TOSCANA
PLANTATION OAKS PLANNED DEVELOPMENT
PINE TREE DRIVE
NORTH BEACH STREET
HALIFAX RIVER
TOMOKA RIVER
STRICKLAND CREEK
THOMPSON CREEK
Addison Blockhouse & McCrae Sugar Mill Ruins
ORMOND LAKES SUBDIVISION
OUT
OUT
1
A1A
FLAGLER COUNTY
VOLUSIA COUNTY
Tomoka River Paddling Trail
John's Island
Sanchez City Park
ORMOND BEACH

TOMOKA BASIN STATE PARKS

N

Feet
0 1,500 3,000 6,000

DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF RECREATION AND PARKS
Date of Aerial: 2007

REFERENCE MAP

Program emphasis is on interpretation of the park's natural, aesthetic and educational attributes.

Bulow Plantation Ruins Historic State Park and Addison Blockhouse Ruins Historic State Park are classified as special feature sites in the DRP's unit classification system. A "special feature" is a discrete and well-defined object or condition that attracts public interest and provides recreational enjoyment through visitation, observation and study. A state special feature site is an area which contains such a feature, and which is set aside for controlled public enjoyment. Special feature sites for the most part are either historical or archaeological by type, but they may also have a geological, botanical, zoological or other basis. State special feature sites must be of unusual or exceptional character, or have statewide or broad regional significance.

PURPOSE AND SCOPE OF THE PLAN

This plan serves as the basic statement of policy and direction for the management of the Tomoka Basin State Parks as a unit of Florida's state park system. It identifies the goals, objectives, actions and criteria or standards that guide each aspect of park administration, and sets forth the specific measures that will be implemented to meet management objectives and provide balanced public utilization. The plan is intended to meet the requirements of Sections 253.034 and 259.032, Florida Statutes, Chapter 18-2, Florida Administrative Code, and is intended to be consistent with the State Lands Management Plan. With approval, this management plan will replace the 2003 approved management plan.

This management plan consists of three interrelated components: the Resource Management Component, the Land Use Component and the Implementation Component. The Resource Management Component provides a detailed inventory and assessment of the natural and cultural resources of the park. Resource management needs and issues are identified, and measurable management objectives are established for each of the park's management goals and resource types. This component provides guidance on the application of such measures as prescribed burning, exotic species removal, imperiled species management, cultural resource management and restoration of natural conditions.

The Land Use Component is the recreational resource allocation plan for the park. Based on considerations such as access, population, adjacent land uses, the natural and cultural resources of the park, current public uses and existing development, measurable objectives are set to achieve the desired allocation of the physical space of the park. These objectives locate use areas and propose the types of facilities and programs and the volume of public use to be provided.

The Implementation Component consolidates the measurable objectives and actions for each of the park's management goals. An implementation schedule and cost estimates are included for each objective and action. Included in this table are (1) measures that will be used to evaluate the DRP's implementation progress, (2) timeframes for completing actions and objectives and (3) estimated costs to complete each action and objective.

All development and resource alteration proposed 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.

In the development of this plan, the potential for Bulow Plantation Ruins Historic State Park, Addison Blockhouse Historic State Park and Tomoka State Park to accommodate secondary management purposes "multiple uses" was analyzed. These secondary purposes were considered within the context of the Division's statutory responsibilities and an analysis of the resource needs and values of the park. This analysis considered the natural and cultural resources of these parks, management needs, aesthetic values, visitation and visitor experiences. For each of these parks, it was determined that no secondary purposes could be accommodated in a manner that would not interfere with the primary purpose of resource-based outdoor recreation and conservation. Uses such as, water resource development projects, water supply projects, stormwater management projects, linear facilities and sustainable agriculture and forestry (other than those forest management activities specifically identified in this plan) are not consistent with this plan or the management purposes of these parks.

For Bulow Creek State Park it was determined that timber management activities could be accommodated in a manner that would be compatible and not interfere with the primary purpose of resource-based outdoor recreation and conservation. This compatible secondary management purpose is addressed in the Resource Management Component of this plan.

The potential for generating revenue to enhance management was also analyzed. Visitor fees and charges are the principal source of revenue generated by each park. It was determined that multiple-use management activities would not be appropriate as a means of generating revenues for land management at Bulow Plantation Ruins Historic State Park, Addison Blockhouse Historic State Park and Tomoka State Park. 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.

For Bulow Creek State Park it was determined that timber management activities would be appropriate as an additional source of revenue for land management. This activity is compatible with the primary purpose of resource-based outdoor recreation and conservation for the park.

The use of private land managers to facilitate restoration and management of these parks was also analyzed. Decisions regarding this type of management (such as outsourcing, contracting with the private sector, use of volunteers, etc.) will be made on a case-by-case basis as necessity dictates.

MANAGEMENT PROGRAM OVERVIEW

Management Authority and Responsibility

In accordance with Chapter 258, Florida Statutes and Chapter 62D-2, Florida Administrative Code, the DRP is charged with the responsibility of developing and operating Florida's recreation and parks system. These are administered in accordance with the following policy:

> It shall be the policy of the Division of Recreation and Parks to promote the state park system for the use, enjoyment, and benefit of the people of Florida and visitors; to acquire typical portions of the original domain of the state which will be accessible to all of the people, and of such character as to emblemize the state's natural values; conserve these natural values for all time; administer the development, use and maintenance of these lands and render such public service in so doing, in such a manner as to enable the people of Florida and visitors to enjoy these values without depleting them; to contribute materially to the development of a strong mental, moral, and physical fiber in the people; to provide for perpetual preservation of historic sites and memorials of statewide significance and interpretation of their history to the people; to contribute to the tourist appeal of Florida.

The Trustees have 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 affect public recreational uses.

Many operating procedures are standardized system-wide and are set by internal direction. These procedures are outlined in the DRP's Operations Manual (OM) that covers such areas as personnel management, uniforms and personal appearance, training, signs, communications, fiscal procedures, interpretation, concessions, public use regulations, resource management, law enforcement, protection, safety and maintenance.

Park Management Goals

The following park goals express the DRP's long-term intent in managing the state park.

1. Provide administrative support for all park functions.
2. Protect water quality and quantity in the park, restore hydrology to the extent feasible and maintain the restored condition.
3. Restore and maintain the natural communities/habitats of the park.
4. Maintain, improve or restore imperiled species populations and habitats in the park.
5. Remove exotic and invasive plants and animals from the park and conduct needed maintenance-control.
6. Protect, preserve and maintain the cultural resources of the park.
7. Provide public access and recreational opportunities in the park.
8. Develop and maintain the capital facilities and infrastructure necessary to meet the goals and objectives of this management plan.

Management Coordination

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

The Florida Department of Agriculture and Consumer Services (FDACS), Florida Forest Service (FFS), assists DRP staff in the development of wildfire emergency plans and provides the authorization 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 the park. In addition, the FFWCC aids the DRP with wildlife management programs, including imperiled species management and Watchable Wildlife programs. The Florida Department of State (FDOS), Division of Historical Resources (DHR) assists staff to ensure protection of archaeological and historical sites. The Florida Department of Environmental Protection (DEP), Office of Coastal and Aquatic Managed Areas (CAMA) and DRP staff are constant partners and collaborators in the respective management programs of the state parks and the adjacent Tomoka Marsh Aquatic Preserve.

Public Participation

The DRP provided an opportunity for public input by conducting a public workshop and an Advisory Group Meeting to present the draft management plan to the public. These meetings were held on Tuesday, March 27, 2012 and Wednesday, March 28, 2012, respectively. Meeting notice(s) were published in the Florida Administrative Weekly, March 16, 2012 Volume 38, Issue 11, included on the Department Internet Calendar, posted in clear view at the park, and promoted locally. The purpose of the Advisory Group meeting is to provide the Advisory Group members an opportunity to discuss the draft management plan (see Addendum 2).

Other Designations

These parks have not been designated as Areas of Critical State Concern as defined in section 380.05, Florida Statutes. Currently they are not under study for such designation. These parks are a component of the Florida Greenways and Trails System. Nocoroco, a native-American occupation site at Tomoka State Park, has been listed on the National Register of Historic Places since 1973.

All waters within the parks have been designated as Outstanding Florida Waters (OFW), pursuant to Chapter 62-302 Florida Administrative Code. Surface waters in these units are also classified as Class III waters by DEP. The OFW protection of the estuarine reaches of the lower Tomoka River and tidewater tributaries in Tomoka State Park (Strickland Creek and Thompson Creek) was expanded in 1991 to include the upper Tomoka River and major freshwater tributaries, from U.S. Highway 1 in Ormond Beach to Interstate Highway 4 in Daytona Beach.

The lower Tomoka River (downstream from U.S. Highway 1), the Tomoka Basin, and upper Halifax River are part of the Tomoka Marsh Aquatic Preserve, which was designated under provision of the Florida Aquatic Preserve Act of 1975 (Section 258.35, Florida Statutes).

In 1989, the state legislature amended Chapter 370, Florida Statutes to include the Tomoka River (upstream to State Road 40) under the Florida Manatee Sanctuary Act, authorizing the

establishment and enforcement of boat speed zones in the main river and tributaries, including Strickland Creek, Thompson Creek, and Dodson Canal. Chapter 16N-22.012, Florida Administrative Code also provides for manatee protection in the Tomoka Basin and Halifax River.

RESOURCE MANAGEMENT COMPONENT

INTRODUCTION

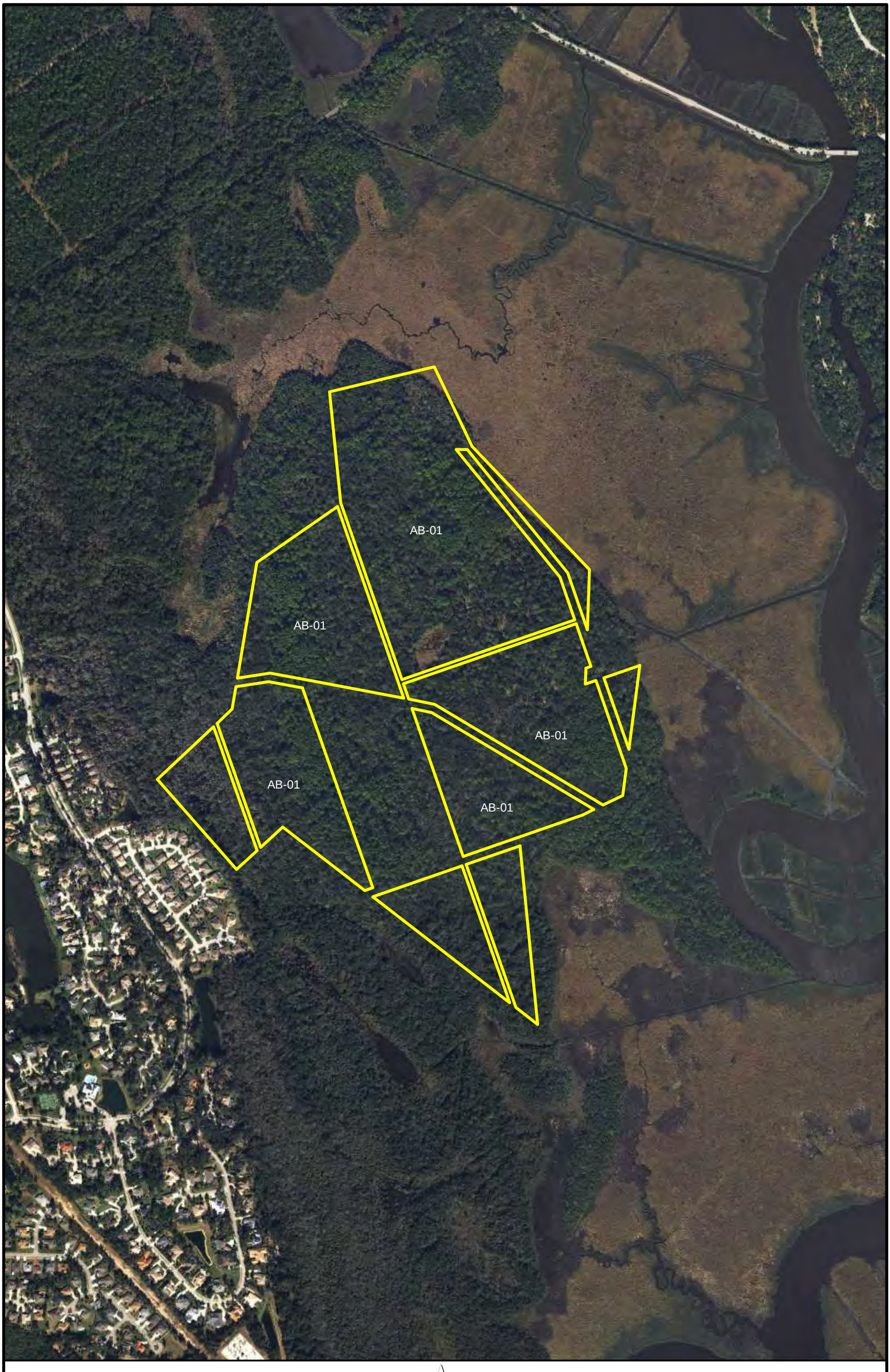
The Florida Department of Environmental Protection (DEP), Division of Recreation and Parks (DRP) in accordance with Chapter 258, Florida Statutes, has implemented resource management programs for preserving for all time the representative examples of natural and cultural resources of statewide significance under its administration. This component of the unit plan describes the natural and cultural resources of the park and identifies the methods that will be used to manage them. The management measures expressed in this plan is consistent with the DEP's overall mission in ecosystem management. Cited references are contained in Addendum 3.

DRP's philosophy of resource management is natural systems management. Primary emphasis is placed on restoring and maintaining, to the degree possible, the natural processes that shaped the structure, function and species composition of Florida's diverse natural communities as they occurred in the original domain. Single species management for imperiled species is appropriate in state parks when the maintenance, recovery or restoration of a species or population is complicated due to constraints associated with long-term restoration efforts, unnaturally high mortality or insufficient habitat. Single species management should be compatible with the maintenance and restoration of natural processes, and should not imperil other native species or seriously compromise park values.

DRP's management goal for cultural resources is to preserve sites and objects that represent Florida's cultural periods, significant historic events or persons. This goal often entails active measures to stabilize, reconstruct or restore resources, or to rehabilitate them for appropriate public use.

Because park units are often components of larger ecosystems, their proper management can be affected by conditions and events that occur beyond park boundaries. Ecosystem management is implemented through a resource management evaluation program that assesses resource conditions, evaluates management activities and refines management actions, and reviews local comprehensive plans and development permit applications for park/ecosystem impacts.

The entire park is divided into management zones that delineate areas on the ground that are used to reference management activities (see Management Zones Map). The shape and size of each zone may be based on natural community type, burn zone, and the location of existing roads and natural fire breaks. It is important to note that all burn zones are management zones; however, not all management zones include fire-dependent natural communities. Table 1 reflects the management zones with the acres of each zone.



ADDISON BLOCKHOUSE
HISTORIC STATE PARK

N

0 250 500 1,000 Feet

Florida Department of Environmental Protection
Division of Recreation and Parks
Date of aerial: 2009

MANAGEMENT ZONES MAP

BC-01
BC-02
BC-26
BC-28
BC-05
BC-27
BC-28
BC-03
BC-04
BC-06
BC-07
BC-09
BC-08
BC-10b
BC-16b
BC-16a
BC-15
BC-11
BC-13
BC-14
BC-12b
BC-12a
BC-18b
BC-18a
BC-20
BC-19
BC-23
BC-17
BC-21
BC-22
BC-24
BC-24
BC-25

BULOW CREEK STATE PARK

N

0 1,250 2,500 5,000 Feet

Florida Department of Environmental Protection
Division of Recreation and Parks
Date of aerial: 2009

MANAGEMENT ZONES MAP

BULOW PLANTATION RUINS HISTORIC STATE PARK

N

0 200 400 800 Feet

Florida Department of Environmental Protection
Division of Recreation and Parks
Date of aerial: 2009

MANAGEMENT ZONES MAP

TM-20
TM-21
TM-19
TM-18
TM-17
TM-12
TM-16
TM-15
TM-01
TM-10
TM-02
TM-09
TM-07
TM-03a
TM-06
TM-03b
TM-03c
TM-08
TM-11
TM-14
TM-03d
TM-04
TM-05
TM-13

TOMOKA STATE PARK

N

0 750 1,500 3,000 Feet

Florida Department of Environmental Protection
Division of Recreation and Parks
Date of aerial: 2009

MANAGEMENT ZONES MAP

Table 1: Tomoka Basin Parks Management Zones	
Management Zone	**Acreage**
Bulow Plantation Ruins Management Zones	
BU-01	16.85
BU-02	43.15
BU-03	72.11
BU-04	15.88
Bulow Creek Management Zones	
BC-01	599.53
BC-02	263.10
BC-03	60.45
BC-04	56.88
BC-05	151.85
BC-06	215.20
BC-07	69.90
BC-08	242.92
BC-09	132.78
BC-10A	4.97
BC-10B	287.26
BC-11	409.57
BC-12A	64.06
BC-12B	39.41
BC-13	222.21
BC-14	104.92
BC-15	310.56
BC-16A	494.73
BC-16B	76.48
BC-17	177.12
BC-18A	82.32
BC-18B	57.32
BC-18C	20.51
BC-19	187.91
BC-20	42.63
BC-21	76.34
BC-22	110.93
BC-23	54.71
BC-24	229.33
BC-25	389.51
BC-26	32.57
BC-27	107.37
BC-28	322.28
Addison Blockhouse Management Zones	
AB-01	134.51

Table 1: Tomoka Basin Parks Management Zones	
Management Zone	**Acreage**
Tomoka Management Zones	
TM-01	214.10
TM-02	27.77
TM-03A	25.52
TM-03B	22.32
TM-03C	14.23
TM-03D	27.49
TM-04	19.09
TM-05	6.73
TM-06	30.54
TM-07	10.52
TM-08	127.75
TM-09	24.52
TM-10	40.76
TM-11	16.10
TM-12	429.43
TM-13	34.28
TM-14	29.38
TM-15	26.02
TM-16	57.28
TM-17	132.07
TM-18	162.64
TM-19	72.99
TM-20	63.51
TM-21	6.42

RESOURCE DESCRIPTION AND ASSESSMENT

Natural Resources

Topography

All four parks are located on the east coast of Florida in the Atlantic Coastal Lowlands physiographic region (Puri and Vernon 1964, Cooke 1945). The landscape of the parks reflects coastal processes that shaped Florida's landforms during the Pleistocene (Ice Ages) when sea levels fluctuated with the advance and retreat of continental glaciers to the north. Most of the parks have relatively flat topography, elevations range from five to ten feet above mean sea level (msl), with low rises and shallow depressions. The parks comprise two major landforms: the Atlantic Coastal Ridge and the Silver Bluff Terrace (Scott 1979).

The sandy uplands along the west side of both Bulow Plantation Ruins Historic State Park and Bulow Creek State Park lie on the east slope of the Atlantic Coastal Ridge, an ancient beach ridge of the Pamlico shoreline that was 10-25 feet above present msl. The base of the Ridge lies

at approximately 10 feet msl where it intersects the Silver Bluff Terrace. The Terrace is comprised of marine and estuarine deposits from the late Pleistocene - early Holocene, when sea levels fluctuated one to ten feet above present msl (Bermes et al.1963).

The topography of the area has been altered to varying degrees to build roads, drain wetlands and manage stormwater runoff.

Bulow Plantation Ruins Historic State Park. The Atlantic Coast Ridge is evident to visitors leaving Bulow Plantation Ruins Historic State Park where the park road markedly rises as it approaches the Old Kings Road. There are several evident indentations in the shoreline of Bulow Creek, south of the boat ramp, which are the remains of historic boat slips from the Bulow Plantation. There are also remnants of old plantation roads and some shallow ditches in the hammock.

Bulow Creek State Park: The highest elevations in the Tomoka Basin parks are on the Atlantic Coastal Ridge in Bulow Creek State Park. The west boundary of the park along Old Dixie Highway in the Fairchild Oak area approximately follows the 25 feet msl contour (USGS Flagler Beach, West). The Atlantic Coastal Ridge slopes gradually east to the low hammocks and flatwoods of the Silver Bluff Terrace at 5-10 feet msl. The steepest gradients in the park are found south of the Fairchild Oak where coquina bluffs outcrop along the old plantation road.

The Mound Grove Tract is situated at the end of an elongated peninsula, between the Bulow Creek floodplain and the Halifax River marshes, with an elevation of approximately ten feet msl. It is a relict beach ridge with coquina deposits, ascribed to the Anastasia formation of the Pleistocene (Scott 1992a, 1992b).

The majority of the lower half of Bulow Creek State Park, formerly known as the VOLT Tract, lies in the floodplain of the lower Tomoka River and wetland drainage of the Tomoka Basin. This area generally follows the three foot msl contour. An exception is the northeast section, which contains uplands on the eastern slope of the Atlantic Coastal Ridge, with land elevations rising from 5 to 20 feet msl (USGS 1993). The lowlands bordering Tomoka Basin contain several narrow elongated islands, such as Bryan Island hammock at the north end of the basin, which is associated with tidal drainage. The larger flatwoods islands are remnants of the Silver Bluff Terrace (Phelps 1990).

The Korona Canal is a significant topographical alteration that was cut through the Atlantic Coastal Ridge and Silver Bluff Terrace to convey drainage from areas to the west of the park into Bulow Creek.

Addison Blockhouse Historic State Park: The park and surrounding terrain is low and flat. Park lands form part of the Silver Bluff Terrace, with ground elevations ranging around four feet msl.

Tomoka State Park: The peninsula that comprises Tomoka State Park is an elongated sand ridge, parallel to the present shoreline, which separates the Halifax River coastal lagoon from the Tomoka River floodplain. The elevation of the peninsula ridge ranges from 10 to 15 feet msl

with the highest point, 16.25 feet msl, along N. Beach St. (1948 benchmark datum). Johns Island, in contrast to the peninsula ridge, is situated on the low, flat Silver Bluff Terrace. The elevations of the Johns Island flatwoods range from approximately three to six feet msl. There is a sandy bluff on the southwest edge of Johns Island that rises from about 6 to 12 feet msl above the Tomoka River floodplain. The Tomoka River cuts through the Atlantic Coastal Ridge near the U.S. Highway 1 bridge and then meanders across a broad tidal floodplain with elevations less than three feet msl to open into the Tomoka Basin.

The tidal marshes bordering the east side of the Tomoka peninsula along the Halifax River have been extensively altered by dredge and fill activity. In the late 1950s and early 1960s, suction dredges cut deep canals and spread the spoil material across the marsh, burying wetland vegetation under a thick mantle of shell and sand. During this same time, Strickland Creek, a man-made waterway, was excavated in the marshes along the western side of the peninsula. The dredge deposits form an elevated berm, about 5 feet above msl, separating Strickland Creek from Thompson Creek, a natural tributary of the Tomoka River.

Geology

The influence of marine processes in the formation of landforms is evident in the geologic units in all the parks. Surface geology is dominated by coastal deposits associated with the formation of the Silver Bluff Terrace and Atlantic Coastal Ridge. Based on USGS well drilling logs from Bulow Plantation Ruins (Bermes et al. 1963), the geologic strata, in general, consist of unconsolidated sands of Holocene (recent)-Pleistocene age overlying shell and clay deposits of Miocene-Pliocene origin. The Atlantic Coastal Ridge consists of quartz sands with inclusions of coquina limestone comprised of soft-hard layers of beach deposits of coquina clams (*Donax variabilis*) that are cemented by calcite. The Silver Bluff sediments are undifferentiated deposits of quartz sand, silts and clay. The surface sediments include beds of shell and layers of organic muck in the Tomoka River floodplain and Tomoka Basin lagoon. The near-vertical banks of the Korona Canal within Bulow Creek State Park provide a profile of local geologic strata. Under a surface layer of sand, there are limestone deposits consisting of coarse shell fragments, predominantly oysters and finer-grained constituents. These near-surface limestones represent relatively recent depositional periods in an estuarine environment (Bermes et al.1963). Some strata contain fossil materials, which have been exposed during dredging operations. Bone fragments of mastodons, camels, horses and other Ice Age mammals have been found in Pleistocene deposits. In 1967, Dr. David Webb, eminent paleontologist at the Florida Museum in Gainesville, assisted local fossil hunters with the recovery of an intact skull of a giant sloth (*Eremotherium* sp.) from the Tomoka River near Johns Island in Tomoka State Park. The skull is now preserved at the Florida Museum (VAS 1993).

The coquina layer, a local deposit of the Anastasia Formation of late Pleistocene age (125,000 years before present) ranges in thickness from two to ten feet (U.S. Department of Agriculture, 1980). The Anastasia Formation is oriented parallel to the present coastline, less than ten miles inland, and extends from St. Johns County to Brevard County along the Atlantic Coastal Ridge. Outcrops occur along the low bluffs bordering the Tomoka River near the Old Dixie Highway Bridge, and in Bulow Creek State Park on the slope behind the Fairchild Oak, and along the

bluffs at the south end of the park. The Addison Blockhouse and associated plantation ruins are mostly constructed of coquina, which was probably quarried from these nearby deposits.

Layers of carbonate limestone of Eocene age lie below the Pleistocene and Holocene deposits. Test wells drilled into the peninsular ridge at Tomoka State Park penetrated Ocala Limestone at a depth of 95 feet below the surface (Phelps 1990).

Soils

Soil types are delineated on the Soils Map for each park and a detailed description of each soil type is contained in Addendum 4. Tuscawilla fine sand is a loamy, fertile soil that supports the growth of some very large live oaks (*Quercus virginiana*) in the hammocks at Bulow Plantation Ruins and Bulow Creek. Subsurface layers of clay and shell increase the fertility of Tuscawilla soils, a fact known to John Bulow and other area planters who cultivated sugarcane and other crops in the lowlands along Bulow Creek before the second Seminole War (1836). The Cocoa-Bulow complex, in contrast, is a well-drained and infertile sandy soil, which supports xeric hammock in the west boundary area of Bulow Plantation Ruins Historic State Park. Turnbull muck is an organic soil of the tidal marshes of the Tomoka River floodplain and Tomoka Basin. Turnbull Variant soil is derived from dredged material. It is a mixture of sand, shell and clay, which was deposited in the spoil areas of Tomoka State Park. Immokalee-Myakka soils are quartz sands with a spodic horizon (hardpan) that are characteristic of the flatwoods of Bulow Creek State Park and Tomoka State Park. Astatula-Bulow soils are well-drained sands with subsurface coquina layers that comprise the Tomoka peninsula ridge.

Soil erosion is a management concern and occurs in three of the parks. The following addresses those parks with erosion problems.

Bulow Plantation Ruins Historic State Park. Minor erosion occurs at the park during heavy rains when fine sediment from dirt roads is transported in stormwater runoff. Most of the suspended sediment is deposited in the hammock, however, before discharge to Bulow Creek.

Bulow Creek State Park: The Korona Canal was excavated in 1966 to drain stormwater from development lands west of Old Kings Road in Flagler County. The canal discharges into Bulow Creek in Volusia County. The gradient of the canal drops sharply at the Old Kings Road where the Atlantic Coastal Ridge slopes downward to the lowlands of the Bulow Creek State Park. For decades, high discharges from the canal eroded the sandy bluffs along the Atlantic Coastal Ridge and carried the sediment into Bulow Creek where it was deposited as accreting sandbars. In 1999, Volusia County implemented the Korona Canal Improvements project to stabilize the eroding banks and reduce sediment discharge into Bulow Creek. The undercut banks were graded and stabilized with rip-rap, and a series of low coquina-rubble dams were installed in the channel to reduce the sediment load in canal discharge. The canal improvements have reduced bank erosion and sediment deposition into Bulow Creek, although sediment loading is still evident in turbid runoff following storm events in the Korona Canal drainage basin.

Tomoka State Park: Soil erosion is evident in some of the shoreline areas of Tomoka State Park. Tomoka Point, comprised of shell midden associated with the Nocoroco site, is vulnerable to erosion from wave action and loss of plant cover by visitor use. Former park managers have noted the loss of midden at the point and subsequent exposure of aboriginal materials, including

human bone. In 1982, the park initiated erosion control by planting saltmarsh cordgrass (*Spartina alterniflora*). The growth of *Spartina*, augmented by other shoreline plantings, has largely stabilized the shell midden at Tomoka Point. Another management concern at Tomoka State Park is the erosion of the low bluffs between the Group Camp Area and the Tomoka River Bridge.

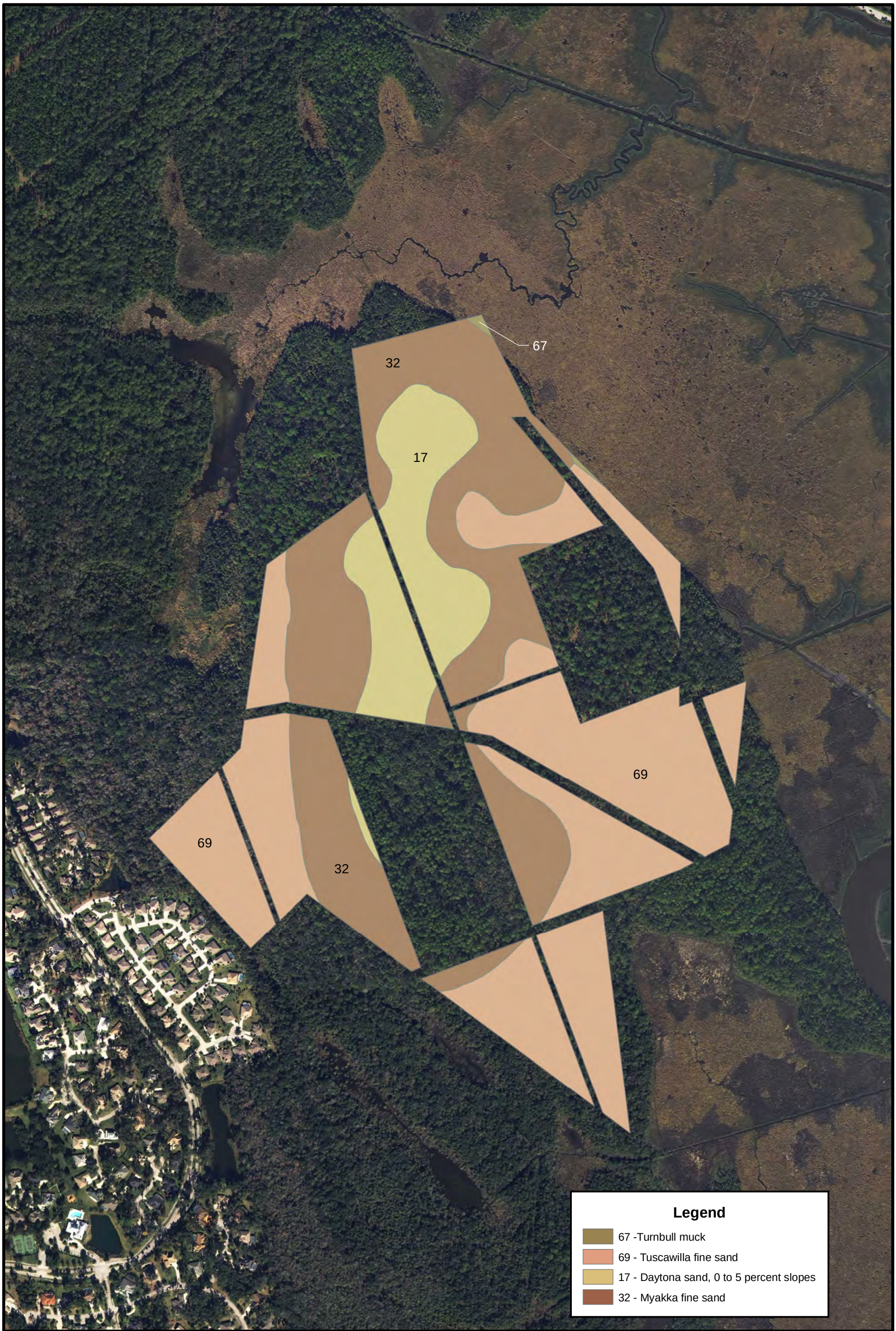
Several factors contribute to the slumping of the bluff including wave action, footpaths from the Group Camp, and runoff from the bridge. Erosion control measures were implemented in 1997 by stabilizing the bluff around the new Group Camp dock with coquina riprap. A concrete walkway with handrails was installed to provide a single, safe access to the dock, replacing the old footpaths from the camp to the river. The park has initiated discussions of the condition of the Tomoka River Bridge with Volusia County, which maintains the bridge crossing. There are also eroding areas along the dredge spoil berm bordering the western shoreline of Strickland Creek. This man-made embankment is inherently unstable, particularly where there is no ground cover on the berm. High-energy wakes from powerboats cause accelerated erosion by undermining shallow-rooted red cedar trees and other shoreline vegetation. Increased law enforcement has reduced boater impacts and increased manatee protection in Strickland Creek.

Minerals

Quartz sand and coquina rocks are the only known minerals with commercial value that occur within park boundaries. Coquina rock was important to the historic development of the Tomoka Basin region. It was used for the construction of sugar mills, houses, and other plantation structures. The quality of coquina as building stone is variable, depending on the “lithification” or degree of hardness of the deposit.

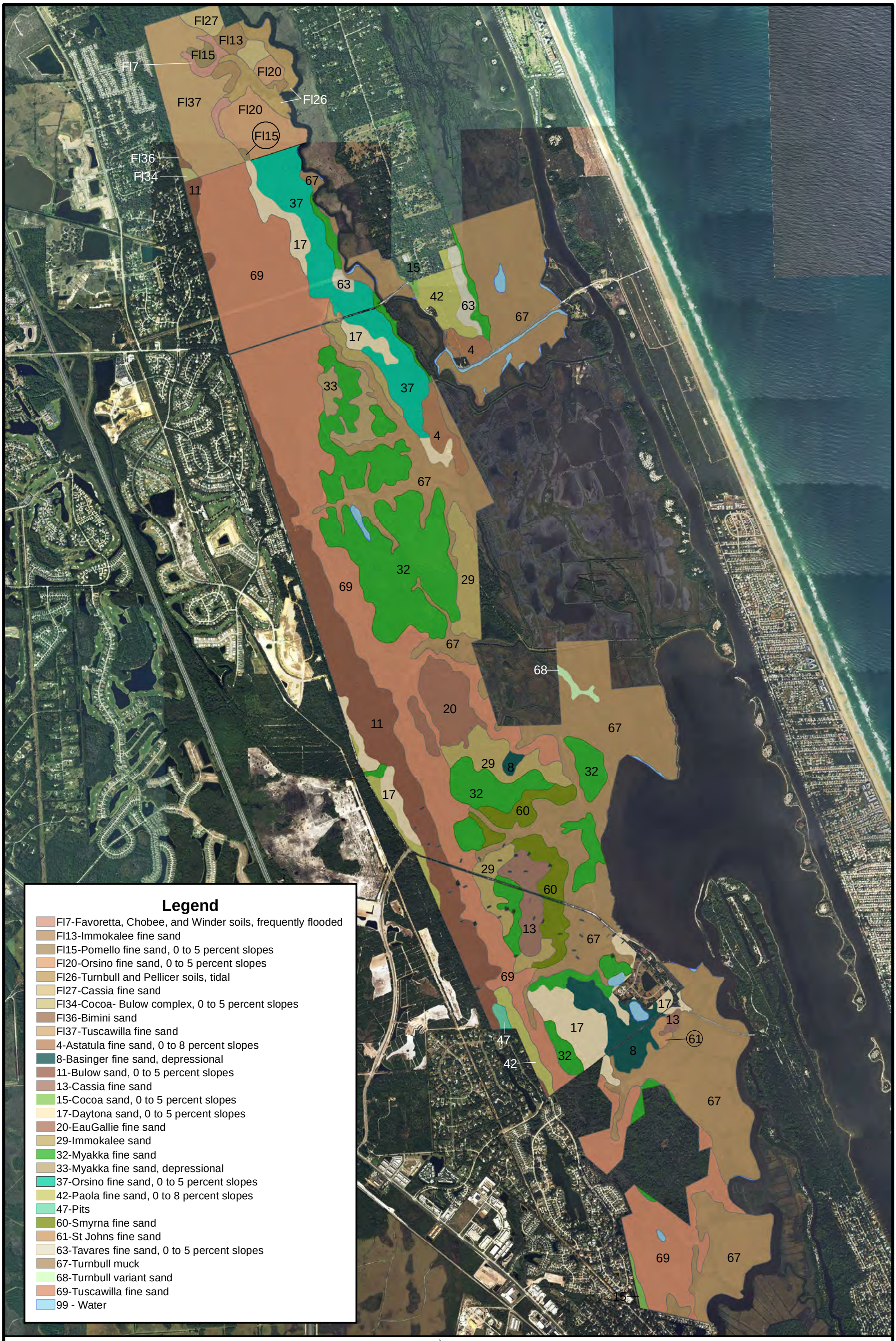
Hydrology

Bulow Plantation Ruins Historic State Park. The park manages approximately 3,200 feet of shoreline along Bulow Creek, which originates in Graham Swamp, about 4 miles north, and flows southerly for about 10 miles before entering the upper Halifax River at Knox Memorial Bridge (Highbridge). In 1999, St. Johns River Water Management District (SJRWMD) installed an automated water level recorder in the creek near the historic Bulow boat slips. The station will provide information on stage, discharge and tidal fluctuations in this reach of Bulow Creek. Staff



ADDISON BLOCKHOUSE
HISTORIC STATE PARK

SOILS MAP



Legend

- Fl7-Favoretta, Chobee, and Winder soils, frequently flooded
- Fl13-Immokalee fine sand
- Fl15-Pomello fine sand, 0 to 5 percent slopes
- Fl20-Orsino fine sand, 0 to 5 percent slopes
- Fl26-Turnbull and Pellicer soils, tidal
- Fl27-Cassia fine sand
- Fl34-Cocoa- Bulow complex, 0 to 5 percent slopes
- Fl36-Bimini sand
- Fl37-Tuscawilla fine sand
- 4-Astatula fine sand, 0 to 8 percent slopes
- 8-Basinger fine sand, depressional
- 11-Bulow sand, 0 to 5 percent slopes
- 13-Cassia fine sand
- 15-Cocoa sand, 0 to 5 percent slopes
- 17-Daytona sand, 0 to 5 percent slopes
- 20-EauGallie fine sand
- 29-Immokalee sand
- 32-Myakka fine sand
- 33-Myakka fine sand, depressional
- 37-Orsino fine sand, 0 to 5 percent slopes
- 42-Paola fine sand, 0 to 8 percent slopes
- 47-Pits
- 60-Smyrna fine sand
- 61-St Johns fine sand
- 63-Tavares fine sand, 0 to 5 percent slopes
- 67-Turnbull muck
- 68-Turnbull variant sand
- 69-Tuscawilla fine sand
- 99 - Water

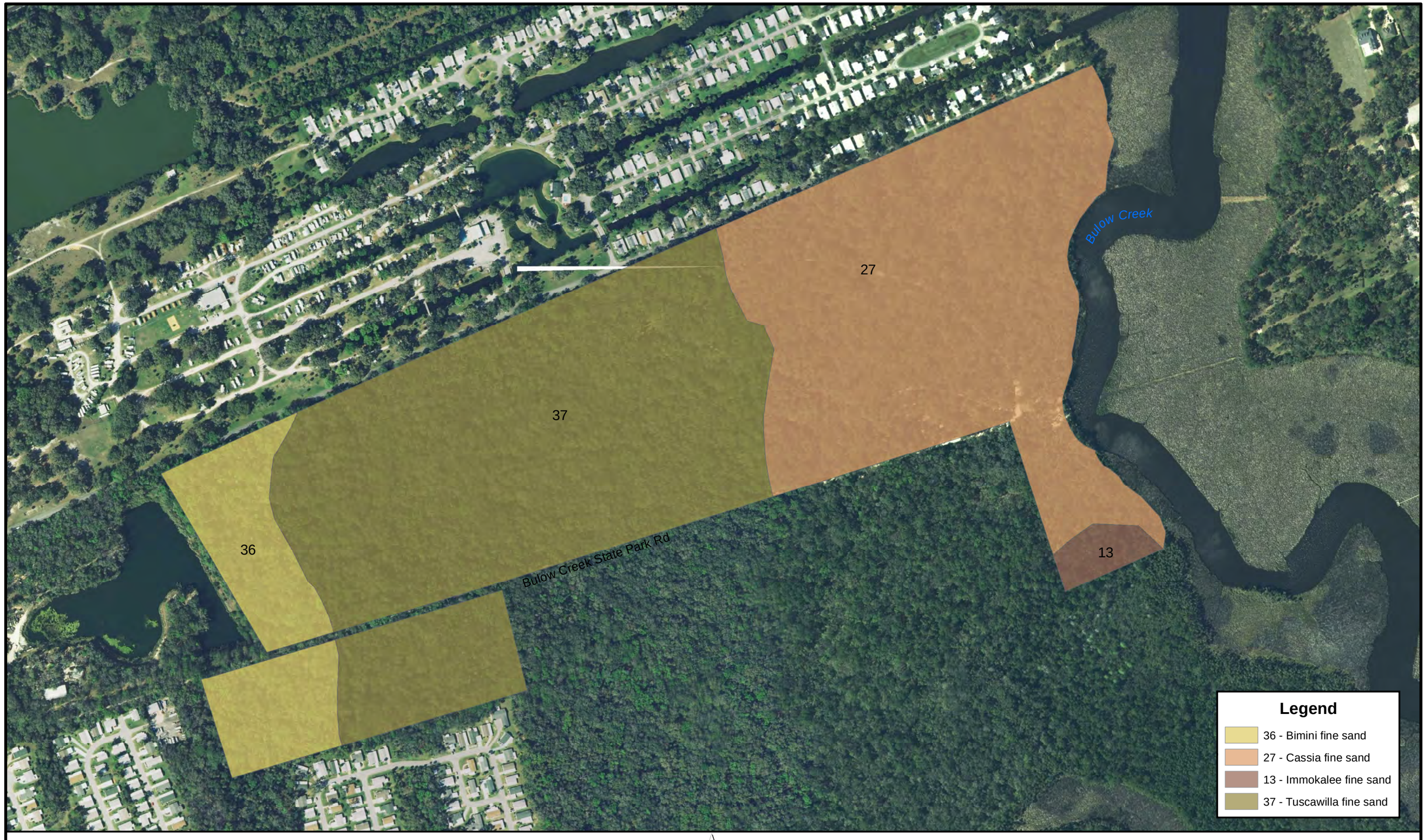
BULOW CREEK STATE PARK

N

0 1,250 2,500 5,000 Feet

Florida Department of Environmental Protection
Division of Recreation and Parks
Date of aerial: 2009

SOILS MAP



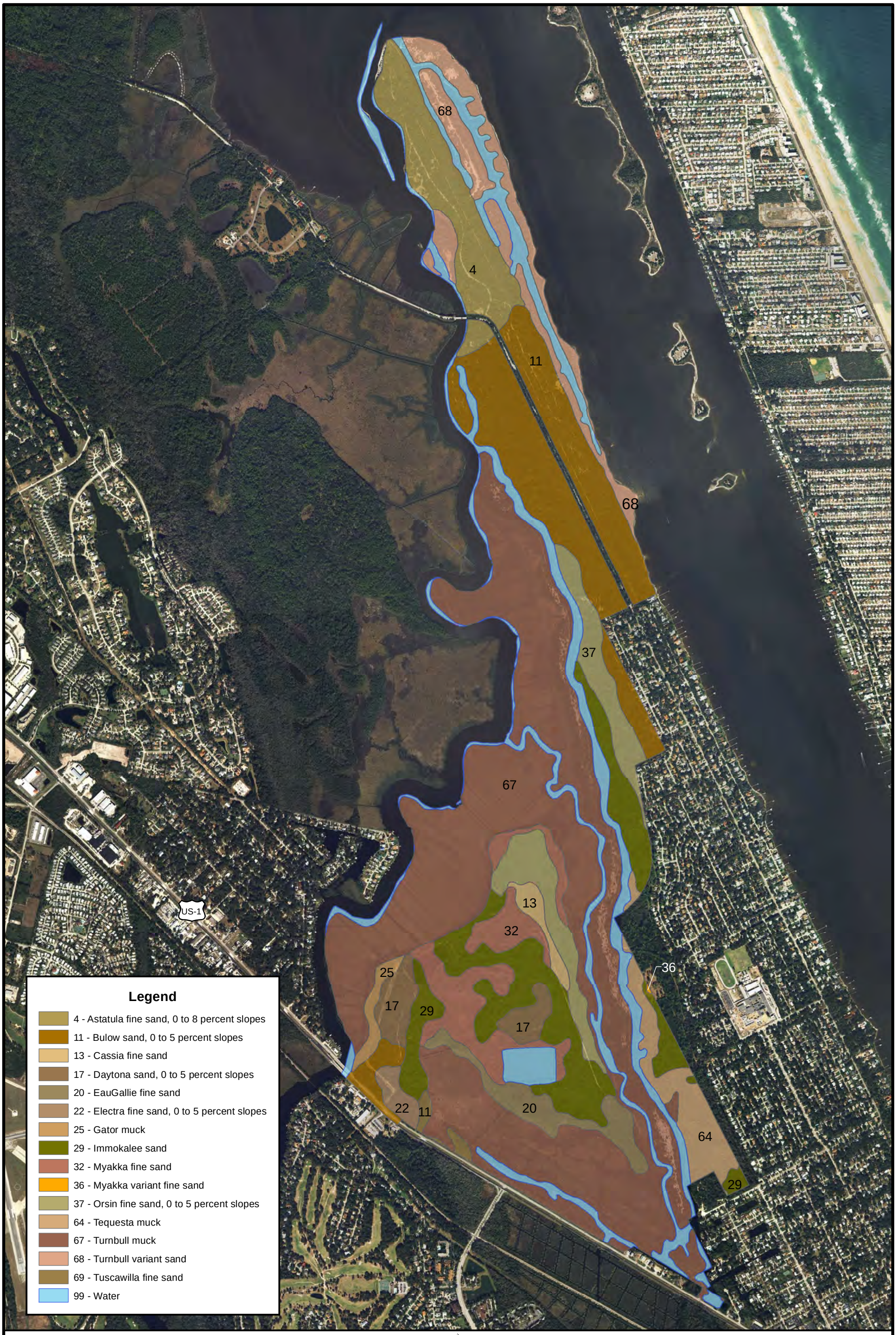
BULOW PLANTATION RUINS HISTORIC STATE PARK

N

0 100 200 400 600 800 Feet

Florida Department of Environmental Protection
Division of Recreation and Parks
Date of aerial: 2009

SOILS MAP



TOMOKA STATE PARK

N

0 750 1,500 3,000 Feet

Florida Department of Environmental Protection
Division of Recreation and Parks
Date of aerial: 2009

SOILS MAP

have been monitoring local rainfall for over 20 years, and have collected data on several floods at the park.

Bulow Creek State Park. The Bulow Creek drainage basin covers approximately 30 square miles in southeast Flagler County and the northeast corner of Volusia County (SJRWMD 1997). The lower reaches of Bulow Creek and tributary branches are influenced by ocean tides that enter coastal lagoons and the Intracoastal Waterway (ICW) at Ponce Inlet, 26 miles south, and at Matanzas Inlet, 22 miles to the north. Salinity concentrations in Bulow Creek are highly variable due to daily and seasonal fluctuations of tides and freshwater runoff

In 2003, SJRWMD approved the Surface Water Improvement and Management (SWIM) plan for the Northern Coastal Basin (NCB) that comprises coastal lagoons and rivers from Ponte Vedra in St. Johns County to Ponce de Leon Inlet in Volusia County. The SWIM program provides funding for water quality sampling and analysis for the Halifax River, Tomoka River and Bulow Creek. In 2004, SJRWMD published a water quality report for the Northern Coastal Basin, including a summary of water quality conditions in Bulow Creek.

The data from the Northern Coastal Basin sampling stations was incorporated into the 2005 Water Quality Status Report for the Upper East Coast Basin, a comprehensive watershed assessment by DEP for the Total Daily Maximum Load (TDML) Program required under the federal Clean Water Act. A TDML is the maximum amount of a specific pollutant that a waterbody can assimilate and still maintain its designated uses under the DEP's water classification system. Bulow Creek is designated Class III waters for “Recreation, propagation and maintenance of a healthy, well-balanced population of fish and wildlife.” The Water Quality Status Report indicates that dissolved oxygen values and iron content in the upstream freshwater segment of Bulow Creek exceed the threshold values of these parameters for Class III waters. Due to these surface water conditions, Bulow Creek (freshwater stream) was added to the statewide list of “impaired waters” (DEP 303(d)-2008) which requires the development of TDMLs as the initial step in the restoration of the waterway. It should be noted that the upstream, freshwater segment of Bulow Creek is not within Park boundaries.

The surface water and groundwater hydrology of Bulow Creek State Park is described in studies by D. Gomberg (1981). He described the interconnection of surface runoff and groundwater at Bulow Creek. Local rainfall that infiltrates the sandy uplands of the Atlantic Coastal Ridge along the western side of the park moves eastward as subsurface flow. Some of this groundwater is discharged by seepage springs (low volume) from the base of the ridge where it meets the lowlands of the Silver Bluff Terrace. Spring flow can be observed from the Skip Wahlin Nature Trail where the boardwalk crosses a small seepage stream. The discharge from seepage springs combines with surface runoff from lowland hammocks to form a network of small streams, which drain into tidal tributaries of Bulow Creek.

There are some old wells at Bulow Creek that formerly provided artesian water for cattle and other local uses, but most of these no longer have free-flowing discharge. However, a long-abandoned, intermittently flowing well was discovered just south of Estuary Road, within Management Zone BC 07. The St. Johns River Water Management District was contacted and they provided a contractor to cap the well. The work was completed by August 2010.

An erosion problem in Korona Canal and sediment loading in stormwater discharges to Bulow Creek was discussed in the Soils section. The deposition of sediment in Bulow Creek in the decades following the opening of Korona Canal resulted in the accretion of large sandbars in the channel that became visible to boaters and local residents by the late 1980s. By the mid 1990s, sand deposits had completely filled a 1000-foot section of the channel downstream from the canal outlet, and a 300-foot section of the channel was blocked upstream from the discharge point (this reach of Bulow Creek is tidal with bi-directional flow). As the sandbars grew, the public looked to the state park to take action to restore the channel, with concerns for boat navigation and the impact of diminished tidal flow on fish and wildlife, including the migratory movements of manatees. The park's preliminary investigation of the sediment problem at Bulow Creek was coincident with a grant application by Flagler County to remove the sandbar deposits. The Sand Bar Removal project was never implemented, however, and sediment buildup in Bulow Creek increased. In 1999, initial actions were taken by Volusia County with The Korona Canal Improvements project (see Soils) which reduced upstream sources of sediment. In 2005, Volusia County Mosquito Control (VCMC) excavated a large volume of sediment and restored the channel to the approximate dimensions of the original channel (approximately 80 feet wide and 4 feet deep). Volusia County Stormwater Management installed a series of coquina-rubble control structures (low flow elevation) in the lower reach of the canal to remove sediments prior to discharge to the restored channel in Bulow Creek. The project was a major accomplishment in the management of the Bulow Creek watershed, but will require monitoring of sediment discharge from the canal to prevent future buildup of sandbars.

The southern half of the park contains numerous drainages that convey surface runoff and groundwater from uplands west of the state property into the Tomoka Basin. Most of the drainageways are poorly defined, comprised of multiple rivulets that convey seasonal runoff through low hammocks and swamps into tidal wetlands. There are some better-defined channels that are indicated as sloughs, two of which drain into the lake in the Addison Branch marsh south of Pine Tree Drive. The slough at the headwaters of the marsh conveys treated stormwater discharge from the Ormond Lakes subdivision as well as runoff from surrounding lowlands. The slough that enters the north end of the marsh lake drains seasonally flooded hammocks that border Pine Tree Drive.

Projections of future water use in the urban growth area of northeast Volusia County indicate a decline of groundwater supply in the Floridan Aquifer and a corresponding drawdown of the water table in surficial aquifers. Although the impact of regional hydrological changes on park resources is difficult to predict, a decline in local aquifers from domestic consumption in suburban developments along the Atlantic Coastal Ridge -- a groundwater "recharge zone" -- could directly effect the flow of seepage springs and wetland hydroperiods in Bulow Creek State Park.

Addison Blockhouse Historic State Park. The park is located in the Tomoka River Watershed comprising both freshwater and estuarine surface water features. Although the Blockhouse has not flooded in recent years, at 5 feet msl it does lie below the FEMA-mapped regional base flood elevation of the 100-Year Flood Zone.

A hydrological study of the National Gardens property (Gomberg 1985), a planned subdivision in the vicinity of Addison Blockhouse, identified three aquifers in the region: a water table aquifer in surficial sandy deposits, a shell aquifer (where localized shell layers occur), underlying the sand mantle, and the Floridan aquifer in the upper layers of Eocene limestone. In terms of aquifer hydraulics, the Silver Bluff terrace is a transition zone between recharge areas, the Atlantic Coastal Ridge and a discharge area east of the Atlantic Barrier Chain. Hydrologic conditions in this recharge-discharge transition zone are characterized by a high water table and low drainage capacity (Knochenmus 1968).

Tomoka State Park. Hydrology is also a primary management concern at Tomoka State Park. As previously described, there are presently no water quality monitoring stations on Strickland Creek, which has been designated as Special Waters OFW (1991) and regulated as a manatee protection zone under the Florida Manatee Sanctuary Act (1993). In this regard, the park supports recommendations in the Manatee Protection Plan of Volusia County (2002 Draft) to implement water quality sampling in Strickland Creek and other tributaries of the Tomoka River Manatee Sanctuary.

The sandy soils and forest cover at Tomoka State Park limit runoff from land areas into surrounding waterways. The stormwater drainage from the Tomoka River Bridge has been identified as a problem and the parking area for the boat ramp and park concession is a source of direct discharge. Soil surveys conducted during the boat ramp improvements indicated that the ground surrounding the parking area is largely aboriginal midden deposits, which limits the amount of land area available for stormwater treatment basins. There is a stormwater inlet in front of the concession building that drains runoff from the store parking area directly into the boat basin. With new technology available, the park will research different types of “water quality inlets” that can remove sediment, grease and oil from runoff before it is discharged at the outlet pipe. Stormwater runoff into the basin could be further reduced by the use of pervious parking material when the existing asphalt surface needs replacement.

A segment of the Tomoka River forms the western boundary of Tomoka State Park, with 4.3 miles of shoreline between the U.S. Highway 1 Bridge and the mouth at Tomoka Basin. The Tomoka River Watershed drains nearly 160 square miles in Volusia and Flagler Counties (Camp Dresser and McKee 1995). The lower half of the Tomoka River has a low gradient, dropping about 1 foot per mile from the bridge at Interstate Highway 95 to mean sea level at the Tomoka Basin. This reach is influenced by ocean tides, which enter the basin from the Intracoastal Waterway and Halifax River lagoon. The upper river is a freshwater stream that drains urban areas, pine flatwoods and swamps. The mixing of tannin-colored freshwater and saline tidewater creates the dark, brackish water of the Tomoka estuary.

The Park includes three tidal tributaries. Strickland Creek is a dredged channel approximately 2.7 miles long, that was excavated along the west side of the Tomoka peninsula. It enters the Tomoka River ca. 0.5 miles upstream (south) of the Old Dixie Highway Bridge. Thompson Creek is a natural tributary. Its mouth is approximately 1.5 miles upstream from the bridge and, at flood tide, flows southerly 2.1 miles to the junction waters of Dodson Canal and Strickland Creek near Sanchez Park. Dodson Canal was dredged before 1943, probably during the construction of U.S. Highway 1 in the 1930s, and is approximately 1 mile in length. The dredged

channels, Strickland Creek and Dodson Canal, reach depths greater than 10 feet in the center of the channel. Thompson Creek is shallower, with depths less than 5 feet.

Daily tide monitoring was initiated in 1998 with the installation of a float-type manual recorder at the park boat basin. The chart records indicate that the Tomoka River has a small tidal range; on average, the daily tides fluctuate approximately 9.25 inches. The maximum daily tidal range during this period was 1.21 feet.

The frequency, depth and duration of tidal flooding are a primary factor in the development of salt marshes (Myers and Ewel 1990). The tidal regime of the Tomoka River is characteristic of the "high marshes" of the east-central Florida coast where the general elevation of the marsh surface is higher than the "mean high tide" level of diurnal lunar tides. The Tomoka marshes are not flooded and drained twice a day like the "low marshes" of northeast Florida that are dominated by saltmarsh cordgrass. The Tomoka marshes may be inundated for prolonged periods during the autumnal rise or after storm events, then dry for extended periods during drought and seasonal low-tide stages. The drainage of the high marshes is poor, with isolated potholes, shallow pools and sluggish flow in tidal creeks meandering across the marsh flats. These drainage conditions promote the breeding of salt marsh mosquitoes, which were the primary motive for the dredging of ditches and canals by dragline dredges in the 1950s and 1960s.

In October 2000, USGS installed a water level recorder and acoustic velocity meter at the docks of the Sunset Picnic Area to monitor tide stage and stream flow in the lower Tomoka River.

Several state and local government agencies are involved in monitoring the water quality of the Tomoka River. A monthly monitoring program for coastal waters of Volusia County was implemented in 1991 by SJRWMD with five stations in the Tomoka River from the mouth at Tomoka State Park (Station TR01) to the headwaters reach between U.S. Highway 92 and Interstate Highway 4 in Daytona Beach (Station TR05).

The SJRWMD water quality data was incorporated into the comprehensive assessment by DEP for the TDML program (Total Daily Maximum Load) required by the Federal Clean Water Act. In the 2005 Water Quality Status Report for the Upper East Coast Basin, DEP subdivided the Tomoka River into two segments, Tomoka River- Estuary from the mouth of the river to the US 1 bridge (SJRWMD stations TR01, TR02) and the freshwater segment, Tomoka River-Stream, from US 1 to the headwaters south of Interstate 4 in Daytona Beach (SJRWMD stations TR03, TR04, TR05). Both estuarine and freshwater stream segments of the Tomoka River are designated as Outstanding Florida Waters (DEP rule 62-302.700). The Special Protection, OFW designation includes the Thompson Creek and Strickland Creek tributaries in Tomoka State Park. The surface water classification for the Tomoka River watershed is subdivided as Class III Marine and Class III Fresh waters for "Recreation, propagation and maintenance of a healthy, well-balanced population of fish and wildlife" in "marine water" and "fresh water" respectively.

The DEP 2005 Water Quality Status Report indicated that both the estuarine and stream segments of the Tomoka River had parameters of concern under TDML criteria. Dissolved oxygen values in both the estuarine segment and freshwater stream segments were below Class

III standards; the Tomoka River watershed was proposed for 303(d) listing as "potentially impaired" waters.

Groundwater conditions at Tomoka State Park have been described in several hydrological investigations. The surficial aquifer is comprised of coastal sediments: sand, silt and clay, and coquina deposits of the Anastasia Formation (Scott 1992). The top of the Floridan aquifer, composed of permeable limestones of Eocene age, lies at a depth of 80 feet below mean sea level. The base of the limestone aquifer is approximately 2,000 feet below msl (Subsurface Detection Investigations 1994).

Urban land uses can have a significant impact on the hydrological resources of parks and preserves. Urban runoff is a major concern at Strickland Creek in Tomoka State Park, which is an OFW and a designated manatee sanctuary. During rain events, Strickland Creek receives untreated stormwater discharge from residential areas in Ormond Terrace and Northbrook subdivisions. The City of Ormond Beach has installed filter packs and sediment traps in some storm drains, but needs to develop regional facilities such as "stormwater parks" (wet detention pond) to effectively treat the large volume of runoff from these subdivisions. Tomoka State Park and citizens groups need to support City efforts to obtain funding for stormwater treatment to prevent degradation of this important manatee habitat and recreational waterway.

Natural Communities

This section of the management plan describes and assesses each of the natural communities found in the state park. It also describes the desired future condition of each natural community and identifies the actions that will be required to bring the community to its desired future condition (DFC). Specific management objectives and actions for natural community management, exotic species management, imperiled species management and restoration are discussed in the Resource Management Program section of this component.

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 that are similar with respect to those factors will tend to have natural communities with similar species compositions. Obvious differences in species composition can occur, however, 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. Some physical influences, such as fire frequency, may vary from FNAI's descriptions for certain natural communities in this plan.

When a natural community within a park reaches the desired future condition, it is considered to be in a "maintenance condition." Required actions for sustaining a community's maintenance condition may include, maintaining optimal fire return intervals for fire dependant communities, ongoing control of non-native plant and animal species, maintaining natural hydrological functions (including historic water flows and water quality), preserving a community's biodiversity and vegetative structure, protecting viable populations of plant and animal species

(including those that are imperiled or endemic), and preserving intact ecotones linking natural communities across the landscape.

These four parks collectively contain 18 distinct natural communities as well as ruderal and developed areas (see Natural Communities Map). A list of known plants and animals occurring in the park is contained in Addendum 5.

MARITIME HAMMOCK

Desired future condition: A coastal evergreen hardwood forest occurring in narrow bands along stabilized coastal dunes. Canopy species will typically consist of live oak (*Quercus virginiana*), red bay (*Persea borbonia*), and cabbage palm (*Sabal palmetto*). The canopy is typically dense and often salt-spray pruned. Understory species may consist of yaupon holly (*Ilex vomitoria*), saw palmetto (*Serenoa repens*), and/or wax myrtle (*Myrica cerifera*). Very sparse or absent herbaceous groundcover will exist. Variation in species composition exists along the coast as you head southward, tropical species become more prevalent.

Description and assessment: The parks contain 3.8 acres of maritime hammock. At Bulow Creek State Park there is a hammock island in the tidal marshes north of Highbridge Road in which maritime influences, particularly wind deposited salt, are apparent in the low stature of the vegetation. Wind pruned live oaks are dominant in the canopy; other hammock trees include cabbage palm, red cedar, and southern magnolia. The understory contains saw palmetto (*Serenoa repens*) and wax myrtle (*Myrica cerifera*). The maritime hammock is assessed to be in good condition.

General management measures: Monitoring and treatment of exotic plants will continue for this area as well as the removal of feral hogs.

MESIC FLATWOODS

Desired future condition: Depending on region of state, dominant pines will usually be longleaf pine (*Pinus palustris*) and/or south Florida slash pine (*Pinus elliottii*). Native herbaceous groundcover should be over at least 50% of the area and less than 3 feet in height. Saw palmetto (*Serenoa repens*) will comprise no more than 50% of total shrub species cover, and are also less than 3 feet in height. Shrub species include saw palmetto, gallberry (*Ilex glabra*), fetterbush (*Lyonia lucida*), runner oak (*Quercus elliottii*), dwarf live oak (*Quercus minima*), shiny blueberry (*Vaccinium myrsinites*), and dwarf huckleberry (*Gaylussacia dumosa*). Shrubs are generally knee-high or less, and there are few if any large trunks of saw palmetto along the ground. The Optimal Fire Return Interval for this community is 1-3 years.

Description and assessment: The Tomoka Basin parks contain 710 acres of mesic flatwoods in various conditions. In general, they have an open canopy of slash pine with a dense ground cover of saw palmetto, gallberry (*Ilex glabra*), fetterbush (*Lyonia lucida*), and rusty lyonia.

At Bulow Creek State Park, there is a stand of mesic flatwoods on a sandy terrace deposit at the south end of the park. The flatwoods have accumulated high fuel loads due to the lack of fire. This tract needs to be burned to reduce fuel loads and restore natural processes. The mesic flatwoods in Bulow Creek State Park are assessed to be in fair condition.

UHF

MF

DM

SHM

MF

MEH

HH

UHF

Legend

- DM - Depression Marsh 1.35 ac.
- HH - Hydric Hammock 8.17 ac.
- MEH - Mesic Hammock 17.13 ac.
- MF - Mesic Flatwoods 47.32 ac.
- SHM - Shell Mound 0.74 ac.
- UHF - Upland Hardwood Forest 59.77 ac.

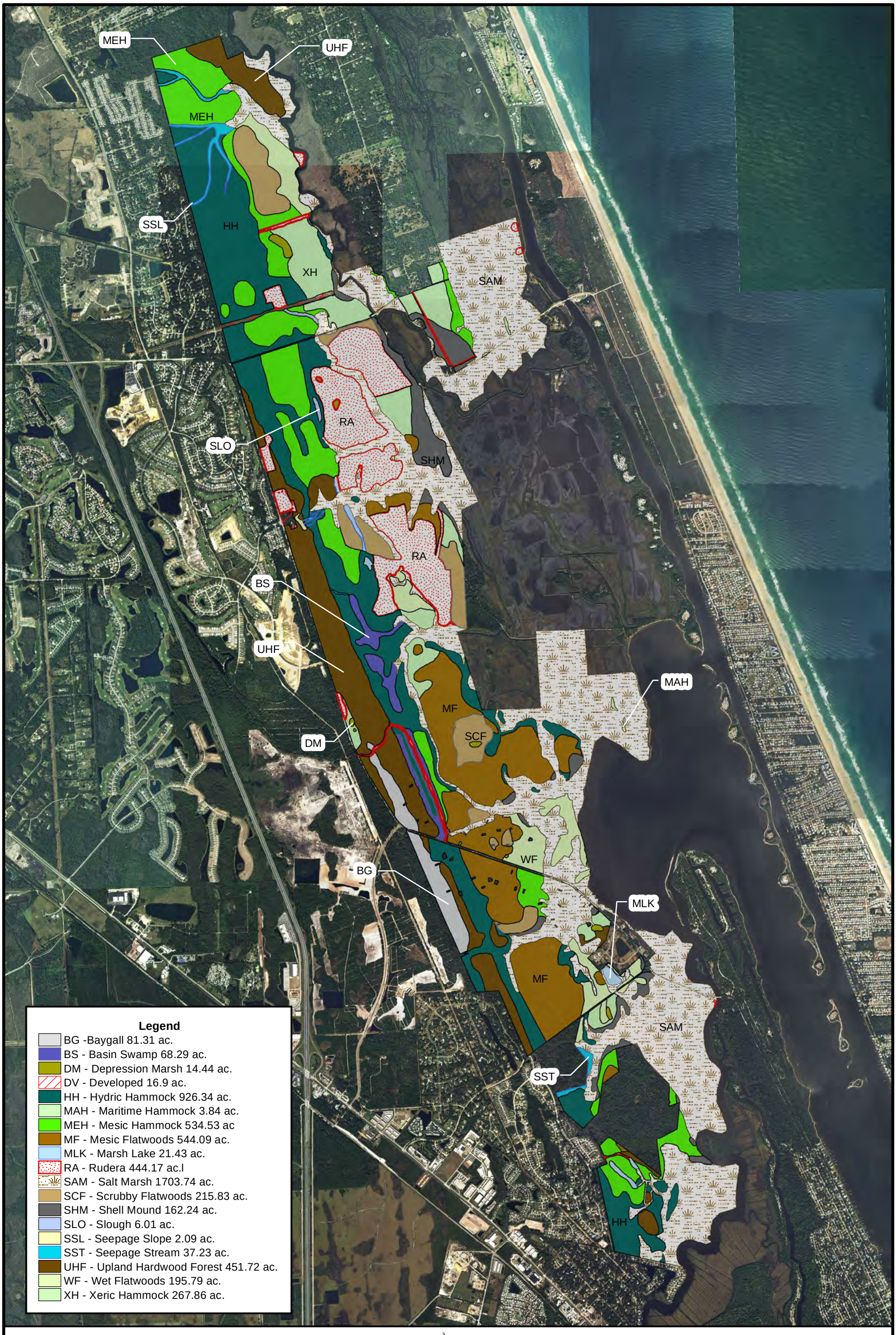
ADDISON BLOCKHOUSE
HISTORIC STATE PARK

N

0 250 500 1,000 Feet

Florida Department of Environmental Protection
Division of Recreation and Parks
Date of aerial: 2009

NATURAL COMMUNITIES MAP



BULOW CREEK STATE PARK

N

0 1,250 2,500 5,000 Feet

Florida Department of Environmental Protection
Division of Recreation and Park
Date of Aerial: 2009

NATURAL COMMUNITIES MAP

BULOW PLANTATION RUINS HISTORIC STATE PARK

N

0 100 200 400 600 800 Feet

Florida Department of Environmental Protection
Division of Recreation and Parks
Date of aerial: 2009

NATURAL COMMUNITIES MAP

TOMOKA STATE PARK

N

0 750 1,500 3,000 Feet

Florida Department of Environmental Protection
Division of Recreation and Parks
Date of aerial: 2009

NATURAL COMMUNITIES MAP

At Tomoka State Park, the mesic flatwoods are associated with Immokalee soils (quartz sands with a hardpan layer) of the terraces of Johns Island and sandy flats bordering Strickland Creek. The present condition of the flatwoods is the result of past land uses and fire history. Sequential views of Johns Island from aerial photos show a great increase in the density of pines on the island. In the mid-20th century, the flatwoods were largely open with widely scattered pines, perhaps due to grazing, logging and burning which were common practices in the pinelands before World War II. Within three decades, the aspect of the mesic flatwoods has changed from savannah-like conditions to a forested community. Recent aerial photos show that crown cover is about 50 percent, indicating a relatively dense stand of slash pines. The mesic flatwoods in Tomoka State Park are assessed to be in fair condition.

General management measures: The long-term restoration of this community will require the regular application of prescribed fire on a 2-4 year burn rotation and may require planting of longleaf pine and thinning via a timber harvest. Firebreaks within and adjacent to the mesic flatwoods may need to be widened and fuel heights along firebreaks reduced to manageable levels. If the duff layer is deep, adequate duff moisture should exist before burning in an effort to remove fuel accumulations gradually and not ignite deep layers of duff that could result in tree mortality. Monitoring and treatment of exotic plants will continue for this area.

SCRUB

Desired future condition: Dominant species over the vast majority of scrub acres will include sand live oak (*Quercus geminata*), myrtle oak (*Quercus myrtifolia*), Chapman's oak (*Quercus chapmanii*), saw palmetto (*Serenoa repens*), and rusty staggerbush (*Lyonia ferruginea*). The oak canopy varies in height from 3-8 feet with the overall average height of scrubs being no more than 6ft in height. There will be a variety of oak age classes/heights between different scrub patches. There are scattered openings in the canopy with bare patches of sand that specific species depend on. Sand pine (*Pinus clausa*), where present, will usually not be dominant in abundance, percent cover, or height. Some areas of mature sand pine occur; groves of sand pine in select locations in the panhandle may exceed 100-150 years of age; do not confuse sand pine age with needed fire return interval. The optimal fire return interval for this community is regionally variable, typically 4-15 years when aiming to achieve a mosaic of burned and unburned areas.

Description and assessment: Scrub communities are comprised of a various number of plants that can survive in sandy, dry and well-drained soils. The main shrub plants that are found in this community are scrub oaks composed of myrtle oak (*Quercus myrtifolia*), Chapman's oak (*Q. chapmanii*), and sand live oak (*Q. geminata*) with scattered saw palmetto, and rusty lyonia. The ground layer is sparsely vegetated with mats of pine litter and lichens, and scattered xerophytic plants including prickly pear cactus (*Opuntia* sp.) and sarsaparilla vine (*Smilax pumila*).

There are two tracts of scrub in Tomoka State Park, totaling 54 acres. There is a small stand of oak scrub on a sandy rise bordering the flatwoods on the eastern side of Johns Island. There is a larger tract of sand pine scrub on the slope between Keyhole Lake and U.S. Highway 1. Part of the sand pine tract was cleared for a mobile home park in the 1970s. This disturbed scrub, consists of a dense second growth of young sand pines (*Pinus clausa*), approximately 3-9 inches DBH (diameter at breast height), with an open understory. Most of the original ground cover was cleared for mobile home sites and residential infrastructure. Although the mobile home

development was abandoned, there are numerous pits with open storm sewers that pose a hazard to park visitors and wildlife. The storm sewers will be covered and the pits backfilled for public safety and habitat protection. About half of the sand pine area was not disturbed by development and contains mature sand pines, 12-18 in DBH, above a dense understory growth of scrub oaks, myrtle oak, Chapman's oak and sand live oak with saw palmetto, and rusty lyonia. The sand pine scrub is assessed to be in poor-fair condition. Mechanical treatments and timber harvests will be used to restore the sand pine scrub to a condition conducive for prescribed burning. A fire return interval will be assigned once the area is assessed after the mechanical treatments.

The oak scrub bordering Thompson Creek has a low canopy, about 20-25 feet, comprised of live oak (*Quercus virginiana*), rusty lyonia, Chapman's oak and myrtle oak. The understory is dominantly saw palmetto over a ground layer of oak leaves, lichens and patches of bracken fern (*Pteridium aquilinum*) and coontie (*Zamia pumila*). The oak scrub is assessed to be in fair condition.

The fauna of the scrub tracts at Tomoka State Park have not been inventoried; field observations include gopher tortoise (*Gopherus polyphemus*), eastern diamondback rattlesnake *(Crotalus adamanteus),* Florida box turtle (*Terrapene carolina bauri*), white-tailed deer (*Odocoileus virginianus*), and bobcat (*Lynx rufus*).

General management measures: In the Johns Island scrub unit, fire should be applied to this area first if it is determined to be safe to do so. If the unit will not burn with fire alone, then the area should be considered for mechanical treatment followed by prescribed fire. Some portions of the management zone containing the scrub may not burn every time the zone is treated with prescribed fire as it has a longer fire return interval than the more pyrrhic portion of the zone. Ideally, the scrub should be managed as early succession scrub and not allowed to succeed back to a more challenging to manage late succession phase of scrub. Firebreaks around the zone may need widening and fuel heights adjacent to firebreaks reduced. A sand pine harvest may be needed to reduce fuel loads prior to burning. Exotic plant species removal will continue.

SCRUBBY FLATWOODS

Desired future condition: Dominant tree species of the interior will usually be longleaf pine (*Pinus palustris*) and/or south Florida slash pine (*Pinus elliottii*) depending on region of the state. Slash pines are the dominant tree in North Florida barrier island scrubby flatwoods. Mature sand pines (*Pinus clausa*) will typically not be present.There will be a diverse shrubby understory often with patches of bare white sand. A scrub-type oak "canopy" will vary in height from 3 – 8 feet and there will be a variety of oak age classes/heights across the landscape. Dominant shrubs include sand live oak (*Quercus geminata*), myrtle oak (*Quercus myrtifolia*), Chapman's oak (*Quercus chapmanii*), saw palmetto (*Serenoa repens*), rusty staggerbush (*Lyonia ferruginea*), and tarflower (*Bejaria racemosa*). Cover by herbaceous species is often well below 40%. The Optimal Fire Return Interval for this community is regionally variable. Typically, 3-5 years when aiming to achieve a mosaic of burned and unburned areas.

Description and assessment: Tomoka Basin parks contains 281 acres of scrubby flatwoods that have an open canopy with scattered slash pine (*Pinus elliottii*), and occasional sand pine. The scrubby flatwoods have a two-layered understory with a subcanopy of scrub oaks and rusty lyonia, 10-15 feet high, above a low shrub layer of saw palmettos. The ground layer is largely

comprised of oak leaf litter. In Bulow Creek State Park, there is a tract of scrubby flatwoods on the south side of Pumphouse Road on a sandy rise bordering the tidal marshes of Tomoka Basin. The eastern boundary line of the park bisects the flatwoods that burned during the summer wildfires of 1998. The scrubby flatwoods portion will be placed on a 3-5 year fire return interval during the restoration period and is considered to be in good condition.

At Tomoka State Park, the scrubby flatwoods intergrade with mesic flatwoods, but occur on slightly elevated rises in the interior of Johns Island. The tract of scrubby flatwoods that is south of Johns Island Road was burned in 1995, and again in 2000. The burns have changed the structure of this tract by thinning the understory oaks and reducing the height of the subcanopy. The more open condition appears to have stimulated the growth of vanilla leaf (*Carphephorus odoratissimus*) and other herbaceous species. The scrubby flatwoods are assessed to be in fair to good condition.

General management measures: This community will require the regular application of prescribed fire on a 3-5 year burn rotation and possible fuel reduction such as mowing to reduce fuel heights adjacent to firebreaks and within the zone itself. If the duff layer is deep, adequate duff moisture should exist before burning in an effort to remove fuel accumulations gradually and not ignite deep layers of duff that could result in tree mortality. Exotic plant species removal will continue.

SHELL MOUND

Desired future condition: This community type is largely the result of human activities instead of natural and physical processes. Shell mounds are small hills or mounds made up almost entirely of mollusk shells discarded by Native Americans. The soils will be circumneutral to slightly alkaline, contain minimal organic material, and are very well drained. Undisturbed shell mounds can support a variety of hardwood trees and shrubs which may include white stopper (*Eugenia axillaris*), live oak (*Quercus virginiana*), cabbage palm (*Sabal palmetto*), red cedar (*Juniperus virginiana*), torchwood (*Amyris elemifera*), wild lime (*Zanthoxylum fagara*), saffron plum (*Sideroxylon celastrinum*), soapberry (*Sapindus saponaria*), snowberry (*Chiococca alba*), and false mastic (*Sideroxylon foetidissimum*). Desired future conditions include minimizing erosion; including maintaining appropriate vegetation heights to minimize toppling of large trees, and protecting sites from illegal digging.

Description and assessment: There are 188 acres of shell mound within the parks. Shell mounds have a cultural origin but contain distinct plant associations, and are thus classified by FNAI as a natural community type. The calcareous, alkaline soils of shell deposits provide substrate for a number of locally rare species; this special botanical feature is described under Special Natural Features.

At Bulow Creek State Park, there are shell mounds at Mound Grove, and along lower Cedar Creek and Bulow Creek. These aboriginal midden sites are comprised of the remains of shellfish, principally estuarine species, the eastern oyster (*Crassostrea virginica*) and quahog (*Mercenaria mercenaria*). Some of the shell mounds support populations of locally rare tropical plants, including wild coffee (*Psychotria nervosa*), soapberry (*Sapindus marginatus*), and marlberry (*Ardisia escallonioides*). The shell mound community is assessed to be in good condition at Bulow Creek.

At Tomoka State Park, there is a variety of aboriginal shell deposits: oyster middens, coquina middens and mixed sand-and-shell mounds. The most diverse collection of tropical plant species in the park is located at Tomoka Point on the prehistoric midden, Nocoroco. This site is discussed in later sections as a Special Natural Feature. The shell mound community is assessed to be in good condition at Tomoka.

General management measures: Monitoring and treatment of exotic plants will continue for this area as well as the removal of exotic hogs. This area will also need to be monitored for erosion that may occur due to recreational use on trails and roads.

MESIC HAMMOCK

Desired future condition*:* A well-developed evergreen hardwood and/or palm forest which can occur, with variation, through much of peninsular Florida. The often dense canopy will typically be dominated by live oak (*Quercus virginiana*) with cabbage palm (*Sabal palmetto*) mixed into the understory. Southern magnolia (*Magnolia grandiflora*) and pignut hickory (*Carya glabra*) can be common components in the subcanopy as well. The shrubby understory may be dense or open, tall or short, and is typically composed of saw palmetto (*Serenoa repens*), beautyberry (*Callicarpa Americana*), American holly (*Ilex opaca*), gallberry (*Ilex glabra*) and sparkleberry (*Vaccinium arboretum*). The groundcover may be sparse and patchy but generally contains panicgrasses (*Panicum* spp.), switchgrass (*Panicum virgatum*), sedges, as well as various ferns and forbs. Abundant vines and epiphytes occur on live oaks and cabbage palms and other subcanopy trees. Mesic hammocks will generally contain sandy soils with organic materials and may have a thick layer of leaf litter at the surface. Mesic hammocks are rarely inundated and not considered to be fire-adapted communities and are typically shielded from fire.

Description and assessment: The parks contain 637 acres of mesic hammock habitat. Mesic hammock occurs on the east slope of the Atlantic Coastal Ridge on well-drained Bulow sand. Fire is rare due to the moist microclimate of coastal hammocks.

Mesic hammock is habitat for a variety of vertebrate animals. Reptiles observed include the eastern diamondback rattlesnake, eastern indigo snake (*Drymarchon corais couperi*), and eastern coral snake (*Micrurus fulvius fulvius*). At Bulow Plantation Ruins, a Florida worm lizard (*Rhineura floridana*) was found as a roadkill on Plantation Road, and a three-toed box turtle (*Terrapene carolina triunguis*) has been recorded, well outside its usual range in the Florida panhandle. Ospreys (*Pandion haliaetus*) also nest in pine snags near Bulow Creek. Additional field observations from this natural community include white-tailed deer, wild turkey (*Meleagris gallopavo*), pileated woodpecker (*Dryocopus pileatus*), gray fox (*Urocyon cinereoargenteus*), Virginia opossum (*Didelphis virginiana*), raccoon (*Procyon lotor*), and bobcat.

Topographically, the mesic hammocks around Bulow Plantation Ruins are not upland forests; they are in coastal lowlands (elevations less than 10 feet above msl), but have mesic characteristics due to localized soil and drainage conditions. At Bulow Plantation Ruins Historic State Park, the mesic hammock is assessed to be in good condition.

At Bulow Creek State Park, the well-known Fairchild Oak is an exceptional tree with a trunk diameter of 24 feet and canopy spread of 150 feet. The mesic hammock has been disturbed by a

variety of historical land uses including plantation fields, cattle grazing, and residential dwellings. With the exception of some relict stands of old live oaks, this community is largely second growth forest. The mesic hammocks in this park are assessed to be in fair-good condition.

At Addison Blockhouse Historic State Park, the long abandoned Blockhouse and plantation ruins are enveloped in hammock growth. Virginia creeper (*Parthenocissus quinquefolia*) and other large grape vines grow in the hammock and upon the walls of the blockhouse ruins. The understory is predominantly comprised of young stands of pignut hickory, laurel oak and cabbage palm. The shrub layer contains yaupon holly, wax myrtle and beautyberry (*Callicarpa americana*). At Addison Blockhouse Historic State Park, the mesic hammocks are assessed to be in fair-good condition.

At Tomoka State Park, the mesic hammock is located near the southern boundary with Sanchez Park. This community is assessed to be in good condition.

General management measures: Monitoring and treatment of exotic plants will continue for this area as well as the removal of exotic hogs. This area will also need to be monitored for erosion that may occur due to recreational use on trails and roads.

UPLAND HARDWOOD FOREST

Desired future condition: Mature, closed canopy hardwood forest typically occurring on slopes and rolling hills with generally mesic conditions. Overstory tree species may consist of southern magnolia (*Magnolia grandiflora*), sweetgum (*Liquidambar styraciflua*), live oak (*Quercus virginiana*), and laurel oak (*Quercus laurifolia*). Understory species will include trees and shrubs such as American holly (*Ilex opaca*),) red bay (*Persea borbonia*) and beautyberry (*Callicarpa americana*). Ground cover will comprise of shade tolerant herbaceous species, sedges and vines.

Description and assessment: the parks contain 514 acres of Upland Hardwood Forest. Within this assessment, the FNAI classification "Successional Hardwood Forest" is treated as Upland Hardwood Forest. The canopy is closed, and is dominated by pignut hickory, southern magnolia, live oak, and occasional mature slash pines. Laurel oaks also dominate within the areas that are more successional in nature. The understory is dominated by palms, notably sabal palm and saw palmetto.

General management measures: It is often difficult to distinguish, within this assessment area, what portions are climax community and what portions are successional. The climax portions are obviously to be assessed in good condition, while the successional portions are in need of intensive restoration efforts. These portions are to be assessed as in poor to fair condition.

XERIC HAMMOCK

Desired future condition: Typically considered a late successional stage of scrub or sandhill that generally occurs in small isolated patches on excessively well drained soils. Vegetation will consist of a low closed canopy dominated by live oak (*Quercus virginiana*) which provides shady conditions. Typical plant species may also include Chapman's oak (*Quercus chapmanii*), and laurel oak (*Quercus laurifolia*). Sand pine, slash pine, or longleaf pine (*Pinus clausa, P. elliottii, P. palustris*, respectively) may also be a minor component. Understory of species will include saw palmetto (*Serenoa repens*), fetterbush (*Lyonia lucida*), myrtle oak (*Quercus*

myrtifolia), yaupon holly (*Ilex vomitoria*), Hercules' club (*Zanthoxylum clava-herculis*), and Florida rosemary (*Ceratiola ericoides*). A sparse groundcover layer of wiregrass (*Aristida beyrichiana*) and other herbaceous species may exist but will typically be absent. A continuous leaf litter layer may be present. Overgrown scrub in need of fire and/or mechanical treatment should not be confused with true xeric hammock.

Description and assessment: The parks contain 608 acres of xeric hammock habitat. Sand live oak (*Quercus geminata*) is the dominant tree species in xeric hammock; growth is limited by drier soil conditions. Pignut hickory is common in the xeric hammock canopy, which also includes laurel oak, redbay, cabbage palm and southern magnolia. Mature sand pine and large slash pine, are scattered throughout the hammock. The understory is a dense thicket of wild olive (*Osmanthus americanus*), myrtle oak, saw palmetto, rusty lyonia, yaupon, American holly and ericaceous shrubs. A variety of blueberry shrubs flower in the understory in spring, including sparkleberry (*Vacciunium arboreum*), deerberry (*Vaccinium stamineum*), and shiny blueberry (*Vaccinium myrsinites*). Saw palmetto is the dominant ground cover with patches of woods grass, nutsedge and clumps of coontie. The Indian pipe, ground orchid, and spring coralroot (*Corallorhiza wisteriana*) are plants found on the hammock floor.

At Bulow Plantation Ruins Historic State Park, xeric hammock occurs in the west boundary area of the park on a sandy slope (elevations range from 10 -15 feet above msl) on the Atlantic Coastal Ridge. The xeric hammock is assessed to be in good condition in this area.

At Bulow Creek State Park, xeric hammock occurs on elevated sandy rises between the low hammocks and flatwoods and the tidal marshes of Bulow Creek, above the 5 feet msl contour on well-drained Orsino sand. In May 1985, the hammock burned under drought conditions with high winds. The oaks and other hammock growth are regenerating and remnant dead pines support a colony of nesting osprey. Fire is infrequent, but occasionally occurs in xeric hammock. However, the high fire hazard conditions under which xeric hammock burns precludes the use of prescribed fire in this community. The xeric hammock is assessed to be in good condition.

The Tomoka peninsula, comprised of well-drained sandy soils, supports xeric hammock at Tomoka State Park. The hammock has a long history of human use, including aboriginal settlements, indigo and cotton plantations, live oak harvesting and the development of tourist facilities in the 20th century. The existing community is a reflection of these historical influences; the original, pre-aboriginal conditions cannot be determined. Many local residents identify the park by the "Tomoka tunnel" along N. Beach Street, an arched opening in the hammock formed by the spreading limbs of the dominant live oaks. The Tomoka hammock is further fragmented by park roads, foot trails, a powerline corridor and visitor use areas. It remains, however, an important island of forested habitat in an urban area, providing food and cover for songbirds migrating along the Atlantic Coastal Flyway. Tomoka State Park is in the breeding range of the painted bunting (*Passerina ciris*) considered by many to be the most colorful songbird in the eastern United States. The Florida Fish and Wildlife Conservation Commission (FFWCC) are concerned about recent declines in breeding and wintering populations in Florida. The park conducted surveys in 1999-2000 for painted buntings, monitoring the hammock and other habitats bordering the Tomoka River and marshes. Several birds were seen during spring and fall migrations, but only one breeding pair was observed in the park and their nesting territory

appears to be focused on a feeding station at a ranger residence. Despite a history of human impacts, the xeric hammock is assessed to be in good condition at Tomoka State Park.

General management measures: For the most part, this natural community is in maintenance state requiring little management other than protection from visitor impacts. For the portions of xeric hammock that border a pyrrhic community type, fire will be allowed to burn into the xeric hammock as needed for fire management. Monitoring and treatment of exotic plants will continue for this area as well as the removal of exotic hogs.

BASIN SWAMP

Desired future condition: Forested basin wetlands that are highly variable in size, shape and species composition and will have an extended hydroperiod typically 200-300 days. While mixed species canopies are common, the dominant trees will be pond cypress and swamp tupelo. Other canopy species can include slash pine (*Pinus elliottii*), red maple (*Acer rubrum*), dahoon holly (*Ilex cassine*), sweetbay (*Magnolia viginiana*), loblolly bay (*Gordonia lasianthus*), and sweetgum (*Liquidambar styraciflua*). Depending upon fire history and hydroperiod, the understory shrub component can be throughout or concentrated around the perimeter. Shrub species can include a variety of species including Virginia willow (*Itea virginica*), swamp dogwood (*Cornus foemina*), wax myrtle (*Myrica cerifera*), and titi (*Cyrilla racemiflora*). The herbaceous component is also variable and may include a wide variety of species such as maidencane (*Panicum hemitomon*), ferns, arrowheads (*Sagittaria* spp.), lizard's tail (*Saururus cernuus*), false nettle (*Boehmeria cylindrica*), and sphagnum moss (*Sphagnum* spp.). Soils will be typically acidic, nutrient poor peats often overlying a clay lens or other impervious layer.

Description and assessment: The parks contain 68 acres of basin swamp habitat. The basin swamps are dominated by deciduous hardwoods: red maple, sweetgum and ash (*Fraxinus* spp.). Cypress (*Taxodium* sp.) is completely absent from the basin swamps at Bulow Creek. Many tree species, adapted to saturated soils, are common to both basin swamps and hydric hammocks. There is a notable difference, however, in hydroperiod-the depth and duration of seasonal flooding. The swamp basins remain flooded longer, with deeper water, than the hydric hammocks, which have ephemeral pools of standing water.

At Bulow Plantation Ruins, there is hardwood swamp in a topographic swale on the west side of the park. The lowest areas have prolonged flooding, which prevents plant growth and creates mud holes during the dry season. The higher ground in the swamp has an understory growth of young cabbage palms, which may be evidence of generally drier conditions in the basin. The basin swamp is assessed to be in fair condition.

At Bulow Creek State Park, the live oak is a primary indicator of soil moisture conditions. It is dominant in mesic and hydric hammocks, but is conspicuously absent from the park's basin swamps. The basin swamps are assessed to be in good condition.

General management measures: Monitoring and treatment of exotic plants will continue for this area as well as the removal of feral hogs.

BAYGALL

Desired future condition: Consists of a wet densely forested, peat filled depression typically near the base of a slope. Seepage from adjacent uplands will maintain saturated conditions. Medium to tall trees will mainly consist of sweetbay (*Magnolia virginiana*), loblolly bay (*Gordonia lasianthus*), and/or swamp bay (*Persea palustris*), occasionally sparse pines (*Pinus* spp.) may also exist. A thick understory consisting of gallberry (*Ilex glabra*), fetterbush (*Lyonia lucida*), dahoon (*Ilex cassine*), titi (*Cyrilla racemiflora*), and red maple (*Acer rubrum*) is typical with climbing vines such as greenbriar (*Smilax* spp.) and muscadine grape (*Vitis* spp.) is usually abundant. The Optimal Fire Return Interval for this community is 25-100 years. Frequent fires from adjacent communities should be allowed to enter baygall ecotone.

Description and assessment: There are approximately 81 acres of baygall habitat found within the parks. At Bulow Creek State Park, the only example of a baygall community is in a depressional trough in the hammock uplands of the park near the western boundary. Tree species that grow in the swamp include sweetgum, red maple, water oak, southern magnolia, and slash pine. Three species of bay tree found in the swamp are loblolly bay (*Gordonia lasianthus*), sweet bay (*Magnolia virginiana*), and red bay. There are thickets of fetterbush and Florida hobblebush (*Agarista populifolia*) and hammocks with swamp fern, and Virginia chain fern (*Woodwardia virginica*). The lowest areas of the baygall are seasonally flooded and have blackgum trees in open, peat-filled depressions. Slash pine and saw palmetto are dominant on higher ground, growing with fetterbush, rusty lyonia, and mixed bay trees. The baygall community is assessed to be in good condition.

General management measures: For the most part, this natural community is in maintenance state. Fires that may occur in the surrounding communities will be allowed to burn into the edge of the baygall to prevent the encroachment of bay trees into the surrounding community. Monitoring and treatment of exotic plants will continue for this area as well as the removal of exotic hogs.

DEPRESSION MARSH

Desired future condition: Emergent herbaceous and low shrub species will be dominant over most of the area with open vistas. Trees are few and if present, will occur primarily in the deeper portions of the community. There is little accumulation of dead grassy fuels due to frequent burning; one can often see the soil surface through the vegetation when the community is not inundated. Dominant vegetation in depression marsh include maidencane (*Panicum hemitomon*), panic grasses (*Panicum* spp.), cutgrass (*Leersia* sp.), common reed (*Phragmites australis*), pickerelweed (*Pontederia cordata*), arrowheads (*Sagittaria* sp.), buttonbush (*Cephalanthus occidentalis*), St. John's wort (*Hypericum fasciculatum*), and coastalplain willow (*Salix caroliniana*). Floodplain marsh dominants also typically include sand cordgrass (*Spartina alterniflora*) and sawgrass (*Cladium jamaicense*). Swales are typically dominated by sawgrass. The Optimal Fire Return Interval for this community is 2-10 years depending on fire frequency of adjacent communities.

Description and assessment: There are 18.6 acres of depression marsh within the parks. In Bulow Creek State Park, there is a freshwater marsh basin west of Bear Den Road, approximately a quarter mile south of Korona Canal. The marsh is mainly comprised of sawgrass

(*Cladium jamaicense*) with other wetland herbs, including dog fennel (*Eupatorium capillifolium*) and wood sage (*Teucrium canadense*). There are hardwoods scattered throughout the marsh, including red maple, sweetgum and black gum. This hardwood growth is indicative of the absence of fire. Perhaps a greater concern for management, however, is the growth of cabbage palms in the marsh, which unlike swamp hardwoods, are resistant to fire. The growth of palms may be indicative that the wetlands are drying out. The marsh lies close to Korona Canal, which can depress water table elevations by intercepting subsurface flow near the channel (Gomberg 1981). These depression marshes are assessed to be in poor-fair condition.

Additionally, there are two small, badly degraded depression marshes within the coquina ridge matrix of the west-central portion of Bulow Creek State Park. These were formerly described as "Dome Swamp," but numerous key characteristics of a dome swamp are not present within these features. Most importantly, they are better described as karstic depression features on a ridge, instead of an interlocking matrix of cypress within a wet flatwoods. In addition, no mature cypresses are present. These two depression marshes do contain small, sterile pond cypress (*Taxodium ascendens*) but these are not the only woody species present. Sweetgum, slash pines and cabbage palms are also invading the marsh. As fire exclusion with possible hydrologic disturbance due to Frenchman's Ditch has allowed these features to degrade, they must be assessed as "poor."

There are two depression marshes in Tomoka State Park, at Johns Island in the low hammock between Clear Lake and Keyhole Lake. Both have a nearly impenetrable growth of sawgrass with live and dead culms. One of these marshes on Johns Island burned during a wildfire in August of 2008. The recently burned marsh is assessed to be in good condition, while the unburned marsh is assessed to be in fair condition.

General management measures: Depression marshes should be brought into a burn rotation if possible in order to stop or prevent hardwood encroachment. The fire return interval may be different for each marsh and will be influenced by the surrounding dominate pyrogenic community. The hydrological changes in the Korona Canal and Frenchman's Ditch area should be monitored and mitigated against if possible but because of this, these marshes may never be restored unless the altered hydrology is corrected. If feasible, it may be necessary to harvest or cut cabbage palms out of some of these marshes.

HYDRIC HAMMOCK

Desired future condition: A closed canopy, evergreen hardwood and/or palm forest with a variable understory dominated by palms, with sparse to moderate ground cover of grasses and ferns. Typical canopy species will include laurel oak (*Quercus laurifolia*), cabbage palm (*Sabal palmetto*), live oak (*Quercus virginiana*), sweetbay (*Magnolia viginiana*), swamp tupelo (*Nyssa sylvatica biflora*), American elm (*Ulmus Americana*), red maple (*Acer rubrum*) and other hydrophytic tree species. Soils are poorly drained, with a normal hydroperiod seldom over 60 days per year. Hydric hammock should occasionally burn by allowing fires to naturally burn across ecotones from fires originating in adjacent upland natural communities.

Description and assessment: The parks contain 1,011 acres of hydric hammock habitat that is associated with Tuscawilla soils of the lowlands east of the Atlantic Coastal Ridge. The hydric conditions result from poor surface drainage of clay-loam soils and groundwater discharge from

seepage springs at the base of the sand ridge. Depressions in the hammock are seasonally ponded and contain swamp hardwoods. Smaller swamp areas are not separately delineated from hydric hammock on the Natural Communities Maps. Hydric hammocks are forested wetlands, with a short hydroperiod, comprised of a diversity of evergreen and deciduous trees including live oak, cabbage palm, red cedar, red maple, Florida elm and sweetgum. The overstory includes cabbage palm, Southern magnolia, Carolina basswood (*Tilia americana* var.*caroliniana*), sweet bay, hackberry (*Celtis laevigata*), and box elder (*Acer negundo*). The understory is diverse with cabbage palm, laurel oak, and a variety of deciduous hardwoods, including red maple, ironwood (*Carpinus caroliniana*), American elm (*Ulmus americana*), water hickory (*Carya aquatica*), red ash (*Fraxinus pennsylvanica*), pop ash (*Fraxinus caroliniana*), sweetgum, and Carolina basswood. Southern shield fern (*Dryopteris ludoviciana*) and butterweed (*Packera glabella*) are characteristic herbs of the hammock, the former on higher ground and the latter in wet depressions in the hydric forest.

At Bulow Plantation Ruins, hydric hammock is limited to the southwest boundary area of the park. The hammock in this area is assessed to be in good condition.

At Bulow Creek State Park, hydric hammock extends the entire length of the property. There are hundreds of large oaks, many having diameters greater than 5 feet DBH and canopy heights of 100 feet or more. The high water table prevents the growth of saw palmetto; young cabbage palms and yaupon holly largely comprise the shrub layer. Overall, the ground cover is sparse, but herbaceous growth varies seasonally with changes in canopy cover. Butterweed is a common winter annual that blooms in early spring before the leaf-out of deciduous trees. The hydric hammock of Bulow Creek State Park is well known to local botanists and was a favorite area of Oakes Ames, former director of the Botanical Museum of Harvard University, who wintered in Ormond Beach during the 1940s. In published notes, Mr. Ames described several species of ground orchids from “Bulow Woods” (Ames 1959) including spring coralroot, and the shadow witch orchid (*Ponthieva racemosa*). Coralroot is still common, and local populations of shadow witch persist in Bulow hammock, but they are threatened by ground disturbance from feral hogs. A long-time area resident remembers large red cedars in Bulow hammock, with trunk diameters of 2-2.5 feet, which were logged by a British company during the Depression years for cedar pencils The hydric hammock was disturbed by bulldozed survey transits in the late 1970s before state acquisition. Twenty years later, the survey cuts have substantial regrowth, primarily by cabbage palms. The hydric hammocks are assessed to be in good condition at Bulow Creek.

At Tomoka State Park, hydric hammock occurs in low drainages between an abandoned transportation right of way at the park boundary (Yonge Street extension) and Strickland Creek. The hammock has a canopy of wetland forest trees and saturated-wet ground with lizard’s tail (*Saururus cernuus*), string-lily (*Crinum americanum*), and giant leather fern (*Acrostichum danaefolium*). The hammock also contains several exotic species such as air potato (see Resource Management) which have invaded from the residential area on the east side of the Yonge Street right of way.

In 2005, the 8.5-acre Goldy tract was added to the Johns Island preserve at Tomoka State Park. The Goldy tract is on the slope between xeric hammock at the FPL powerline access on US 1 and Johns Island marsh. The soils in the hammock at the base of the slope remain moist from

groundwater seepage and support a variety of herbaceous species including Jack-in-the-pulpit (*Arisaema triphyllum*), green dragon (*Arisaema dracontium*), prairie iris (*Iris hexagona*), and a rare terrestrial orchid, *Platanthera flava,* the southern tubercled orchid, which is state listed as Threatened (FDACS). The hydric hammocks at Tomoka State Park are assessed to be in fair condition due to the growth of invasive exotic plants in the boundary area along the Yonge Street right of way.

General management measures: Generally, these areas within the Parks are in maintenance state. Monitoring and treatment of exotic plants will continue for this area as well as the removal of feral hogs.

SLOUGH

Desired future condition: Characterized by broad shallow channels, inundated with slow moving water except during extreme droughts. With a hydroperiod of at least 250 days, Sloughs are the deepest drainageways within marsh and swamp systems and can contain open water, herbaceous cover or be partially forested. Sloughs will occur in irregular linear arrangements within strand swamp, floodplain swamp, basin swamp, glades marsh, or slough marsh communities. The vegetation structure will be quite variable. Other forested sloughs will have a canopy of tupelo (*Nyssa* spp.), Carolina ash (*Fraxinus caroliniana*), planer tree (*Planera aquatica*), bald cypress (*Taxodium distichum*) and buttonbush (*Cephalanthus occidentalis*). Sloughs dominated by emergent herbs often contain alligatorflag (*Thalia geniculata*), arrowhead (*Sagittaria* spp.), canna (*Canna flaccida*), pickerelweed (*Pontederia cordata*), and lizard's tail (*Saururus cernuus*). Deeper Sloughs may contain submerged and floating vegetation including American white waterlily (*Nymphaea odorata*), spatterdock (*Nupar advena*), frog's bit (*Limnobium spongia*), bladderworts (*Utricularia* spp.), and duckweeds (*Lemna* spp.). The soils will be peat, typically submerged, but may become exposed during extreme drought and subject to deep peat fires.

Description and assessment: At Bulow Creek State Park, there is a 6-acre slough that drains swampy ground and a series of man-made ponds, just north of the FPL powerline, into Boardman Pond at the headwaters of Cedar Creek. The slough flows through a culvert in the FPL right of way, then southeasterly in a natural channel, which is bordered by, swamp hardwoods and cabbage palms. The slough is assessed to be in fair condition.

General management measures: Monitoring and treatment of exotic plants and animals will continue for this area.

WET FLATWOODS

Desired future condition: Depending on the region of the state, dominant pines will usually be longleaf pine (*Pinus palustris*), slash pine (*Pinus elliottii*), pond pine (*Pinus serotina*), and/or loblolly pine (*pinus taeda*). Pond cypress (*Taxodium ascendens*) and cabbage palm may reach canopy in some locations. The canopy will be open, with pines being widely scattered and of at least three age classes. Native herbaceous cover is at least 80%. Pitcherplants (*Sarracenia* spp.) and other plants such as terrestrial orchids may be present and abundant in some areas. Common shrubs will include sweetpepperbush (*Clethra alnifolia*), fetterbush (*Lyonia lucida*), large gallberry (*Ilex coriacea*), titi (*Cyrilla racemiflora*), and wax myrtle (*Myrica cerifera*). The Optimal Fire Return Interval for this community is 3-5 years.

Description and assessment: Wet flatwoods are common on the pine islands in the Tomoka Basin lowlands; they comprise 215 acres within the parks. Cabbage palms are abundant and characteristic of the understory of the wet flatwoods. Other common tree species include red cedar, live oak and sweetgum. The ground cover is dominantly low cabbage palm with patches of saw palmetto and wax myrtle. Serpent fern and shoestring fern are common epiphytes on the trunks of cabbage palms.

At Bulow Creek State Park, the wet flatwoods have a relatively high density of slash pine of different size classes; some mature pines have trunk diameters exceeding 24 inches DBH. The wet flatwoods are assessed to be in fair to good condition.

In Tomoka State Park, there is a stand of wet flatwoods bordering Strickland Creek, downslope from the xeric hammock along the Poplar Avenue boundary road. There is no evidence of recent fire in the stand. The wet flatwoods are assessed to be in fair condition.

General management measures: Prescribed fire should be applied to this community every three to five years. This community has been disturbed in the past due to historic agricultural use, exotic plant infestations and possibly by altered hydroperiod.

MARSH LAKE

Desired future condition: Often associated with depression marshes which are characterized as shallow, generally round or elliptical depressions, vegetated with concentric bands of aquatic vegetation. Depending upon the depth and slope of the depression, an open water zone, with or without floating plants, may occur at the center. The open water zone is considered to be a marsh lake if it is small in comparison to the surrounding marsh. Otherwise, the system is considered to be a flatwoods lake or a prairie lake, depending upon the surrounding community. The hydrosoil will typically be acidic sand with some peat and occasionally a clay lens. Although water levels may fluctuate significantly, water is typically present year-round.

Description and assessment: At Bulow Creek State Park, there are numerous tidal tributaries draining into the Tomoka Basin; 21 acres of this drainage can be classified as marsh lake. Most of the tributaries have narrow creeks draining tidal marshes that have been ditched for mosquito control. Addison's Branch is an unaltered tidal tributary that terminates in a 7-acre lake bordered by brackish marsh. The marsh lake is difficult to access by land or water, but is a special scenic feature at the southern end of the park. The marsh lake is assessed to be in good condition.

General management measures: Generally, these areas within the Parks are in maintenance state. Monitoring and treatment of exotic plants will continue for this area as well as the removal of feral hogs.

SEEPAGE SLOPE

Desired future condition: Trees will be few or absent. Groundcover will be dense and is exceptionally species-rich. Dominant species will be wiregrass and/or sedges. In the peninsula, blue maidencane (*Panicum hemitomon*), cutthroatgrass (*Panicum absissum*), and Curtiss' dropseed (*Sporobolus curtissii*) may also be dominant, with cutthroatgrass occasionally being the dominant species. Pitcherplants (*Sarracenia* spp.), other carnivorous plants, and terrestrial

orchids may be present and abundant in some areas. The Optimal Fire Return Interval for this community is 1-3 years.

Unfortunately, none of the above description applies to the seepage slope in the parks. The seepage slope habitat present here is a currently unrecognized variant, best described as "Forested, Calcareous Seepage Slope." As can be presumed from the description, this habitat in the parks occurs along the eastern slope portion of the Atlantic Ridge system and is characterized by organic soils over coquina substrate. A linear spring system seeps out of the slope, creating a unique and fragile habitat type. The climax community is of upland trees on the upper portion of the slope (canopy dominated by *Quercus virginiana* and Carya *glabra*), and wetland trees on the downslope portion (canopy dominated by *Fraxinus pennsylvanica, Acer rubrum, Nyssa sylvatica* var. *biflora*). The herbaceous layer is dominated by forest sedges, including *Carex bromoides, Carex godfreyi, Carex gholsonii, Carex leptalea*, and the state threatened *Carex chapmanii*. These species are uncommon throughout the state, but dominate the herbaceous layer of this habitat. Fire is a highly undesirable element within this subtype habitat, and it therefore cannot be considered "fire type."

Description and assessment: This habitat type comprises 2.1 acres, all of which are currently confined to Bulow Creek State Park. The above, modified desired future condition is an accurate, current assessment of this currently unrecognized subtype. This habitat type is quite fragile, as the organic soils are susceptible to trampling and erosion. Additionally, the abundant feral hogs within this area pose an even greater threat to this habitat type.

General management measures: With the exception of the damage caused by feral hogs, this climax community is in maintenance phase. Enhanced efforts at hog eradication will be the only way to improve the quality of this habitat type.

SEEPAGE STREAM

Desired future condition: Narrow, relatively short perennial or intermittent stream formed by percolating water from adjacent uplands. Water color will be clear to slightly colored, with a fairly slow flow rate and fairly constant temperature. Bottom substrate is typically sandy, but may include gravel or limestone.

Description and assessment: At Bulow Creek State Park there are 37 acres of seepage stream, these streams originate as small springs along the base of the coquina bluffs on the western side of the park and discharge freshwater into tidal tributaries that penetrate the interior lowlands. One of these springs is visible from the boardwalk on the Skip Whelan Trail near the main use area. Groundwater discharge is seasonal; during rainy periods, the clear flow of seepage springs is augmented by darker-colored runoff from low hammocks and swamps. The seepage springs are assessed to be in good condition.

General management measures: The seepage streams within Bulow Creek State Park are in maintenance condition. The only area of improvement for this natural community is the continued and increased removal of feral swine.

SALT MARSH

Desired future condition: A largely herbaceous community that occurs in the portion of the coastal zone affected by tides and seawater and protected from large waves. Salt marsh typically has distinct zones of vegetation based on water depth and tidal fluctuations. Saltmarsh cordgrass (*Spartina alterniflora*) dominates the seaward edge; the areas most frequently inundated by tides. Needle rush (*Juncus roemerianus*) dominates the higher, less frequently flooded areas. Other characteristic species include Carolina sea lavender (*Limonium carolinianum*), perennial saltmarsh aster (*Symphyotrichum tenuifolium*), wand loosestrife (*Lythrum lineare*), marsh fimbry (*Fimbristylis spadicea*), and shoreline seapurslane (*Sesuvium portulacastrum*). A landward border of salt-tolerant shrubs including groundsel tree (*Baccharis halimifolia*), saltwater falsewillow (*Baccharis angustifolia*), marshelder (*Iva frutescens*), and Christmasberry (*Lycium carolinianum*) may exist. Soil salinity and flooding are the two major environmental factors that influence salt marsh vegetation. While there is little data on natural fire frequency in salt marshes, fire probably occurred sporadically and with a mosaic pattern, given the patchiness of the fuels intermixed with creeks, salt flats, etc.

Description and assessment: There are a total of 2,295 acres of salt marsh at the parks. This habitat type includes those formerly classified as tidal marsh and estuarine unconsolidated substrate. Based on the salinity regime, the wetlands of lower Tomoka River and Bulow Creek floodplains are characterized as brackish marshes, where saline tidewaters mix with freshwater runoff. The tidal marsh is comprised of patches of salt tolerant grasses-predominantly sand cordgrass (*Spartina bakeri*), black needlerush (*Juncus roemerianus*), and salt grass (*Distichlis spicata*) with succulent halophytes including perennial glasswort (*Sarcocornia ambigua*), annual glasswort (*Salicornia bigelovii*), and saltwort (*Batis maritima*). Sea oxeye (*Borrichia frutescens*) grows in slightly elevated areas of the marshes and on berms bordering the Tomoka River channel.

The tidal regime of the floodplain marshes, described under Hydrology, is characterized by highly variable hydroperiod (the depth and duration of flooding) and poor surface drainage. Floodwaters are detained in potholes and shallow depressions in the marsh and, before ditching, surface water drained slowly to the river through meandering tidal creeks. The standing pools provide breeding sites for salt marsh mosquitoes, *Aedes sollicitans* and *A. taeniorhynchus*. Although mosquitoes are the ubiquitous and familiar marsh inhabitants, there are a variety of invertebrates and vertebrates in the tidal wetlands. The coffee-bean snail (*Melampus bidentatus*) is an abundant air-breathing gastropod that cannot tolerate prolonged submergence. When the marsh is flooded, coffee-bean snails can be seen clustered on plant stems above water. The Carolina marsh clam (*Polymesoda caroliniana*) is common in Juncus marsh. Crab holes aerate the tidal marsh substrate. The red-jointed fiddler crab (*Uca minax*) feeds on marsh detritus; the purple marsh crab (*Sesarma reticulatum*) is omnivorous, preying on fiddlers and other crabs as well as digesting plant material. The rice rat (*Oryzomys palustris*) is an abundant small mammal and nests above water in marsh grasses. Colonies of the round-tailed muskrat (*Neofober alleni*) build straw “muskrat houses” in clumps of sand cordgrass. Like muskrats, marsh rabbits are herbivorous, feeding on grasses and other marsh plants. There are varieties of snakes including the eastern diamondback rattlesnake that use the food resources of the marsh, but do not reside in estuarine wetlands. Based on present information, there is only one species of snake, the Atlantic salt marsh snake (*Nerodia clarkii taeniata*) that is a permanent resident of brackish marshes. The

status of the Atlantic salt marsh snake is controversial and is discussed further under designated species. The river otter (*Lutra canadensis*) and American alligator (*Alligator mississipiensis*) also inhabit tidal creeks in the estuarine tidal marsh.

At Bulow Plantation Ruins, the salt marshes are limited to areas adjacent to Bulow Creek. This community is assessed to be in good condition.

The tidal marshes at Bulow Creek State Park are largely comprised of "high marsh" vegetation, a mixed growth of salt grass and low succulent species, glasswort (*Sarcocornia ambigua*) and saltwort. There are also wet depressions with blackrush and stands of saltmarsh cordgrass in the higher salinity marshes near the mouth of Bulow Creek. Some of the marsh tracts have been disturbed by physical alterations for mosquito control. The salt flats on the north side of Highbridge Road were ditched by draglines between 1958 and 1963 (aerial photo series) to drain potholes and shallow ponds, primary mosquito breeding habitat. The disturbed salt marshes at Bulow Creek State Park are assessed to be in poor–fair condition. The unaltered salt marshes are assessed to be in good condition.

At Tomoka State Park, the management of salt marsh mosquitoes has also had a significant impact on the ecology and scenic quality of the tidal marshes. Mosquito control was first implemented during the Depression era (1930s) by WPA (Works Projects Administration) crews, which hand-ditched the Tomoka marshes. In the 1950s, draglines were used to excavate series of parallel cuts, "grid ditches" in the floodplain of the lower Tomoka River. Deep channels were excavated by suction dredges in the marshes on the eastern side of Tomoka Point and Strickland Creek was dredged along the western side of the peninsula. The physical alteration of the Tomoka marshes for mosquito control had significant impacts on the wetlands: changing surface drainage, de-watering the substrate and altering marsh topography and vegetation. In the 1960s, mosquito control agencies discontinued dragline ditching for "source reduction" and developed chemical larvicides, such as "Altosid" to control the development of larval mosquitoes in aquatic habitats. Since 1980, the East Volusia Mosquito Control District (EVMCD) has been using rotary ditching and larvicide treatments as primary source reduction techniques. In 1993, EVMCD first used rotary ditching at Tomoka State Park to open breaches in a low berm impounding a 22-acre tract of tidal marsh between Strickland Creek and the Tomoka River. The project did not conflict with DRP policy that prohibits the use of rotary ditching in unaltered marshes. The 22-acre marsh, like most of the tidal wetlands along the lower Tomoka River, has been disturbed by hand ditching and draglines. In December 2000, Tomoka State Park initiated the Dragline Ditch Project using an amphibious excavator contracted by St. Johns River Water Management District to backfill ditches with dredge spoil that was deposited on the marsh surface.

The north end of the Johns Island marsh was impounded by a causeway constructed in the 1950s as a haul road to move sand from a borrow pit in the center of the island for use during the widening of U.S. Highway 1. In 1997, Volusia County installed five sets of culverts under the haul road (as mitigation for local road construction) to increase tidal exchange between the north marsh and south marsh which is connected to the Tomoka River estuary. The culvert openings have increased tidal flooding in the north marsh, evident from the dieback of salt-intolerant hardwoods that invaded the marsh after the causeway was built. The monitoring of hydrological

changes in the north marsh, and associated changes in vegetation and marsh fauna, is identified as a hydrological restoration goal for Tomoka State Park. The disturbed salt marshes in Tomoka State Park are assessed to be in fair condition. The unaltered and restored salt marshes are assessed to be in fair-good condition.

General management measures: Continued and increased feral swine removal will improve the quality of the estuarine tidal marshes within Bulow Plantation Ruins Historic State Park and Bulow Creek State Park. Additionally, phase 5 of the Dragline Ditch Removal project will be discussed within the Resource Management Program section of the plan.

RUDERAL

Desired future condition: The ruderal areas within the park will be managed to minimize the effect of the developed areas on adjacent natural areas. Priority invasive plant species (EPPC Category I and II species) will be removed from all developed areas. Other management measures include proper stormwater management and development guidelines that are compatible with prescribed fire management in adjacent natural areas.

Description and assessment: There are 718 acres of ruderal land within the parks. Most of this acreage is within pine plantations. This region has a long and varied history of human land use, including aboriginal occupation, plantation agriculture, cattle grazing, pine plantations, and citrus groves. Some of these historical landscapes have disappeared with forest regrowth; others remain as altered or "ruderal" areas.

At Bulow Creek State Park, pine plantations and citrus groves comprise most of the ruderal land use areas. The pines were planted in 1957-58 and are described in the Timber Management Analysis section of this plan. Another ruderal area at the park is Mound Grove, located on the upland finger between Lowbridge on Bulow Creek and Highbridge on the ICW, and the site of a major citrus operation, dating to the late 1800s. The Knox family constructed Highbridge Road and continued to ship citrus out of Mound Grove until the mid-1900s. The Knox family planted date palms along the canal bordering Highbridge Road, many of which are visible today. Under state ownership, the old Knox grove is gradually returning to hammock with the growth of laurel oak, pignut hickory and cabbage palm. There are remnants of citrus rows with open sandy ground between which supports a colony of gopher tortoises. The Kunner Tract, situated between Bulow Creek and the north branch of Cedar Creek, is an old land grant dating to the mid 1800s (Daniel et al. 1980). It was a citrus grove in the 1950s (Volusia County aerial photo archives: 3-16-58) and was subsequently cleared and abandoned. Today there is no sign of citrus on the Kunner Tract; it is early hammock growth, mostly laurel oaks, with an open understory.

At Tomoka State Park, a considerable amount of land was formerly disturbed by dredging, filling and other alterations of wetlands and uplands. The ruderal features include canals, borrow pits, spoil deposits, and historic sites. These features are discussed in other sections of the plan. In planning community restoration projects, it is important to distinguish features that have special cultural value from other man-made disturbances. The best example is the berm that extends across the north end of Johns Island marsh. Before state ownership, there was a proposal to remove this berm as a mitigation measure for wetland enhancement. Historical research showed that this feature was built in the 19th century, or possibly earlier during British Period

settlements. The berm has been preserved and is now identified as a historical site, Johns Island Dam in the Florida Master Site file (VO00639).

General management measures: Control of invasive plant species in ruderal areas will be on going. Timber harvest and prescribed fire will be applied to the pine plantations, and in the rest of the acreage, prescribed fire will be applied for vegetative fuel management when appropriate.

DEVELOPED

Desired future condition: The developed areas within the park will be managed to minimize the effect of the developed areas on adjacent natural areas. Priority invasive plant species (EPPC Category I and II species) will be removed from all developed areas. Other management measures include proper stormwater management and development guidelines that are compatible with prescribed fire management in adjacent natural areas.

Description and assessment: Developed areas, as indicated on the Natural Communities Maps, are the locations of park development. These comprise 66 acres, and include the main recreational use areas, roads and shop facilities. At Bulow Plantation Ruins Historic State Park, Plantation Drive, the main picnic area and shop facilities comprise the developed areas of the park. The developed areas at Bulow Creek State Park include the Fairchild Oak Use Area, and a power line easement. Tomoka State Park is one of the older parks in the Florida park system. Over the years, varieties of facilities and use areas have been developed for public recreation and staff operations. Many of the developed areas of the park occur on cultural sites. Park management, supported by archaeological research, is evaluating specific use areas and, in the case of Mt. Oswald Plantation Settlement at Tomoka Point, has reduced the size of facilities, and associated parking area, to protect a significant historical site (VO04310).

General management measures: Control of invasive plant species in developed areas will be on going.

Imperiled Species

Imperiled species are those that are (1) tracked by FNAI as critically imperiled (G1, S1) or imperiled (G2, S2); or (2) listed by the U.S. Fish and Wildlife Service (USFWS), FFWCC or the Florida Department of Agriculture and Consumer Services (FDACS) as endangered, threatened or of special concern.

There are several rare epiphytic ferns in the live oak hammocks of Bulow Creek. In July 2002, Gil Nelson with the Florida Native Plant Society identified two state-listed endangered species in Bulow Creek State Park, the auricled spleenwort (*Asplenium erosum)* and plume polypody (*Pecluma plumula)* which is found at Bulow Plantation Ruins. Additionally, two other species of Pecluma are found within Bulow Creek State Park, *Pecluma dispersa and Pecluma ptilodon* var. *bourgeuana*.

In 2007-2008, the park staff reported three rare plants to staff of the University of South Florida Herbarium who confirmed the taxonomic names and listed status of each species. *Pteroglossaspis ecristata* and *Platanthera flava* are terrestrial orchids, and the toothed spleenwort (*Asplenium dentatum*), is an epilithic fern associated which limerock substrates in

south Florida. The rare specimen of *Asplenium dentatum* at Bulow Creek State Park was growing on coquina rock, a local limestone formed from deposits of beach shell.

One of only three protected populations of Levy pinkroot (*Spigelia loganioides*), an endangered plant species, is known to occur in the park. Within Bulow Creek State Park, Levy pinkroot is widely distributed throughout the mechanized quarry area of management zone BC 19.

In 2009, a small and vulnerable population of the endemic coastal mock vervain *Glandularia maritima* was discovered near "The Point" in Tomoka State Park. Seed collection and restocking in a less vulnerable area will be conducted in order to insure the continued presence of this State of Florida endangered species within the park.

Five plant species listed as commercially exploited (FDACS) are found in the Tomoka Basin State Parks: coontie (*Zamia pumila*), greenfly orchid (*Epidendrum conopseum*), butterfly orchid (*Encyclia tampensis*), cinnamon fern (*Osmunda. cinnamomea*) and royal fern (*O. regalis* var. *spectabilis*). The threat of illegal collecting to local populations of these plants is discussed in following sections of the plan.

The Florida manatee (*Trichechus manatus latirostris*) is listed as endangered by USFWS and FFWCC. The Tomoka River was designated as protected habitat by the Florida Manatee Sanctuary Act of 1989 (Chapter 62N-22 FAC). The sanctuary includes the major tidal tributaries of the lower Tomoka River, including Strickland Creek, Thompson Creek and Dodson Canal. Tomoka State Park has management authority over the majority of riparian lands and state-owned submerged lands (MA68-086) of the Tomoka tributaries, excepting a 47-acre multi-parcel tract of undeveloped land bordering Dodson Canal..

The Manatee Sanctuary Act authorizes the regulation of watercraft use for the protection of manatees, as boat collisions account for about 80 percent of human-caused mortality in manatees. Boat speed zones were established for the Tomoka River and tributaries in 1994 as described under rule 16N-22.012 FAC. Manatees inhabit the Tomoka River during the spring and summer months; generally from late March through October; although individuals have been observed by the park biologist in December and February. DEP aerial monitoring surveys (December 1985 through January 1987 and March 1991 through July 1993) and park shoreline surveys have documented manatees feeding, resting and mating in the Tomoka River. The sanctuary is particularly recognized, however, as calving and nursing habitat. Both manatee biologists and local shoreline residents commonly observe female-calf pairs in the main river and tributary canals. In 1982, a resident in the Ormond Terrace subdivision photographed a manatee giving birth in a backwater canal on upper Strickland Creek, the first manatee birth recorded outside of captivity in Florida.

A significant number of perinatal mortalities have been reported from the Strickland-Thompson-Dodson tributaries in Tomoka State Park. Based on necropsy results from recovered carcasses, USFWS cannot definitely determine the causes of the perinatal mortality. The Florida Manatee Recovery Team comments: "It [perinatal mortality] may be related to pollution, injuries and stress from increased vessel traffic and other human activities, changes in the age structure of

mature breeding females, habitat changes, or some combination of these and other possible causes (USFWS 1995)."

In September 2003, the U.S. Fish and Wildlife Service (USFWS) increased protection for the Florida manatee in the Tomoka River by the establishment of the Halifax and Tomoka Rivers Manatee Refuge under the Endangered Species Act of 1973. The federal rule in 50 CFR Part 17 augments existing state protection for the manatee under 16N-22.012 FAC. Based on an analysis of local mortality data and population trends of the east coast population of the Florida manatee, USFWS found an increasing trend in watercraft-related mortality in the Halifax and Tomoka Rivers leading to the refuge designation and authority to strengthen boat speed regulations. Under the USFWS rule there have been few changes of the State designated speed zones on Tomoka River and tributaries: the one-mile reach downstream of the Tomoka River Bridge at I-95, which was formerly posted "25 mph" for water sport recreation was changed to "seasonal slow speed"(April 1-August 31). In the Tomoka Basin, boat speeds have been reduced from "30 mph" to "25 mph" outside of the existing 300-foot shoreline buffer that is "slow speed." In addition to speed zone changes, the federal rule nullifies "exemptions" to commercial fishermen and fishing guides in the Tomoka River and Tomoka Basin who were formerly granted exemptions from speed zone restrictions with a state permit.

Residential development and urban infrastructure have progressively encroached on state lands in the Tomoka Basin since the Multi-Park Unit Management Plan was approved in 2003. Urbanization and fragmentation of natural areas is occurring state-wide and is, in part, responsible for increased interactions between humans and animals that require large territories, particularly the Florida black bear (*Ursus americanus floridanus)* and the Florida panther (*Puma concolor coryi)*. In January 2008, a hog trapper with the USDA Wildlife Services reported that a hog-proof feed barrel was opened by a black bear (claw marks were conclusive evidence) at a hog trap off Pumphouse Road in Bulow Creek State Park. Although the appearance of a black bear at Bulow Creek was an unexpected and interesting wildlife observation, there have been an increasing number of reports of black bears in urban areas and outlying parks in recent years, particularly at garbage refuse sites and wildlife feeders (Daytona Beach News Journal, September 1998). Additionally, bear scat containing saw palmetto seeds and hog fur was observed by the Park biologist in the firebreak of BC 11 in mid-September 2009. Subsequent sightings of a black bear in the neighborhood immediately west of management zone BC 19 were reported during May and June of 2010, and a reliable report of a bear crossing Old Dixie Highway just south of the Dummett Mill was reported during this time.

There was an even rarer animal sighting in February 2008 when a panther was reported by a local woodsman in vicinity of Old Dixie Highway in Bulow Creek State Park. Park staff documented this sighting by taking track casts and photographs of track patterns which were accepted by FFWCC as a confirmed occurrence of a panther, *Puma concolor* (Florida panther subspecies was undeterminable), at Bulow Creek State Park. There have been no confirmed reports since the initial sighting; the Bulow Creek panther is likely a transient animal. The combined area of the Tomoka Basin State Parks, about 15 square miles, would not provide enough territory for this wide-ranging species. Based on FFWCC research, a female panther requires about 75 square miles and a male panther requires about 200 square miles of habitat as

"home range." In this regard, life for transient animals in the increasing urbanized environment of Florida is hazardous.

There are a variety of wetland habitats at Bulow Creek and Tomoka State Park that support populations of state and federal listed wading birds, including Little Blue Heron (*Egretta caerula)*, Snowy Egret (*Egretta thula)*, Tricolored Heron (*Egretta tricolor)*, White Ibis (*Eudocimus albus)*, Great Egret (*Ardea alba)*, Yellow-crowned Night Heron (*Nyctanassa violocea)*, Black-crowned Night Heron (*Nycticorax nycticorax)* and Wood Stork (*Mycteria americana)*. A monthly bird survey of the Tomoka Marsh Aquatic Preserve performed by Preserve manager D. Shelley in 1995-96 indicated that Wood Storks are most abundant in Tomoka Basin during the winter months, November through February.

The Peregrine Falcon is commonly observed along the Tomoka River floodplain during fall migration. In June 2008 a status report by FFWCC biologists (Rodgers et al., 2008) concluded that the Peregrine Falcon in Florida did not meet imperilment criteria and FFWCC has recommended delisting the Peregrine Falcon as of July 2009.

The Bald Eagle (*Haliaeetus leucocephalus)*, formerly listed as a threatened species was de-listed by USFWS in August 2007 and was de-listed by the FFWCC in April 2008. The change in status under the Endangered Species Act and state law does not enable arbitrary disturbance of the birds or their nesting habitats in Florida. Nesting and migrating bald eagles are protected under the federal Bald and Golden Eagle Protection Act and Migratory Bird Treaty Act. The FFWCC has adopted USFWS guidelines for eagle nest protection - the 660-foot buffer rule – in the 2008 Bald Eagle Management Plan. The eagle nests at Tomoka State Park and Bulow Creek State Park, described in the 2003 Multi-Park UMP, have continued to be productive: both nests have fledged young in 4 of the 5 nesting seasons from 2004-2007 (FFWCC aerial surveys)

The status of the Atlantic salt marsh snake (*Nerodia clarkii taeniata*) in northeast Volusia County has not been confirmed. Based on a review of the taxon by Carr and Goin (1942), the type locality for this species is the Tomoka Basin based on specimens collected by E.D. Cope in 1895. Recent surveys at Tomoka and Bulow Creek, however, have not confirmed the presence of this listed species. Local specimens of salt marsh snakes appear to be hybrids, with morphological characteristics of both the Atlantic salt marsh snake, and the Florida water snake (*Nerodia fasciata pictiventris*). Further studies using genetic analysis are needed to determine the taxonomic status of the salt marsh snakes in the Tomoka River and Bulow Creek and their relationship to closely related species from freshwater habitats.

The status and management of the gopher tortoise in Florida has changed significantly since the last update of the manangement plan in 2003. At that time, the gopher tortoise was listed by FFWCC as a Species of Special Concern. In September 2007, the gopher tortoise was uplisted to Threatened status and FFWCC concurrently adopted new policies under the Gopher Tortoise Management Plan. The new management directives and related permitting changes (Gopher Tortoise Permitting Guidelines April 2008) will affect DRP's management of gopher tortoises in state parks. At Tomoka State Park, the incidence of Upper Respiratory Tract Disease (URTD) was a major concern in the management of gopher tortoises. In October 2005, a gopher tortoise at Tomoka Point displayed symptoms of URTD and tested positive for the bacterium,

Mycoplasma agassizii, the first documented case of URTD in the Tomoka Basin State Parks. At that time, URTD was considered to be potentially lethal, highly infectious and a threat to entire populations. After treatment with antibiotics, the rehabilitated tortoise was returned to the park, with FFWCC directions to return the animal to the same location where it was originally found. URTD appeared to be spreading in the small colony at Tomoka Point as two more tortoises tested positive for the mycoplasma; they also were treated with antibiotics and returned to their home sites. The veterinarian who treated the Tomoka animals related to park staff that after working with numerous tortoises with URTD, she had not seen any infected animals die from the disease and did not consider URTD a lethal threat to tortoise populations, if the habitat conditions were adequate. This was consistent with findings by FFWCC that suspended mandatory URTD testing in August 2006. The staff at Tomoka subsequently changed their approach to tortoises that were symptomatic of URTD: a tortoise with nasal discharge at Tomoka Point appeared to be healthy otherwise and was not removed from the colony. There have been no mortalities and nesting has been observed.

The status of the eastern indigo snake is uncertain in the multi-park area. There have only been a few sightings in the last decade. A live indigo snake was observed near the park manager's residence at Tomoka State Park in May 2000. A roadkill was reported from Old Dixie Highway near Bulow Creek State Park in September 2001.

There is a reference in FCREPA Volume 1, Mammals (Humphrey 1992) to an old record of the pallid beach mouse (*Peromyscus polionotus decoloratus*) "at or near Bulow Plantation Historical Site" The pallid beach mouse, a local endemic subspecies, was formerly designated as endangered, but is now believed to be extinct and has been delisted by USFWS and FFWCC.

Table 2 contains a list of all known imperiled species within the park and identifies their status as defined by various entities. It also identifies the types of management actions that are currently being taken by DRP staff or others, and identifies the current level of monitoring effort. The codes used under the column headings for management actions and monitoring level are defined following the table. Explanations for federal and state status as well as FNAI global and state rank are provided in Addendum 6.

Table 2: Imperiled Species Inventory

Common and *Scientific* Name	**Imperiled Species Status**				**Management Actions**	**Monitoring Level**
	FFWCC	**USFWS**	**FDACS**	**FNAI**		
PLANTS						
Toothed spleenwort *Asplenium dentatum*			LE	G5, S1S2	3	Tier 2
Eared spleenwort *Asplenium erosum*			LE	G5, S2		Tier 2

Common and *Scientific* Name	**Imperiled Species Status**				**Management Actions**	**Monitoring Level**
	FFWCC	**USFWS**	**FDACS**	**FNAI**		
Chapman's sedge *Carex chapmanii*			LT	G3, S3	14	Tier 1
Florida butterfly orchid *Encyclia tampensis*			CE			Tier 1
Green-fly orchid *Epidendrum conopseum*			CE			Tier 1
Garberia *Garberia heterophylla*			LT			Tier 1
Coastal mock vervain *Glandularia maritima*			LE	G3, S3	3	Tier 2
Angle pod *Gonolobus suberosus*			LT		14	Tier 1
Spiked crested coralroot *Hexalectris spicata*			LE			Tier 1
Southern twayblade *Listera australis*			LT		14	Tier 1
Cardinalflower *Lobelia cardinalis*			LT		14	Tier 1
Pigmypipes *Monotropsis odorata* syn. *Monotropsis reynoldsiae*			LE	G1Q, S1	14	Tier 1
Shell-mound pricklypear *Opuntia stricta*			LT			Tier 1
Cinnamon fern *Osmunda cinnamomea*			CE		14	Tier 1
Royal fern *Osmunda regalis* var. *spectabilis*			CE		14	Tier 1
Widespread polypody *Pecluma dispersa*			LE	G5, S2		Tier 1
Plume polypody *Pecluma plumula*			LE	G5, S2		Tier 1
Comb polypody *Pecluma ptilodon* var. *bourgeauana*			LE	G5? S2		Tier 1
Southern tubercled orchid *Platanthera flava*			LT			Tier 1
Giant orchid *Pteroglossaspis ecristata* syn. *Eulophia ecristata*			LT	G2G3, S2	14	Tier 1
Levy pinkroot *Spigelia loganioides*			LE	G2Q, S2	14	Tier 1
Giant airplant *Tillandsia utriculata*			LE			Tier 1

Common and *Scientific* Name	**Imperiled Species Status**				**Management Actions**	**Monitoring Level**
	FFWCC	**USFWS**	**FDACS**	**FNAI**		
Coontie *Zamia pumila*			CE			Tier 1
REPTILES						
American alligator *Alligator mississippiensis*	LS	T(S/A)		G5, S4		Tier 1
Eastern indigo snake *Drymarchon corias couperi*	LT	LT		G3, S3		Tier 1
Gopher tortoise *Gopherus polyphemus*	LT			G3, S3	1, 14	Tier 3
Atlantic salt marsh snake *Nerodia clarkii taeniata*	LT	LT		G4TIQ, S1		Tier 1
BIRDS						
Piping Plover *Charadrius melodus*	LT	LT		G3, S2		Tier 1
Little Blue Heron *Egretta caerulea*	LS			G5, S4		Tier 1
Reddish Egret *Egretta rufescens*	LS			G4, S2		Tier 1
Snowy Egret *Egretta thula*	LS			G5, S3		Tier 1
Tricolored Heron *Egretta tricolor*	LS			G5, S4		Tier 1
Swallow-tailed Kite *Elanoides forficatus*				G5, S2		Tier 1
White Ibis *Eudocimus albus*	LS			G5, S4		Tier 1
Merlin *Falco columbarius*				G5, S2		Tier 1
Peregrine Falcon *Falco peregrinus*	LE			G4, S2		Tier 1
American Oystercatcher *Haematopus palliatus*	LS			G5, S2		Tier 1
Wood Stork *Mycteria americana*	LE	LE		G4, S2		Tier 1
Brown Pelican *Pelecanus occidentalis*	LS			G4, S3		Tier 1
Roseate Spoonbill *Platalea ajaja*	LS			G5, S2		Tier 1
Black Skimmer *Rynchops niger*	LS			G5, S3		Tier 1
Least Tern *Sterna antillarum*	LT			G4, S3		Tier 1

Common and *Scientific* Name	**Imperiled Species Status**				**Management Actions**	**Monitoring Level**
	FFWCC	**USFWS**	**FDACS**	**FNAI**		
Caspian Tern *Sterna caspia*				G5, S2		Tier 1
Sandwich Tern *Sterna sandvicensis*				G5, S2		Tier 1
MAMMALS						
Florida manatee *Trichechus manatus latirostris*	LE	LE		G2, S2		Tier 1
Florida black bear *Ursus americanus floridanus*	LT			G5T2, S2		Tier 1

Management Actions:

1. Prescribed Fire
2. Exotic Plant Removal
3. Population Translocation/Augmentation/Restocking
4. Hydrological Maintenance/Restoration
5. Nest Boxes/Artificial Cavities
6. Hardwood Removal
7. Mechanical Treatment
8. Predator Control
9. Erosion Control
10. Protection from visitor impacts (establish buffers)/law enforcement
11. Decoys (shorebirds)
12. Vegetation planting
13. Outreach and Education
14. Other -- feral hog removal

Monitoring Level:

Tier 1: Non-Targeted Observation/Documentation: includes documentation of species presence through casual/passive observation during routine park activities (i.e. not conducting species-specific searches). Documentation may be in the form of *Wildlife Observation Forms*, or other district specific methods used to communicate observations.

Tier 2: Targeted Presence/Absence: includes monitoring methods/activities that are specifically intended to document presence/absence of a particular species or suite of species.

Tier 3: Population Estimate/Index: an approximation of the true population size or population index based on a widely accepted method of sampling.

Tier 4: Population Census: A complete count of an entire population with demographic analysis, including mortality, reproduction, emigration, and immigration.

Tier 5: Other: may include habitat assessments for a particular species or suite of species or any other specific methods used as indicators to gather information about a particular species.

Detailed management goals, objectives and actions for imperiled species in this park are discussed in the Resource Management Program section of this component and the Implementation Component of this plan.

Exotic Species

Exotic species are plants or animals not native to Florida. Invasive exotic species are able to out-compete, displace or destroy native species and their habitats, often because they have been released from the natural controls of their native range, such as diseases, predatory insects, etc. If left unchecked, invasive exotic plants and animals alter the character, productivity and conservation values of the natural areas they invade.

The Tomoka Basin State Parks have numerous exotic plant infestations. Most of these are relatively scattered and small-scale, but there are a few notable exceptions. Brazilian pepper (*Schinus terebinthifolia*) is the most abundant and widespread exotic plant in the parks. Approximately half of the acreage of the Parks is affected by this plant in some way. Most infestations appear as small seedlings and scattered plants, but there are several areas of dense growth.

In 2001, the park worked with East Volusia Mosquito Control District (EVMCD), which received funding support from the Bureau of Invasive Plant Management (BIPM) to remove Brazilian pepper from the Mound Groove property and along Highbridge Road.

In 2006, EVMCD received BIPM funding to treat 45 acres of Brazilian pepper growth on cabbage heads, pine islands, and along marsh-upland edges in the large inaccessible area south of Pumphouse Road on the west side of Tomoka Basin. The area north of Pumphouse Road, along tributary branches of Cedar Creek, has never been treated for Brazilian pepper or other invasive exotic plants. This is the largest untreated area in Bulow Creek State Park.

Brazilian pepper is also the most abundant invasive exotic at Tomoka State Park. Scattered individuals are found along the shorelines of tidal creeks and at the landward margin of salt marshes bordering palm swamps, hydric hammocks, and upland communities; it is found sparingly in the interior hammocks and pine flatwoods. The highest density of Brailizian pepper growth occurs on the large dredge spoil deposits along the Halifax River on the east side of the park, and on the spoil berm along the west side of Strickland Creek, which is actually a dredged canal. The first treatments for Brazilian pepper control started at Cedar Point (dredge spoil island) in 2000-2001; the scope of exotic plant removal increased in following years with funding support from BIPM and DRP Resource Restoration funds.

Brazilian pepper is not the only serious exotic pest plant in the parks. Torpedograss (*Panicum repens*), tuberous sword fern (*Nephrolepis cordifolia*), and lantana (*Lantana camara*) are widespread and pervasive throuthout the Parks. Additionally, over 3 acres each of cogongrass (*Imperata cylindrica*) and Australian pine (*Casuarina equisetifolia*) have been documented

within the parks boundaries. Cogongrass is especially recalcitrant; it will take several years of dedicated, persistent effort to eradicate this plant from the parks.

It is estimated that the Brazilian pepper problem in the parks is approximately equal to the difficulty posed by the collective remaining exotic pest plant species within the parks boundaries. The cogongrass has been treated several times since February 2003, resulting in over 2 acres being treated multiple times. Since October of 2009, 4 acres of cogongrass and 11 acres of Australian pine have been treated.

There is no record of torpedograss having ever been treated in the parks before October 2009. Since that time, over 5 acres of torpedograss have been treated. At least an additional 10 acres are in need of treatment at this time.

There is an exotic plant problem in the southeast boundary area of Tomoka State Park between Yonge Street extension, an abandoned transportation right of way (City of Ormond Beach) and Strickland Creek. The wetlands and hammocks in the boundary area have been invaded by several Category 1 species (FLEPPC) including air-potato (*Dioscora bulbifera*), wild taro (*Colocasia esculenta*), Chinese tallow, sword fern (*Nephrolepis cordifolia*), Japanese climbing fern (*Lygodium japonicum*), and Mexican petunia (*Ruellia simplex*). Air-potato, wild taro, and Chinese tallow were treated from 1998-2003. A rapidly spreading infestation of Mexican petunia was first treated in 2002, and then retreated in 2003 and 2004. The park efforts, however, are limited to state-owned lands and cannot control the large source populations of exotic plants on the city right of way and adjacent private property. Park management needs to initiate an agreement with the City of Ormond to clear the exotics and native vegetation along the Yonge Street right of way to maintain a buffer between the park and residential subdivisions and a firebreak for access by both city and the park fire equipment and personnel. An alternative proposal is to have the city vacate this section of the Yonge Street right of way and transfer ownership to DRP for the management by the Tomoka Basin Parks' Administration.

A unique feature of the parks is the dynamic influence of salinity upon the aquatic exotic pest plant populations within the parks. Many salt-intolerant species such as water spangles (*Salvinia minima*), water hyacinth (*Eichhornia crassipes*) and dotted duckweed (*Landoltia punctata*) that are not normally present within the brackish reaches of the Bulow Creek and Tomoka River drainages will become established from upstream, off-park populations during periods of high rainfall and subsequently lowered salinity. This has been accounted for within the Table 2 as a distribution of 0/3 or 0/2. The zero represents the lack of presence of a species due to increased salinity, and the second number represents the presence of a population during an influx of fresh water. These species will not normally be targeted for control unless extended periods of fresh water necessitate treatment.

Park staff conduct regular visits to all portions of the parks during the normal course of business, and all infestations are noted during these outings are recorded via hand-held GPS. Additionally, staff members are being trained to recognize the most serious exotic pest plants and their desirable native look-alikes, and any sightings by these staff members are reported as soon as possible. As these sightings are confirmed, the populations are assessed and prioritized for control.

Table 3 contains a list of the Florida Exotic Pest Plant Council (FLEPPC) Category I and II invasive, exotic plant species found within the park (FLEPPC 2009). The table also identifies relative distribution for each species and the management zones in which they are known to occur. An explanation of the codes is provided following the table. For an inventory of all exotic species found within the park, see Addendum 5.

Table 3: Inventory of FLEPPC Category I and II Exotic Plant Species

Common and *Scientific Name*	**FLEPPC Category**	**Distribution**	**Management Zone**
PLANTS			
Alligatorweed *Alternanthera philoxeroides*	II	2	BC 05
		3	TM 01
Sprenger's asparagus-fern *Asparagus aethiopicus*	I	2	TM 19
Australian pine *Casuarina equisetifolia*	I	2	BC 14
		5	BC 14
		6	TM 18, TM 20, TM 21
Camphor tree *Cinnamomum camphora*	I	2	BC 21, BC 22, TM 03d, TM 05
Wild taro *Colocasia esculenta*	I	6	BC 02, TM 14
Carrotwood *Cupaniopsis anacardioides*	I	2	TM 20, TM 18
Crowfoot Durbangrass *Dactyloctenium aegyptium*	II	2	BC 05, TM 02, TM 16, TM 18, TM 19, TM 20
Air potato *Dioscorea bulbifera*	I	2	TM 18, TM 19
		3	BC 05, TM 13, TM 14, TM 15, TM 18
Water-hyacinth *Eichhornia crassipes*	I	0/3	BC 01, BC 02, BC 05, BC 26, BU 02, TM 01, TM 12
Hydrilla *Hydrilla verticillata*	I	6	BC 02, TM 11
Cogongrass *Imperata cylindrica*	I	2	BC 08, BC 12b, BC 16a, BC 18c, BC 21
Dotted duckweed *Landoltia punctata*	II	0/2	BC 01, BC 02, BC 05, BC 26, BU 02, TM 01, TM 12
Lantana *Lantana camara*	I	3	BC 02, BC 03, BC 04, BC 09, BC 10a,

Table 3: Inventory of FLEPPC Category I and II Exotic Plant Species			
Common and *Scientific Name*	**FLEPPC Category**	**Distribution**	**Management Zone**
			BC 10b, BC 14, BC 15, BC 17, BC 19, BC 21, TM 02, TM 12, TM 17, TM 18, TM 19, TM 20, TM 21
White leadtree *Leucaena leucocephala*	II	0	
Japanese climbing fern *Lygodium japonicum*	I	2	BC 01, BC 02, BC 05
Peruvian primrosewillow *Ludwigia peruviana*	I	3	BC 05
Old world climbing fern *Lygodium microphyllum*	I	0	
Chinaberry *Melia azedarach*	II	2	BC 10a, TM 17, TM 20
Rose Natal grass *Melinis repens*	I	2	TM 19
		3	BC 05, TM 20
Asian sword fern *Nephrolepis brownii*	I	2	BC 19
Tuberous sword fern *Nephrolepis cordifolia*	I	1	BC 19, BC 25
		2	BC 01, BC 06, BC 08, BU 03, TM 05, TM 07, TM 08, TM 13, TM 16, TM 17, TM 18
		3	BC 19
Guineagrass *Panicum maximum*	II	2	BC 06, TM 16, TM 19
Torpedograss *Panicum repens*	I	2	BC 17, BC 21, BU 02, TM 17
		3	BC 16a, BC 17
		4	BC 17
Senegal date palm *Phoenix reclinata*	II	0	
Chinese ladder brake *Pteris vittata*	II	2	BC 01, BC 05, BC 08, BU 03
Mexican petunia *Ruellia simplex*	I	3	BC 05, BC 10a, TM 14
Water spangles *Salvinia minima*	II	0/3	BC 01, BC 02, BC 05, BC 26, BU 02, TM 01, TM 12
Chinese tallow *Sapium sebiferum*	I	2	BC 12b, BC 17, BC 19, TM 14

Table 3: Inventory of FLEPPC Category I and II Exotic Plant Species			
Common and *Scientific Name*	**FLEPPC Category**	**Distribution**	**Management Zone**
Brazilian pepper *Schinus terebinthifolia*	I	2	BC 03, BC 04, BC 05, BC 06, BC 07, BC 08, BC 09, BC 10a, BC 10b, BC 11, BC 12a, BC 12b, BC 13, BC 14, BC 15, BC 16a, BC 16b, BC 17, BC 18a, BC 18c, BC 19, BC 20, BC 21, BC 22, BC 23, BC 24, BC 25, BC 26, BC 27, BC 28, TM 01, TM 02, TM 03d, TM 04, TM 06, TM 07, TM 08, TM 09, TM 10, TM 12, TM 13, TM 14, TM 15, TM 16, TM 17, TM 18, TM 19, TM 20, TM 21
		3	BC 03, BC 04, BC 06, BC 07, BC 09, BC 13, BC 14, BC 15, BC 16a, BC 16b, BC 17, BC 18a, BC 21, BC 25, BC 27, BC 28, TM 03d, TM 04, TM 07, TM 12, TM 13, TM 18, TM 20
		4	BC 12a, BC 14, BC 15, BC 21, BC 27, TM 18, TM 20
		5	BC 15, TM 13, TM 20
Creeping oxeye *Sphagneticola trilobata*	II	2	TM 08, TM 12, TM 17

Distribution Categories:

0: No current infestation: All known sites have been treated and no plants are currently evident.

1: Single plant or clump: One individual plant or one small clump of a single species.

2: Scattered plants or clumps: Multiple individual plants or small clumps of a single species scattered within the gross area infested.

3: Scattered dense patches: Dense patches of a single species scattered within the gross area infested.
4: Dominant cover: Multiple plants or clumps of a single species that occupy a majority of the gross area infested.
5: Dense monoculture: Generally, a dense stand of a single dominant species that not only occupies more than a majority of the gross area infested, but also covers/excludes other plants.
6: Linearly scattered: Plants or clumps of a single species generally scattered along a linear feature, such as a road, trail, property line, ditch, ridge, slough, etc. within the gross area infested.

Exotic animal species include non-native wildlife species, free ranging domesticated pets or livestock, and feral animals. Because of the negative impacts to natural systems attributed to exotic animals, DRP actively removes exotic animals from state parks, with priority being given to those species causing the ecological damage.

In some cases, native wildlife may also pose management problems or nuisances within parks. A nuisance animal is an individual native animal whose presence or activities create special management problems. Examples of animal species from which nuisance cases may arise include raccoons, venomous snakes and alligators that are in public areas. Nuisance animals are dealt with on a case-by-case basis.

The most significant exotic animals in Tomoka Basin State Parks are feral swine (*Sus scrofa*) and nine-banded armadillos (*Dasypus novemcinctus*). Of these two, feral swine present a significant management problem. Within Bulow Creek State Park, a robust population of feral hogs persists in spite of continued management efforts. These hogs regularly uproot hundreds of acres of hydric hammock, mesic hammock, mesic flatwoods and salt marsh. Their rooting not only decimates sensitive populations of herbaceous plants and ground dwelling vertebrates and invertebrates, but it also provides a foothold for invasive exotic plants.

In the time between February 2003 and FY 2008-09, 57 hogs were removed by park staff. During FY 2008-09, 487 hogs were removed via USDA contract and an additional nine were removed by park staff. During FY 2009-10, USDA removed 37 hogs and additional 168 were removed via park staff. During FY 2001-11, 109 hogs were removed by a combination of park staff and a contractor who operated within the park for three months. Through the second quarter of the 2011-12 FY, 41 hogs were removed. As of the end of December 2011, the total number of feral hogs removed since approval of the last unit management plan has been 908 individuals.

Nine-banded armadillos are also a problem species within the Parks. Their foraging disturbs sensitive cultural sites, and they can have an impact on ground-nesting reptiles and birds. The known record of armadillo control within the Parks prior to FY 2009-10 is three individuals. For FY 2009-10, 35 nine-banded armadillos were removed. For FY 2010-11, 61 were removed. Through the second quarter of FY 2011-12, an additional 9-banded armadillo was removed. This brings the total number of nine-banded armadillos removed since approval of the last Unit Management Plan to 100.

Detailed management goals, objectives and actions for management of invasive exotic plants and exotic and nuisance animals are discussed in the Resource Management Program section of this component.

Special Natural Features

The channel of the lower Tomoka River forms the boundary between Tomoka State Park and Bulow Creek State Park. The ecological and recreational significance of the river and its major tributaries was recognized by their designation as one of 41 Special Waters amongst DEP's list of Outstanding Florida Waters (OFW) in 1991. Seasonal changes in water temperature, different salinity regimes and a diversity of tributary streams create a variety of habitat conditions for fish and wildlife. Manatees, which are sensitive to cold water, migrate into the Tomoka during the warm months. The Florida Marine Fisheries Institute (FMRI) conducted monthly fish surveys in the Tomoka River, upper Halifax River and other coastal waters of Volusia County from January 1993 to September 1997. The Tomoka River stations had the highest species diversity of all the stations sampled in coastal Volusia County. Varieties of freshwater species were collected at the upstream station near Thompson Creek, including four species of centrarchid sunfish (*Lepomis spp.*), largemouth bass (*Micropterus salmoides*) and American eel (*Anguilla rostrata*). FMRI collected numerous estuarine and marine species near the mouth of Tomoka River. The bay anchovy (*Anchoa mitchilli*) was numerically dominant in the catch, but seven species in the family Sciaenidae form the backbone of the recreational fishery in the Tomoka River. These familiar sciaenid species include red drum, black drum, spotted seatrout, weakfish, Atlantic croaker and spot. The FMRI survey, designed for smaller size classes that are overlooked in the recreational catch, showed that the Tomoka River estuary provides habitat for the juvenile life stages of important sport and commercial species. Juvenile red drum enters the Tomoka River in autumn, juvenile croaker was collected in winter and young spot arrive in late winter and spring (Paperno 1998).

There are numerous large, old live oaks with a trunk diameter greater than 60 inches and a circumference greater than 188 inches in the mesic and hydric hammocks at Bulow Creek State Park. The best-known old-growth oak is the Fairchild Oak, found at the park entrance area on Old Dixie Highway. The Fairchild Oak was measured by Robert Simons and botany professor Daniel Ward in 1993 for the Florida Champion Tree Record. The diameter of the Fairchild Oak was 91.4 inches (circumference 287 inches); the total points, which includes crown spread, was 388 points. Although the Fairchild Oak is not the state champion, it is one of the great trees of Florida and an important natural feature at Bulow Creek State Park. It is known to generations of local residents and tourists on the historic Old Dixie Highway. In 2007, a group of professional arborists inspected the Fairchild Oak; they measured trunk diameter, 96.8 inches, and estimated the age of the oak at 484 years. One of the arborists rappelled up the oak to inspect the tree for branch damage and signs of wood decay organisms, particularly the sulphur shelf fungus, *Laetiporus sulphureus*, which digests cellulose. In 2003, park staff had photographed sulfur-yellow mushrooms, the fruiting bodies of *Laetiporus*, growing on the Fairchild Oak. The arborists did not find evidence of deep decay by *Laetiporus* or other fungi, however, and concluded that the tree was generally healthy, but did recommend the removal of dead branches and the protection of surface feeder-roots by the addition of sterile mulch to the ground area within the drip-line of the tree.

At Tomoka State Park, the shell mound at Tomoka Point supports a unique plant association comprised of both temperate and tropical species. The canopy of the hammock with live oak, red cedar and cabbage palm, is characteristic of the temperate broad-leaved evergreen forest of northeast coastal Florida (A.M. Greller hammock classification in Myers and Ewel 1990). The understory, however, contains a variety of tropical species that are commonly found in the hammocks of South Florida and the West Indies. These tropical hammock species include marlberry (*Ardisia escallonioides*), white stopper (*Eugenia axillaris*), myrsine (*Rapanea punctata*), wild coffee (*Psychotria nervosa*), and tallow wood (*Ximenia americana*). These tropical species are cold sensitive and vulnerable to winter freezes. Following a hard freeze in December 1983, many shell mound plants, including marlberry, white stopper, and hog-plum (also black mangroves in the boat basin) were killed to ground level. They were not dead, however, and during the mild decade of the 1990s have regrown to form spreading shrubs and small trees (C.DuToit, pers. obs.). As discussed by E. Norman, botanist at Stetson University, the calcareous substrate of shell middens appears to provide a greater degree of protection or cold tolerance than the common quartz sands of east coastal Florida, enabling certain tropical species to survive as disjunct populations on northern shell mounds, distant from their source populations in South Florida. The nearest occurrence of tropical hammock flora to Tomoka State Park is on large shell mounds, 20–40 miles south of the park, at Green Mound County Park, Spruce Creek Preserve and Canaveral National Seashore.

Cultural Resources

This section addresses the cultural resources present in the park that may include archaeological sites, historic buildings and structures, cultural landscapes and collections. The Florida Department of State (DOS) maintains the master inventory of such resources through the Florida Master Site File (FMSF). State law requires that all state agencies locate, inventory and evaluate cultural resources that appear to be eligible for listing in the National Register of Historic Places. Addendum 7 contains the DOS, Division of Historical Resources (DHR) management procedures for archaeological and historical sites and properties on state-owned or controlled properties; the criteria used for evaluating eligibility for listing in the National Register of Historic Places, and the Secretary of Interior's definitions for the various preservation treatments (restoration, rehabilitation, stabilization and preservation). For the purposes of this plan, significant archaeological site, significant structure and significant landscape means those cultural resources listed or eligible for listing in the National Register of Historic Places. The terms archaeological site, historic structure or historic landscape refer to all resources that will become 50 years old during the term of this plan.

Condition Assessment

Evaluating the condition of cultural resources is accomplished using a three-part evaluation scale, expressed as good, fair and poor. These terms describe the present condition, rather than comparing what exists to the ideal condition. Good describes a condition of structural stability and physical wholeness, where no obvious deterioration other than normal occurs. Fair describes a condition in which there is a discernible decline in condition between inspections, and the wholeness or physical integrity is and continues to be threatened by factors other than normal wear. A fair assessment is usually a cause for concern. Poor describes an unstable condition where there is palpable, accelerating decline, and physical integrity is being compromised

quickly. A resource in poor condition suffers obvious declines in physical integrity from year to year. A poor condition suggests immediate action is needed to reestablish physical stability.

Level of Significance

Applying the criteria for listing in the National Register of Historic Places involves the use of contexts as well as an evaluation of integrity of the site. A cultural resource's significance derives from its historical, architectural, ethnographic or archaeological context. Evaluation of cultural resources will result in a designation of NRL (National Register or National Landmark Listed or located in an NR district), NR (National Register eligible), NE (not evaluated) or NS (not significant) as indicated in the table at the end of this section.

There are no criteria for use in determining the significance of collections or archival material. Usually, significance of a collection is based on what or whom it may represent. For instance, a collection of furniture from a single family and a particular era in connection with a significant historic site would be considered highly significant. In the same way, a high quality collection of artifacts from a significant archaeological site would be of important significance. A large herbarium collected from a specific park over many decades could be valuable to resource management efforts. Archival records are most significant as a research source. Any records depicting critical events in the park's history, including construction and resource management efforts, would all be significant.

The parks contained within this management plan encompass highly significant prehistoric and historic cultural resources that merit their nomination to the National Register of Historic Places as an archaeological and historic district. Because these parks contain archaeological evidence for every period of the aboriginal cultural sequence from PaleoIndian times through European contact, they have the potential to yield significant information concerning changing settlement patterns in northeast Florida. In addition, the region contains significant historic sites. Evidence of occupation throughout the nineteenth century as well as remains of homesteads from the early twentieth century is found on these properties.

The Spanish, French and British, in their turn, all explored and claimed the central Florida coast, with the Spanish and British making land grants to encourage settlement (Gannon 1996). When Juan Ponce de Leon explored the coast of Florida in 1513, Timucua Indians were living in northeast and central Florida (Milanich 1995). In 1565, Philip II of Spain sent Pedro Menendez de Aviles to destroy Fort Caroline, the French colony at the mouth of the St. Johns River, and to establish Spanish St. Augustine (Gannon 1996). In 1605, the Spaniard Alvaro Mexia visited the Timucuan village of Nocoroco on his way south during a diplomatic mission to the Ais Indians. He mapped the site, which indicated that Nocoroco was located on the western bank of the Tomoka peninsula, within the current boundary of Tomoka State Park. Mexia described Nocoroco as an important village that carried the same name as the river that faced the Timucuan village. He said there were four other villages on the bay, but did not name them, implying that Nocoroco was the most important village in the area, and probably the seat of the local chief (Piatek 1992). The First Spanish Period lasted from the founding of St. Augustine in 1565 until 1763, when Charles III of Spain ceded Florida to the British in exchange for the return of Cuba.

During the First Spanish Period, the Crown made land grants in the Tomoka River area, but none of these grants were ever occupied (Gannon 1996).

During the British occupation of peninsular Florida (1763 to 1783), Richard Oswald was the major landowner within the parks area. His numerous endeavors are reflected in at least three sites numbered within the Florida Master Site File.

During the Second Spanish Period (1783-1821), the Spanish Crown made land grants in the Tomoka River area to British and American citizens. The availability of large tracts of inexpensive land, access to navigable waterways, and high sugar prices fostered the development of a major sugar production area within the Halifax-Tomoka region (Daniel 1980, Gannon 1996).

After Florida became an American territory in 1821, a number of wealthy American planters purchased large tracts of land in the region, imported large numbers of slaves, and cleared fields in preparation for the cultivation of sugar, cotton, indigo, and a variety of lesser crops. (Daniel 1980, Gannon 1996).

Throughout the 1790s and the first three decades of the 1800s, Seminole Indians living along the St. Johns River and further west into the interior of Florida, raided the plantations in the east coast for cattle, horses, slaves, food, clothes, and captives to hold for ransom or to enslave. At the beginning of the Second Seminole War, the Seminoles raided and destroyed the plantations in the region, leaving the area deserted until the 1870s (Piatek 1992, Gannon 1996).

The following sections present assessments for those sites that could be visually inspected by the cultural resources management evaluation team at various dates up to and including December 2009. Areas inspected include sites that were reported to show disturbance, either from human activity or from natural occurrences. Additional site assessment information is provided based on Florida Master Site File (FMSF) data.

Prehistoric and Historic Archaeological Sites

Desired future condition: All significant archaeological sites within the park that represent Florida's cultural periods or significant historic events or persons are preserved in good condition in perpetuity, protected from physical threats and interpreted to the public.

Description—Addison Blockhouse Historic State Park: There are four archaeological sites within the park boundaries, one prehistoric and two historic with the fourth being a historic grave site placed in a prehistoric midden. The prehistoric sites, shell middens, occur along the contiguous boundary between Addison Blockhouse Historic State Park and Bulow Creek State Park.

VO 0193, Addison Blockhouse, is a ruin of what was likely the kitchen building in the Addison Plantation. During the Second Seminole War, this structure served as the central base for Camp McRae. The FMSF originally included the Addison Blockhouse and surrounding earthworks (2nd Seminole War) with the McRae sugarmill site under FMSF VO193; the McRae Mill has subsequently been assigned its own number (VO 7496).

VO0243, Addison's Mound, is the grave site for John Addison. This grave site was placed within a prehistoric midden. The site no longer contains the remains of John Addison; the whereabouts of the remains are currently unknown.

VO 7496, the Addison/McRae Mill, is a ruin of the original Addison sugar mill. Upon the death of Addison, the property was sold to McRae.

VO 9221, the McRae Midden, is a prehistoric shell midden of undetermined cultural period. It occurs on both sides of the contiguous boundary between two parks.

Bulow Creek State Park: Bulow Creek State Park contains numerous prehistoric middens as well as several highly significant historic sites. Before state ownership, DHR conducted a wide-area reconnaissance survey (R. Daniel 1980) covering the northern half of the present Bulow Creek State Park. In the 1990s archaeologist Ted Payne did a preliminary investigation of the northeast section of VOLT tract (added to the park in 2000), and located features at the 19th century Bunch-Dummett slave village, and 18th century Moultrie rice fields (Payne 1996). T. Payne also described structural features and surface artifacts at the Bunch-Dummett residence-kitchen site (Payne 1999) on the Mission Pines tract that was added to the park in 2005.

FL00018, Bellemead 5, is a small shell midden bordering Bulow Creek. Although no diagnostic ceramics were reported, the oyster and clamshell midden probably dates to the St. Johns cultural period (Daniel, 1980, Florida Department of State: FL00018).

FL00019, Bellemead 6, is another oyster and clamshell midden of undetermined date, although it likely dates to the St. Johns cultural period (Daniel, 1980, Florida Department of State: FL00019).

FL00020, Bellemead 7, is another oyster and clamshell midden located on the Bulow Creek marsh. It has not been dated, but probably dates to the St. Johns cultural Period. The midden straddles the Flagler-Volusia County line. The Volusia County part of the site has not been surveyed, and is probably the larger part of the site (Daniel, 1980, Florida Department of State: FL00020).

VO00063 is an undated shell midden, now bisected by Old Dixie Highway and a mosquito control canal (Daniel, 1980, Florida Department of State: VO00063).

VO0167 Tomoka Basin No. 1 is an aboriginal shell midden at the "first bridge" on Old Dixie Highway (replaced by a box culvert) between the Toscana Subdivision and Dummett Mill site. The midden was disturbed by the excavation of a canal prior to WW II and part of the site is located on a private in-held parcel.

VO00241, Dummett Mill, is a sugar factory with a rum distillery that was constructed in 1825. All that remains of the two-story coquina structure is the foundation with its northern wall and chimneys. The site contains structural supports for the sugar and rum processing facilities consisting of a coquina superstructure with handmade bricks utilized in the heated areas. Rubble, earth and vegetation cover the interior of the building, but many of the structural components of

the factory are preserved. Some of the brick-insulated coquina structural supports for the kettles remain, as do the distillery fireboxes. Immediately behind the kettle row would have been the workers' platform. Just south of where this platform would have been located is a coquina-lined well that was used to supply water during sugar and rum production. The north wall had masonry arches that provided stress-relieving strength (Payne 1999:111). Photos of the Dummett Mill from the early 1900s indicate that a substantial part of the mill structure was removed in the last century, by natural causes and human vandalism. Prior to the transfer of the property from VOLT to the state, Volusia County erected a chain link fence around the mill site. DRP later cleared most of the understory vegetation between the mill and Old Dixie Highway to provide an open vista of the ruins from the roadway. The combination of the fence barrier and visual exposure has been an effective deterrent to vandalism and unintentional human damage caused by visitors climbing around the mill ruins.

The Structural Stabilization Study (SouthArc, Inc. 2001) indicated structural problems at Dummett Mill ruins and the pervasive impact of vegetation growth and internal moisture on coquina limestone. In 2004, the park received funding from BNCR to initiate the repair and stabilization of the mill structure. The 1st phase of the project was the repair of the twin chimneys, the most prominent feature of the ruins. The upper courses of both chimneys were re-built with the original coquina blocks and, where blocks were missing, with new coquina blocks cut from local quarry rock. The chimney openings were covered with plywood and sealed with a cement cap to prevent rainwater from entering the interior flues. Wood braces were installed in two holes in the mill wall to enhance stability, but the entire structure needs external and internal reinforcements to prevent future collapse. A tree service removed overhanging oak limbs and several large pines at the mill site to maintain a tree-fall free zone.

In 2011 the National Park Service, Historic Preservation Training Center, accomplished additional stabilization of the structure. Using coquina from the private, adjacent coquina quarry they undertook to stabilize and rebuild the arch and other areas of the walls. First, the northeast corner and middle archway received replacement stone. Second, voids on the southern face were filled with used brick bought out of Orlando. Third, the top of the main wall was grouted between its wythes and with stainless steel cramps were then set using epoxy anchors to staple the wythes together, and a
1" protective mortar cap was established. Finally, the two chimney openings on the north face of the structure were reinforced using brick in one, and pressure treated lumber in the other. The west end of the ruin received the bulk of new material and was stair-stepped to buttress the side of the structure and lock the extant vousiour stone into place.

VO00244, McHardy Plantation (previously Rosetta), contains the ruins of several plantation buildings. The site probably dates to a Second Spanish Period land grant to Robert McHardy in 1808. The sugar mill ruins, which have been assigned their own FMSF number (VO 9217), are about 0.5 mile northeast of the plantation house ruins. Remains of the manager's residential complex, workers' settlement, and service buildings for Moultrie's (subsequently McHardy's) plantation have not been identified, but the preserved rice field complex with its two dams and field dikes have been located in marshlands (Payne 1999).

VO00245, Mound Grove, is a large shell midden located on Bulow Creek. The site dates to the St. Johns cultural period, and has been disturbed by the construction of a road and houses built on the midden in the late 19th or early 20th century (Daniel, 1980, Florida Department of State: VO00245).

VO00246, Bulow Creek Midden, is a late Archaic to St. Johns period shell midden located on Bulow Creek. Part of the midden has been removed for use as roadfill, and has been damaged by bulldozer cuts (Daniel, 1980, Florida Department of State: VO00246).

VO00248, Bellemead I, is a shell midden of undetermined date that lies just below ground surface (Daniel, 1980, Florida Department of State: VO00248).

VO00249, Bellemead II, is a large shell midden of undetermined date, although it probably dates to the St. Johns cultural period (Daniel, 1980, Florida Department of State: VO00249).

VO00252, Historic Dump I, is located near the Ormond Tomb and appears to date to the late 19th and early 20th century (Daniel, 1980, Florida Department of State: VO00252).

VO00257, Bulow Creek Midden 2, is a St. Johns period shell midden on Bulow Creek that has been disturbed by a powerline right of way (Daniel, 1980, Florida Department of State: VO00257).

VO00258, the Stevens Inc., Brick Site, is a surface scatter of firebrick, paving brick, metal barrel hoops and metal slag. One of the bricks was stamped Stevens/Stevens Inc., Atlanta (Daniel, 1980, Florida Department of State: VO00258).

VO01972, Harwood House site, is contiguous with VO0251 Ormond Plantation. This was bought from the heirs of the Ormond family for use as a cattle ranch in 1888 by Norman Harwood. Built here, are a number of wooden houses and two coquina cisterns. A later owner, the Conrad Oates Company, built a coquina land sales office at some point after 1915 (see VO09206). As the last house was demolished in the late 1980s, only the coquina structures survive today. The site also contains the huge Fairchild Oak.

VO2586, Bunch Workers' Quarters, contains the remains of a 19th century homestead. Ted Payne conducted archaeological work at this site, but his subsequent publication (Florida Anthropologist, 52, 103-113) created some confusion between this site and a nearby site (VO 9182). A note within the FMSF delineates the current treatment for the locality of these two sites.

VO2587, Plantation Site, contains the ruins of a plantation residence and kitchen. A preliminary site survey by Ted Payne identified early 19th century artifacts indicating occupation during the Second Spanish Period-Territorial Period (Payne 1999 FAS). This site, which appears to be a component of the Bunch-Dummett plantation, is on the Mission Pines tract that was added to the park in 2005. This site is also the locality of a 20th Century historic dumpsite of hotelware form the Hotel Clarendon (currently The Plaza Resort and Spa).

VO02588, Lee Landing, is a subsurface brick feature located on the eroding western bank of the Tomoka Basin. Originally thought to be a brick-lined boat landing, Payne has postulated that the feature was actually the subsurface remains of a brick kiln exposed by the erosion of the western shoreline of the Tomoka Basin (DuToit pers. comm.). The hypothesis that this site may be a kiln does not stand up to field observation, however, due to the non-random, non-scattered distribution of the bricks into the Tomoka Basin.

VO07165, Rogers Island Midden, is a prehistoric midden of undetermined cultural period.

VO07223, Weeks Place, is an abandoned 20th Century homestead site.

VO08194, Korona Canal Midden, is an unspecified St. Johns period shell midden.

VO09182, Pete's Place, contains the likely remnants of a 19th Century enslaved workers' quarters. The site was known to members of a hunt club prior to its addition to the park in 2005 as part of the Mission Pines tract. See the above description for VO02586 for more information.

VO09191, Tomoka Basin Midden, is a shell midden assigned to the Second St. Johns cultural period.

VO09217, Mill Attributed to McHardy, was recently separated out of the VO0244 McHardy Plantation site. This site is the actual sugar mill that was destroyed and abandoned, as were all of the mills in the area, during the onset of the Second Seminole War.

VO09218, Tomoka Basin Midden 4, is a prehistoric shell midden of an unassigned cultural period.

VO09219, Tomoka North Creek Midden, is a prehistoric shell midden of an unassigned cultural period.

VO09220, Tomoka South Creek Midden, is a prehistoric shell midden of an unassigned cultural period.

VO09221, McRae Midden, is discussed in the Addison Blockhouse Historic State Park section of this document.

VO09222, Tomoka River Midden 3, is a prehistoric shell midden of an unassigned cultural period.

VO09223, Tomoka River Midden 4, is a prehistoric shell midden of an unassigned cultural period.

VO09224, Tomoka Basin Midden 3, is a prehistoric shell midden of an unassigned cultural period.

VO09225, Tomoka Basin Midden 2, is a prehistoric shell midden assigned to an unspecified St. Johns cultural period.

VO09226, Corduroy Creek Crossing, was added to the FMSF in January of 2010. It consists of numerous logs, locally felled and placed lengthwise parallel to the flow of a small, unnamed tributary creek to the Tomoka Basin. It serves as a crossing to prevent sinking into the deep muck of the creek bed while crossing.

VO09227, Joes New Still, is a 20th Century liquor still discovered near the McHardy Mill ruins.

VO09228, Moultrie's Rice Canal, is presumably an 18th Century water control device that was hand-dug at the north end of Rosetta Island.

VO09229, Keeney House Site, is the remnants of an early 20th Century (possible Late 19th Century) house site. The house was destroyed sometime during or after the mid 1940s.

Bulow Plantation Ruins Historic State Park: The FMSF lists one known prehistoric site and one historic site. In addition, there are numerous prehistoric sites near the site (located on the Bulow Creek State Park property), and numerous architectural features associated with the recorded historic site.

FL00007 Bulow Plantation Ruins consists of three sub-sites. FL00007A is the Bulow Plantation main house, FL00007B is the Sugar Mill and associated works and FL00007C is the enslaved workers' quarters' complex. Pellicer lists forty-six slave cabins as being lost when the plantation was burned in 1835. These were small frame structures located in a semi-circle around the main house, an unusual arrangement whose only counterpart was at Kingsley plantation on Fort George Island, near Jacksonville, Florida. The FL00007C site also crosses the contiguous boundary between this park and Bulow Creek State Park, but will be discussed here only.

Other visible features of the site include a well or storage pit; a springhouse to the northwest of the mill; and three cuts in the bank of Bulow Creek that define boat slips constructed by Bulow.

FL000017, Bellmead 4 consists of a surface scatter of ceramics and worked shells.

Tomoka State Park: Several archaeological surveys and studies have been undertaken at Tomoka State Park over the past quarter century. These include Andrew Douglass (1881) John Griffin and Hale G. Smith (1946), and Randy Daniel and Jay Haviser (1976). During the 1990s, Tomoka State Park saw several archaeological investigations of specific areas and sites. In 1992, Bruce Piatek surveyed Tomoka Point (VO 82), and in 1995 returned to survey the southern part of the park. In addition, in 1992, Dana Ste. Claire examined the Tomoka Stone site (VO 2571). In 1997, Ted Payne excavated part of the Nocoroco, Mount Oswald and Perpal site, and investigated features believed to be affiliated with Mount Oswald (VO 82 and VO 4310).

VO00081, the Tomoka Mounds and Midden Site, is a related complex of three mounds and a shell midden, located on the west side of the Tomoka peninsula, north of the park shop. VO00081 had probably been a continuous midden two miles in length although it now consists

of a broken series of mounds that were disturbed by construction activities during the mid-twentieth century. Andrew Douglass first published the results of his excavations at VO00081in 1881 (Piatek 1992). Douglass found eight bannerstones or atlatl weights, but did not recognize the human burials with which the bannerstones were probably associated. In 1946, John Griffin and Hale G. Smith of the Florida Park Service conducted the first modern professional archaeological investigation at Tomoka. Griffin found that the mounds contained human burials. In 1976, Randy Daniel and Jay Haviser of the DAHRM identified a total of seven to nine mounds within the site. Although VO00081 had never been assigned to a cultural period, the site's lack of ceramics and the presence of the atlatl bannerstones indicate that it probably dates from the Late Archaic. If so, the presence of human burials in Late Archaic mounds threatens the commonly accepted defined burial mound period in Florida, and pushes it much further back into the past (Piatek 1992). Bruce Piatek (1992) also obtained radiocarbon dates for Mound Six that ranged from 4679 to 930 BP.

Numerous looter holes were observed at several of the mounds, most of which resulted from activity occurring several decades ago. However, several potholes that are more recent were also located. The effects of the early archaeological investigations as well as erosion also threaten the integrity of the site.

VO00082, the site of the large Timucuan village, Nocoroco, was nominated to the National Register in 1973. Located on the western bank of the Tomoka peninsula, from Tomoka Point to just south of the current park ranger station, the site survives as a shell and black dirt midden that dates from the Late Archaic and St. Johns periods. Excavations conducted on this site in the late 1940s by Griffin and Smith (1949) yielded evidence to suggest that this was the site of Nocoroco first described in 1605 by Alvaro Mexia. It is some 700 feet long from north to south, no wider that 50 feet, with cultural material on the western beach and the banks above obviously eroding into the Tomoka Basin and the Tomoka River (Piatek 1992).

The Nocoroco village site and Mount Oswald and Perpal plantation sites (VO 4310) which were developed upon the prehistoric midden have all been disturbed by erosion at Tomoka Point. The prehistoric-historic period stratigraphy has been altered by physical erosion due to wave impacts during northeasters and other storm events. Nocoroco and Mount Oswald have also been disturbed by the early development of Tomoka State Park in the 1950s. The construction of park facilities in the 1950s displaced a large amount of the prehistoric material and disturbed the historic context of artifacts and possible structural remains of the plantation settlements. The facilities construction in the 1950s also further disturbed the Nocoroco site, which at the time of Spanish contact, was described as one the largest native American settlements along the east coast of Florida.

VO00639, the Johns Island Dam or the Lost Causeway, consists of an elevated grade across the north end of Johns Island marsh. The site is likely to be that of an earthen dam that was part of Oswald's rice plantation (Piatek 1995). The site is protected by its remote and inaccessible location.

VO00640, Bellemead Midden, is an undefined Saint Johns Period midden on the northwest portion of Johns Island.

VO02571, the Tomoka Stone site, is a dense shoreline coquina shell midden located on the east shore of the Tomoka peninsula, on the western bank of the Halifax River. The site dates to the Late and possibly Middle Archaic period. Today the midden is partially flooded by the Halifax River, indicating that the site was deposited during a period of lower sea levels, which also supports an occupation during the archaic period (Russo and Ste. Claire 1992).

VO03453, the Johns Island Still, consists of the remains of 20th century liquor still, probably a bootleg Prohibition era operation (Piatek 1995).

VO04310, the Mount Oswald Plantation Settlement site, covers only that part of the plantation that falls within the boundaries of the park (situated on the Tomoka peninsula). The Oswald land grant included 20,000 acres in the present day Ormond Beach area. Richard Oswald was a West Indies plantation owner and slave trader who championed the colonization and economic development of East Florida. In 1764, Oswald applied for and received a 20,000-acre land grant that became Mount Oswald Plantation, one of the earliest and largest plantations in British East Florida. Oswald exported cash crops such as indigo, sugar, rum and rice. The plantation was abandoned about April 1784, a year after Florida returned to Spanish sovereignty. In 1803, Gabriel Perpal received a 1,900-acre land grant, which covered part of the previous Mount Oswald Plantation. Perpal's plantation buildings were situated in the same general location as the Mount Oswald house.

In 1997, archaeologist Ted Payne conducted preliminary investigations at the Mt. Oswald site and located numerous domestic artifacts dating to the 18th century and early 19th century indicating residential occupation during the Oswald settlement and Perpal ownership (Payne, 1997). Shovel test units also revealed non-domestic artifacts including a scatter of iron pieces and molten slag, indicating a blacksmith operation at Mount Oswald.

VO04366, the Saw Dust Pits, is a "U" shaped pile of sawdust. The site is probably from a portable sawmill operation dating to the early 20th century.

VO07072, Tomoka Point East, is a platform of logs partially submerged on the east side of Tomoka Point discovered in 1996. The logs appear to be red cedar. Their purpose is unclear, although their placement is obviously deliberate (Florida Department of State: VO07072, Isaacs's pers. comm.).

VO07127, Oswald's Ferry Settlement, is another site attributed to Richard Oswald.

VO07499, the Burns Midden, is located on Strickland Creek in the south end of the park. The shell midden dates to the St. Johns I and II periods (Piatek 1995). While erosion is a potential threat, the remote location of the site and difficult access provides protection.

VO07500, the Sorensen Midden, consists of a small shell midden located on Johns Island bordering Thompson Creek marsh. No artifacts were recovered, and the midden has not been dated (Piatek 1995).

VO07501, the Thompson Creek Bridge, is an historic causeway and bridge crossing possibly dating to the Oswald Plantation during the British Period. The causeway and a few bridge pilings survive (Florida Department of State: VO05272, Piatek 1995).

VO09240, Concrete Slab for Tomoka State Park Building 26, is a partial concrete slab. Building 26 was reconstructed and expanded in the early 1990s, and presumably, for the sake of thoroughness, the remnant original slab has been added to the FMSF as an archaeological site.

Condition Assessment: Most of the archaeological sites within the Parks are in fair condition. The sugar mills show various ranges of condition. While the Bulow sugar mill has had, extensive restoration work performed since 2001, and can thusly be described as being in fair-good condition.

In 2001, the Volusia Anthropological Society (FAS affiliate group) received a grant from DHR for a Structural Stabilization Study of eight sugar mills in Volusia and Flagler County (SouthArc, Inc. 2001) which included four sites managed by Tomoka Basin State Parks: VO241 (Dummett), VO244 (McHardy) VO193(Addison/McCreae) and FL7(Bulow). The major structural problems at each mill were identified, with recommendations for masonry repairs, coquina preservation treatments and site improvements. Stabilization and restoration work was initiated at Bulow Plantation Ruins in 2003-2004. The accumulated debris in the springhouse cistern was removed and the walls were stabilized by repairing cracks, pinning joints and re-pointing coquina masonry. All vegetation was removed from the springhouse walls to prevent deterioration of coquina limestone by organic acids, and a temporary tent-shelter was placed over the structure to keep the springhouse shaded and dry and deflect falling tree debris.

The 2nd phase of the Bulow Plantation project was completed 2004-2006. A historical preservation architect was contracted made extensive repairs to the sugar mill: the deteriorating brick masonry in the arches on the south side of the mill was repaired/reconstructed and braces installed to support the archway structure. In the engine house, wood lintels and damaged or missing coquina blocks were re-fabricated and replaced in wall openings; a replica of the "lost plaque," an engraved coquina block with the original date of construction "Jan 26 1831," was restored to south wall of the engine house. The contractor also made repairs to the sugar train. The interior of the flue from the draft chimney was braced to prevent further deterioration and the eroded surface of the clarifier shelf was patched and coated with a coquina-cement preservative. In addition to the structural repairs, conservation treatments were applied to the entire mill structure. Biological growth (algae, moss and lichen) was removed by pressure cleaning, open masonry joints were re-pointed and damaged blocks replaced. The tops of the walls were sealed with a cementitious wash to reduce moisture penetration into permeable coquina limestone. The park hired to a tree service to remove overhanging limbs and trees to create a tree-fall free zone around the mill structure.

As referenced above, the 2011 stabilization efforts for the Dummet Mill have brought that structure into "good" condition. Some of the other mills, however have not fared as well. The remote location of both the McRae and McHardy mills is an obstacle to restoration efforts. These two mill structures must be assessed as fair to poor.

Likewise, the two non-mill coquina structures, Addison Blockhouse, which was a partial recipient of grant-funded work mentioned above including construction of a heavy canopy to protect the structure from the elements, and the Harwood Land Company House, are also showing the effects of their age and exposure to the harsh Central Florida climate. They must also be assessed to fair and poor, respectively.

Many of the prehistoric middens were disturbed by land clearing or ditch digging projects within the first 75 years of the 20th Century. Thusly, these can only be assessed to be in fair condition. The more remote middens that have not been disturbed can be assessed to be in good condition.

Level of Significance: The Florida FMSF has record of three archaeological sites in Addison Blockhouse Historic State Park. Addison-McRae (8VO00193) is deemed NR Eligible by surveyors, a "Potential contributor, National Register district," and is recommended for further "archaeological survey and structural stabilization/protection" since the site contains "potential for further archaeological and structural remains," making it Eligible under criterion D. FMSF data indicates that SHPO has "Insufficient information" to determine whether or not VO193 is Eligible for listing on the National Register of Historic Places.

Addison's Mound (8VO0243) has not been evaluated for NR Eligibility by the recorder(s) or SHPO. An FMSF Historic Cemetery number should be assigned to the Addison Grave site and documentation, based on DuToit's 1996-letter report contained in FMSF VO243, Daniels' VO243 (July 1979) update and Breit's VO243 (July 1996) update, and current determination of the grave's appearance, location and bounds provided to FMSF in a completed Historic Cemetery form.

The FMSF includes 11 cultural resources in Tomoka State Park. Tomoka State Park Mounds and Midden (VO00081) were deemed by surveyors as an NR Eligible Resource Group under criterion D but the resource group has not been evaluated by SHPO. The complex is a group of nine mapped mounds on a strip midden along the east side of Tomoka River. Three of the mounds, previously VO78 (Mt. Oswald), VO79 (NN), and VO80 (NN), were subsumed by creation of VO81; the other six mounds mapped by Daniels (1979) have not been assigned FMSF site numbers. Nocoroco (VO00082) is deemed NR Eligible under criterion D and considered Potentially Eligible by SHPO. Although not evaluated by the SHPO, surveyors' evaluations include Preservation Recommended for Bellemead Midden (VO00640) and Ineligible for NRHP for Saw Dust (VO04366), Johns Island Still (VO3453), and Oswald's Ferry Settlement (VO07127); Insufficient Information for recorders' evaluations is cited for Lost Causeway (VO00639), Burns Midden (VO07499) and Sorensen Midden (VO07500); Tomoka Stone (VO02571) and Tomoka Point East (VO07072) were not evaluated by the recorder.

General management measures: The sites must be monitored, any stabilization issues addressed, and additional information or data relative to any of the sites submitted to DHR/FMSF. In addition to general site care recommendations, any potholes in Addison's Mound should be filled to restore the appearance of original contours to the mound.

NR Listed or Eligible resources warrant higher profile monitoring and measures to stabilize and mitigate deterioration and disturbance, but all sites will be located, visited and monitored

regularly with necessary steps taken to conserve their integrity. Evidence of previously unrecorded sites will be documented and newly discovered sites will be recorded to DHR/FMSF standards. Boundaries of sites will be redefined as appropriate.

Historic Structures

Desired future condition: All significant historic structures and landscapes that represent Florida's cultural periods or significant historic events or persons are preserved in good condition in perpetuity, protected from physical threats and interpreted to the public.

Description: There are 24 historic park service structures within the four parks; one at Bulow Creek State Park, four at Bulow Plantation Ruins Historic State Park, and 19 at Tomoka State Park. All but one of these park service structures were built in the 1950s.

Bulow Creek State Park: VO09206, Harwood Land Company House. In 1888, Norman Harwood bought the plantation from the heirs of the Ormond family for use as a cattle ranch. He built a number of wooden houses and two coquina cisterns. A later owner, the Conrad Oates Company, built a coquina land office at some point after 1915. Only the coquina structure survives today.

Bulow Plantation Ruins Historic State Park: FL00891, Bulow Plantation Ruins Historic State Park Building 1, is the residence for the Resident Park Services Specialist for this park. FL00892, Bulow Plantation Ruins Historic State Park Building 2, is the pavilion, office and restroom for the Park. It is constructed of coquina block.

FL00893, Bulow Plantation Ruins Historic State Park Building 4, is an interpretive center, museum and restroom facility near the Bulow Sugar Mill.

FL00894, Bulow Plantation Ruins Historic State Park Building 6, is the maintenance shed for this park.

Tomoka State Park: VO09232 through VO09250 represent most of the infrastructure of this Park. The buildings include pavilions, residences, storage sheds, maintenance buildings and restroom facilities. The Assistant Park Manager residence, VO09232, which was constructed prior to 1940, is nonetheless ineligible for National Register status because it was moved sometime between its construction and the 1960s.

Condition Assessment: The only historic structure that needs immediate management action is the Harwood Land Company House. Its condition has deteriorated to where the walls have lost their structural integrity. Management should decide whether demolition is the best option for this resource of limited cultural value.

Level of Significance: Addison Sugar Mill (8VO07496) has not been evaluated for NR Eligibility by the recorder(s) or SHPO.

The original boundary of Tomoka State Park as acquired in 1941 is potentially eligible for listing in the National Register of Historic Places as a historic district. The park was developed between 1954 and 1969. The park is the best preserved of the parks developed in the second development

period of Florida State Parks and was in many ways a continuation of the National Park Service design influences on the park which began in the 1930s as part of the Civilian Conservation Corps park development. It is significant that the state park director and assistant directors were both involved in the design and development of the CCC parks in Florida and NPS employees in the 1930s. For this reason, it is believed that this park would qualify under Criteria A and C of the Criteria for Evaluation for listing in the National Register of Historic Places for historical and architectural history. Nearly all the buildings in the park retain their integrity and there are very few intrusions that would compromise the integrity of the park's design. The following buildings are all contributing buildings to the district: 8VO 9233, 8VO9234, 8VO9235, 8VO9236, 8VO9237, 8VO9238, 8VO9239, 8VO9240, 8VO9241, 8VO9242, 8VO9243, 8VO9244, 8VO9245, 8VO246 and 8VO247. As contributing buildings, these buildings are all considered eligible for listing in the National Register of Historic Places and will need to be managed in accordance with the Secretary of the Interior's Standards for Rehabilitation. Contributing elements of the district would include the park's layout and road system.

Sunset Picnic area is potentially eligible for listing in the National Register of Historic Places as one of only two areas remaining in a state park that contains facilities that date to the days of desegregation. 8VO9235 is a picnic shelter constructed for this segregated area of the park. Their associations with the days of segregation as well as African-American recreation make this property significant under Criterion A of the Criteria for Evaluation for listing in the National Register of Historic Places.

The Tomokie Statue and associated fountain and pool are unrecorded structures that are considered eligible for listing in the National Register of Places under Criterion C. The sculpture is the last and largest sculpture of Fred Dana Marsh, a prominent local artist. However, the sculpture is so deteriorated that the loss of integrity may be a factor in its eligibility for listing.

The historic structures located at Bulow Plantation Historic State Park, 8FL00894, 8FL00892, 8FL00893 and 8FL00894 are not considered eligible for listing in the National Register of Historic Places.

One of the Bulow Plantation Slave House Ruins (FL00007c) is an NR Listed site within park boundaries and is a contributing element to Bulow Sugar Plantation Ruins (FL00007), an NR Listed Resource Group that is otherwise mostly contiguous to the park and contained within Bulow Ruins State Monument. The Slave House Ruins and other plantation related sites in the park are considered Eligible or Potentially Eligible under criteria A and D. A small portion of Bulow Plantation Main House Ruins (VO00007a), not evaluated by the recorder(s) but considered Potentially Eligible by SHPO, lies within park boundaries. Ormond Plantation (VO00251) is a site Potentially Eligible for NR Listing that is partially within Bulow Creek State Park. Ormond Plantation, Dummett Plantation (VO00241) and McHardy Plantation (VO00244) were deemed Eligible by the recorders but SHPO has not evaluated VO241 or VO244. A portion of an historic road segment (FL00142) deemed Ineligible by the recorder(s) and not evaluated by SHPO due to Insufficient Information extends into the park; this resource requires no special consideration or treatment. None of the other 20 sites recorded in the park have been evaluated by SHPO; Surveyors/recorders' evaluations for these 20 sites include one "more work

recommended" (VO00246), three "preservation recommended" (FL00018, 19, 20), and four "insufficient information" with no evaluation of the remaining 12 sites.

General management measures: The contributing buildings in the Tomoka State Park Historic District are intended to continued use as operational state park buildings. As such all renovation and repairs, work will be conducted in accordance with the Secretary of the Interior's Standards for Rehabilitation. The Harwood Land Company House 8VO9206 has been previously approved for demolition by the DHR and is scheduled to removal following adequate photo and graphic documentation. The Tomokie Statue has also been approved for removal and documentation by the DHR on the condition that the statute is dismantled and the parts preserved for possible future restoration. The statue has been documented with high resolution, three-dimensional scanning.

Collections

Desired future condition: All historic, natural history and archaeological objects within the park that represent Florida's cultural periods, significant historic events or persons, or natural history specimens are preserved in good condition in perpetuity, protected from physical threats and interpreted to the public.

Description—Addison Blockhouse Historic State Park: Bags of catalogued and inventoried artifacts from the Addison Blockhouse site are stored at the museum at Tomoka State Park.

Tomoka State Park All accessioned materials have been de-accessioned with the exception of two items. The Artwork that was displayed in the Fred Dana Marsh Museum has been transferred on permanent loan to the Wofsonian Institue. The two items still accessioned are held at the park Administrative Offices, and are as follows: TMST.0.20 Fishing Spear and TMST.11.1 Wooden Effigy. Both are in good condition.

An informal collection of taxidermed animals and various items exists for the purposes of interpretation. All items are assessed to be in fair to good condition.

Level of Significance: TMST.11.1 is an extremely important artifact. It is one of the few wooden effigies that survive in Florida from the pre-historic era. While its provenance is suspect, it is associated with the park and is an important artifact.

General management measures: The two artifacts currently at the park should be relocated to the State Parks central collection for storage until they can be put on display at the park.

Detailed management goals, objectives and actions for the management of cultural resources in this park are discussed in the Cultural Resource Management Program section of this component. Table 4 contains the name, reference number, culture or period, and brief description of all the cultural sites within the park that are listed in the Florida Master Site File. The table also summarizes each site's level of significance, existing condition and recommended management treatment. An explanation of the codes is provided following the table.

Table 4: Cultural Sites Listed in the Florida Master Site File					
Site Name and FMSF #	**Culture/Period**	**Description**	**Significance**	**Condition**	**Treatment**
Addison Blockhouse Historic State Park					
Addison Blockhouse VO193	19th Century Spanish/US	Site		Fair	
Addison's Mound VO0243	Prehistoric/19th Century Spanish/US	Site		Fair	
McRae Midden VO9221	Prehistoric	Site		Good	
Bulow Creek State Park					
Bulow Plantation Enslaved Workers' quarters FL007c	19th Century Spanish/US	Site		Fair	
Bellemead 5 FL18	SJ I-II	Site			
Bellemead 6 FL19	SJ I-II	Site			
Bellemead 7 FL 20	SJ I-II	Site			
Charley's Old Still FL00895	20th Century US	Site		Fair	
Tomoka River Midden VO63	SJI	Site		Fair	
Tomoka Basin No. 1 VO167	SJ I-II	Site		Fair	
Dummett Sugar Mill VO241	19th Century Spanish/U.S.	Site		Good	
Rosetta Plantation VO244	18th Century British/19th Century Spanish/U.S.	Site		Fair	
Mound Grove VO245	Prehistoric	Site		Fair	
Bulow Creek Midden VO246	Prehistoric	Site		Fair	
Bellemead 1 VO248	Prehistoric	Site		Fair	
Bellemead 2 VO249	Prehistoric	Site			
Ormond Plantation VO251	19th Century	Site			
Historic Dump 1 VO252	20th Century	Site			

Bulow Creek Midden 2 VO257	Prehistoric	Site			
Stevens Inc. Brick Site VO258	Historic	Site		Fair	
Harwood House VO1972	Historic - Late 19th Early 20th Century	Site		Fair	
Bunch Workers' Quarters VO2586	19th Century Spanish/U.S.	Site			
Plantation Site VO2587	19th Century Spanish/U.S.	Site		Fair	
Lee Landing VO2588	19th Century Spanish/U.S.	Site		Fair	
Roger's Island Midden VO7165	Prehistoric	Site		Good	
Weeks Place VO7223	20th Century U.S.	Site		Fair	
Addison/McRae Sugar Mill VO7496	19th Century Spanish/U.S.	Site		Fair	
Korona Canal Midden VO8194	SJ	Site		Fair	
Pete's Place VO9182	19th Century Spanish/U.S.	Site		Good	
Tomoka Basin Midden VO9190	SJ II	Site		Good	
Tomoka Mini Midden VO9191	SJ II	Site		Fair	
Harwood Land Company House VO9206	20th Century U.S.	Building		Poor	
Mill Attributed to McHardy VO9217	19th Century Spanish/U.S.	Site		Poor	
Tomoka Basin Midden 4 VO9218	Prehistoric	Site		Fair	
Tomoka North Creek Midden VO9219	Prehistoric	Site		Fair	
Tomoka South Creek Midden VO9220	Prehistoric	Site		Good	
McRae Midden VO9221	Prehistoric	Site		Good	
Tomoka River Midden 3 VO9222	Prehistoric	Site		Fair	
Tomoka River Midden 4 VO9223	Prehistoric	Site		Good	
Tomoka Basin Midden 3 VO9224	Prehistoric	Site		Good	
Tomoka Basin Midden 2 VO9225	SJ	Site		Good	
Corduroy Creek Crossing VO9226	American (nonspecific)	Site		Good	

Joe's New Still VO9227	20th Century American	Site		Fair	
Moultrie's Rice Canal VO9228	British/Second Spanish/Territorial American	Resource Group – Linear resource		Fair	
Keeney House Site VO9230	20th Century American	Site		Fair	
Bulow Plantation Ruins Historic State Park					
Bellemead 4 FL17	SJ IA	Site			
Bulow Plantation Ruins FL07	19th Century	Site			
Bulow Plantation Ruins HSP Building 1 FL00891	Modern (Post 1950)	Building			
Bulow Plantation Ruins HSP Building 2 FL 00892	Modern (Post 1950)	Building			
Bulow Plantation Ruins HSP Building 4 FL00893	Modern (Post 1950)	Building			
Bulow Plantation Ruins HSP Building 6 FL00894	Modern (Post 1950)	Building			
Tomoka State Park					
Tomoka Mounds Complex/Mt. Oswald Mound VO81	Archaic	Site			
Nocoroco VO82	SJ I-II	Site			
Johns Island Dam VO 639	19th Century U.S.	Site			
Bellemead Midden VO0640	SJ	Site			
Tomoka Stone VO2571	Orange	Site			
Johns Island Still VO3453	20th Century	Site			
Mount Oswald Plantation Settlement VO4310	18th Century British (1763-83)	Site			
Saw Dust Pits VO4366	20th Century	Site			
Tomoka Point East VO7072	20th Century	Site			
Oswald's Ferry Settlement VO7127	18th Century British	Site		Fair	

Burns Midden VO7499	SJ I-II	Site			
Thompson Creek Bridge VO7501	18th Century British; 19-20th Century U.S.	Structure			
Concrete Slab for Tomoka SP Building 26 VO9231	Modern (Post 1950)	Site	NE	Fair	
Tomoka State Park Building 1 VO9232	20th Century American	Building	N	Good	RH
Tomoka State Park Building 4 VO9233	Modern (Post 1950)	Building	NR	Good	RH
Tomoka State Park Building 5 VO9234	Modern (Post 1950)	Building	NR	Good	RH
Tomoka State Park Building 6 VO9235	Modern (Post 1950)	Building	NR	Good	RH
Tomoka State Park Building 8 VO9236	Modern (Post 1950)	Building	NR	Good	RH
Tomoka State Park Building 10 VO9237	Modern (Post 1950)	Building	NR	Good	RH
Tomoka State Park Building 11 VO9238	Modern (Post 1950)	Building	NR	Good	RH
Tomoka State Park Building 12 VO9239	Modern (Post 1950)	Building	NR	Good	RH
Tomoka State Park Building 13 VO9240	Modern (Post 1950)	Building	NR	Good	RH
Tomoka State Park Building 14 VO9241	Modern (Post 1950)	Building	NR	Good	RH
Tomoka State Park Building 21 VO9242	Modern (Post 1950)	Building	NR	Good	RH
Tomoka State Park Building 22 VO9243	Modern (Post 1950)	Building	NR	Good	RH
Tomoka State Park Building 23 VO9244	Modern (Post 1950)	Building	NR	Good	RH
Tomoka State Park Building 24 VO9245	Modern (Post 1950)	Building	NR	Good	RH

Tomoka State Park Building 25 VO9246	Modern (Post 1950)	Building	NR	Good	RH
Tomoka State Park Building 28 VO9247	Modern (Post 1950)	Building	NR	Good	RH
Tomoka State Park Building 29 VO9248	Modern (Post 1950)	Building	NR	Good	RH
Tomoka State Park Building 30 VO9249	Modern (Post 1950)	Building	NE	Good	
Tomoka State Park Building 35 VO9250	Modern (Post 1950)	Building	NR	Good	RH

Significance:

NRL	National Register listed
NR	National Register eligible
LS	locally significant
NE	not evaluated
NS	not significant

Condition

G	Good
F	Fair
P	Poor

Recommended Treatment:

RS	Restoration
RH	Rehabilitation
ST	Stabilization
P	Preservation
R	Removal

RESOURCE MANAGEMENT PROGRAM

Management Goals, Objectives and Actions

Measurable objectives and actions have been identified for each of DRP's management goals for the parks. Please refer to the Implementation Schedule and Cost Estimates in the Implementation Component of this plan for a consolidated spreadsheet of the recommended actions, measures of progress, target year for completion and estimated costs to fulfill the management goals and objectives of this park.

While, DRP utilizes the ten-year management plan to serve as the basic statement of policy and future direction for each park, a number of annual work plans provide more specific guidance for

DRP staff to accomplish many of the resource management goals and objectives of the park. Where such detailed planning is appropriate to the character and scale of the park's natural resources, annual work plans are developed for prescribed fire management, exotic plant management and imperiled species management. Annual or longer- term work plans are developed for natural community restoration and hydrological restoration. The work plans provide DRP with crucial flexibility in its efforts to generate and implement adaptive resource management practices in the state park system.

The work plans are reviewed and updated annually. Through this process, DRP's resource management strategies are systematically evaluated to determine their effectiveness. The process and the information collected is used to refine techniques, methodologies and strategies, and ensures that each park's prescribed management actions are monitored and reported as required by Chapters 253.034 and 259.037, Florida Statutes.

The goals, objectives and actions identified in this management plan will serve as the basis for developing annual work plans for the park. The ten-year management plan is based on conditions that exist at the time the plan is developed, and the annual work provide the flexibility needed to adapt to future conditions as they change during the ten-year management planning cycle. As the park's annual work plans are implemented through the ten-year cycle, it may become necessary to adjust the management plan's priority schedules and cost estimates to reflect these changing conditions.

Natural Resource Management

Hydrological Management

Goal: Protect water quality and quantity in the park, restore hydrology to the extent feasible and maintain the restored condition.

The natural hydrology of most state parks has been impaired before acquisition to one degree or another. Florida's native habitats are precisely adapted to natural drainage patterns and seasonal water level fluctuations, and variations in these factors frequently determine the types of natural communities that occur on a particular site. Even minor changes to natural hydrology can result in the loss of plant and animal species from a landscape. Restoring state park lands to original natural conditions often depends on returning natural hydrological processes and conditions to the park. This is done primarily by filling or plugging ditches, removing obstructions to surface water "sheet flow," installing culverts or low-water crossings on roads, and installing water control structures to manage water levels. A hydrological restoration assessment has been completed at the Tomoka Basin Parks, and the main restoration objectives of the ten year management plan have been outlined below.

Objective: Restore natural hydrological conditions and functions to approximately 460 acres of tidal marsh.

This objective will be met by implementing Phase 5 of the parks' Dragline Ditch Restoration project. Phases 1-4 have already been implemented. The history of this project is contained below.

The management of salt marsh mosquitoes has had a significant impact on the ecology and scenic quality of the tidal marshes at Tomoka Basin Parks. The physical alteration of the Tomoka marshes for mosquito control had significant impacts on tidal wetlands by changing surface drainage, de-watering the substrate and altering marsh topography and vegetation. In November 2000, the Bureau of Natural and Cultural Resources approved a plan by EVMCD to use rotary ditching to reconnect stagnant sections of the 1930s hand-dug ditches that support mosquito breeding. The rotary ditching plan was jointly permitted with a project by Tomoka Basin Parks to restore several marsh tracts disturbed by dragline ditches.

As of July 2008, there are approximately 30,000 linear feet of grid ditches that remain to be backfilled to complete Phase 5 of the Dragline Ditch Project

Objective: Develop an erosion prevention plan to supplement the current efforts at Tomoka Point and on Tomoka Bluff.

As noted in the "Soils" portion of the resource description, there are still erosion concerns at Tomoka Point. The cordgrass plantings should be monitored and augmented as needed. The erosion occurring at Tomoka Bluff – between the Group Camp area and the CR-4011 bridge over the Tomoka River – can be mitigated with carefully chosen native plantings and other erosion control methods.

Objective: Develop a partnership with local agencies for water quality monitoring and sampling in the Bulow Creek/Korona Canal area and within the Tomoka River and surrounding tributaries.

This objective will be met by contacting the appropriate State and County agencies in order to implement a cooperative water quality-monitoring program.

Natural Communities Management

Goal: Restore and maintain the natural communities/habitats of the park.

As discussed above, DRP practices natural systems management. In most cases, this entails returning fire to its natural role in fire-dependent natural communities. Other methods to implement this goal include large-scale restoration projects as well as smaller scale natural communities' improvements. Following are the natural community management objectives and actions recommended for the state park.

Prescribed Fire Management: Prescribed fire is used to mimic natural lightning-set fires, which are one of the primary natural forces that shaped Florida's ecosystem. Prescribed burning increases the abundance and health of many wildlife species. A large number of Florida's imperiled species of plants and animals are dependent on periodic fire for their continued existence. Fire-dependent natural communities gradually accumulate flammable vegetation; therefore, prescribed fire reduces wildfire hazards by reducing these wildland fuels.

All prescribed burns in the Florida state park system are conducted with authorization from the FDACS, Florida Forest Service (FFS). Wildfire suppression activities in the park are coordinated with the FFS.

Objective: Within ten years, have 1,360 acres of the park maintained within the optimum fire return interval.

Table 5 contains a list of all fire-dependent natural communities found within the park, their associated acreage and optimal fire return interval, and the annual average target for acres to be burned.

Table 5: Prescribed Fire Management		
Natural Community	**Acres**	**Optimal Fire Return Interval (Years)**
Baygall	81.3	25-100
Depression Marsh	18.6	2-10
Mesic Flatwoods	710.6	2-5
Scrub	54.2	5-15
Scrubby Flatwods	281.2	3-5
Wet Flatwoods	215.5	2-7
Annual Target Acreage	235-580 acres/year	

The parks are partitioned into management zones, and burn prescriptions are implemented on the prescribed burn cycle for each zone (see Management Zones Map). The parks' burn plans are updated annually because fire management is a dynamic process. To provide adaptive responses to changing conditions, fire management requires careful planning based on annual and very specific burn objectives. Each annual burn plan is developed to support and implement the broader objectives and actions outlined in this ten-year management plan.

Burning within the parks is difficult. The close proximity to sensitive smoke areas including a municipal airport less than one mile southwest of the park boundary and a middle school less than a quarter-mile east of the park boundary complicates burning. The Interstate Highway 95 corridor is less than a mile to the west of most of the park. This fact makes burning impossible whenever easterly winds may be present. Furthermore, the coastal location of the park means that seabreeze conditions (easterly winds) will place a greater influence on local weather patterns, further restricting the number of available burn days. In fact, the proximity to smoke-sensitive areas means that most of the northerly zones in the park can only be burned on a north or northwest wind, and the southerly zones can only be burned on south or southwest winds. Complicating matters further is the fact that much of the recently acquired land was received in a state of having been unburned for more than 30 years. The combined factors of heavy fuel loading and deep duff layers in these parcels adds more potential hazards to uneventful burning. In practice, prescribed burning within an "urban interface" requires significantly greater resources (more engines and crews, mechanical site preparation, 100 percent mopup) than does rural burning, on an acre-by-acre basis. In addition to operational resources, many incidental actions are important for burning in an urban environment: media announcements, neighborhood outreach and public educational programs. To sustain burn programs in an urban environment, park management will need additional equipment and trained personnel. Due to these factors, the annual target burn acreage for these parks is an average of 275 acres.

In order to track fire management activities, DRP maintains a statewide burn database. The database allows staff to track various aspects of each park's fire management program including

individual burn zone histories and fire return intervals, staff training/ experience, backlog, if burn objectives have been met, etc. The database is also used for annual burn planning which allows DRP to document fire management goals and objectives on an annual basis. Each quarter the database is updated and reports are produced that track progress towards meeting annual burn objectives.

Natural Communities Restoration: In some cases, the reintroduction and maintenance of natural processes is not enough to reach the natural community desired future conditions in the park, and active restoration programs are required. Restoration of altered natural communities to healthy, fully functioning natural landscapes often requires substantial efforts that include mechanical treatment of vegetation or soils and reintroduction or augmentation of native plants and animals. For the purposes of this management plan, restoration is defined as the process of assisting the recovery and natural functioning of degraded natural communities to desired future condition, including the re-establishment of biodiversity, ecological processes, vegetation structure and physical characters.

Examples that would qualify as natural communities' restoration, requiring annual restoration plans, include large mitigation projects, large-scale hardwood removal and timbering activities, roller-chopping and other large-scale vegetative modifications. The key concept is that restoration projects will go beyond management activities routinely done as standard operating procedures such as routine mowing, the reintroduction of fire as a natural process, spot treatments of exotic plants, small-scale vegetation management and so forth.

Following are the natural community/habitat restoration and maintenance actions recommended to create the desired future conditions in the mesic flatwoods, scrubby flatwoods, and scrub communities at the parks**.**

> ***Objective: Conduct habitat/natural community restoration activities on 238 acres of mesic flatwoods, scrubby flatwoods, and scrub communities.***

The restoration of 202 acres of mesic and scrubby flatwoods will be conducted via timber harvest and subsequent burning in zones BC 4, BC 5, BC 6, BC 7 and BC 18. This timber harvest will be dependent upon the concurrence of both favorable lumber market conditions and favorable weather conditions.

Restoration of 36 acres of scrub in TM 06 and TM 08 will be conducted by either burning or mechanical thinning followed by burning. The restoration of the scrub in TM 06 and TM 08 is of higher priority than the mesic flatwoods restoration projects. After each project has been conducted, maintenance rotation with prescribed fire will ensure the areas remain in good condition.

Natural Communities Improvement: Improvements are similar to restoration but on a smaller, less intense scale. This typically includes small-scale vegetative management activities or minor habitat manipulation. Following are the natural community/habitat improvement actions recommended at the park.

> ***Objective: Conduct natural community/habitat improvement activities on 40 acres of communities.***

As this objective will be met via exotic plant control, it has been addressed within the "Exotic Species Management" portion of this component.

Imperiled Species Management

Goal: Maintain, improve or restore imperiled species populations and habitats in the park.

DRP strives to maintain healthy populations of imperiled plant and animal species primarily by implementing effective management of natural systems. Single species management is appropriate in state parks when the maintenance, recovery or restoration of a species or population is complicated due to constraints associated with long-term restoration efforts, unnaturally high mortality or insufficient habitat. Single species management should be compatible with the maintenance and restoration of natural processes, and should not imperil other native species or seriously compromise park values.

In the preparation of this management plan, DRP staff consulted with staff of the FFWCC's Imperiled Species Management or that agency's Regional Biologist and other appropriate federal, state and local agencies for assistance in developing imperiled animal species management objectives and actions. Likewise, for imperiled plant species, DRP staff consulted with FDACS. Data collected by the FFWCC, USFWS, FDACS and FNAI as part of their ongoing research and monitoring programs will be reviewed by park staff periodically to inform management of decisions that may have an impact on imperiled species at the park.

Ongoing inventory and monitoring of imperiled species in the state park system is necessary to meet DRP's mission. Long-term monitoring is also essential to ensure the effectiveness of resource management programs. Monitoring efforts must be prioritized so that the data collected provides information that can be used to improve or confirm the effectiveness of management actions on conservation priorities. Monitoring intensity must at least be at a level that provides the minimum data needed to make informed decisions to meet conservation goals. Not all imperiled species require intensive monitoring efforts on a regular interval. Priority must be given to those species that can provide valuable data to guide adaptive management practices. Those species selected for specific management action and those that will provide management guidance through regular monitoring are addressed in the objectives below.

Objective: Maintain imperiled species occurrence inventory list for plants and develop/update imperiled species occurrence inventory list for animals.

The development and maintenance of an imperiled animal species inventory list will be an ongoing process, and will require the cooperation of both DRP qualified staff and the assistance of outside researchers.

Objective: Monitor and document 1 selected imperiled animal species in the park.

A tier-3 level survey for gopher tortoises *Gopherus polyphemus* will be conducted. The work of Ashton and Ashton will be used as the baseline for the survey plan. This survey can be conducted via the partnership of both Park and District Biological staff.

The future involvement of Tomoka Basin State Parks under the state plan for gopher tortoise conservation cannot be determined until the park completes a survey of the existing populations and upland habitats. The FFWCC Permitting Guidelines provide standard methodologies for burrow counts to determine baseline densities, and soil and vegetation analysis to assess habitat quality. This baseline information will be used in the development of a management plan to restore any currently suboptimal habitat for gopher tortoise. Although Upper Respiratory Tract Disease (URTD) is no longer regarded by agency pathologists as a lethal threat to gopher tortoise populations, URTD should continue to be monitored and reported to the park biologist and FFWCC.

Objective: Monitor the documented 23 selected imperiled plant species in the park.

Twenty-three species of imperiled plants occurring in the parks have been vouchered at the University of South Florida Herbarium (USF). Twenty of these species have been selected for tier one monitoring, and three species have been selected for tier two monitoring. These three are: Toothed spleenwort (*Asplenium dentatum*), eared spleenwort (*Asplenium erosum*), and coastal mock vervain (*Glandularia maritima*) (all three are discussed in the next objective). The two imperiled *Asplenium* species are sufficiently rare as to require more detailed monitoring. The population of toothed spleenwort is particularly vulnerable, being located in an area of the park that receives frequent visitor use.

Objective: Protect and expand the current populations of coastal mock vervain (Glandularia maritima) and toothed spleenwort (Asplenium dentatum) within the Park.

The current population – two individuals -- of coastal mock vervain is located in a roadside area that makes the very limited number of individuals extremely vulnerable to extirpation. A plan must be developed and implemented to collect seed and establish other colonies of this species in more remote yet suitable habitat within the Parks. Once new stations are established, regular tier 2 monitoring should begin.

The current population of toothed spleenwort is likewise in a precarious position. While a colony of ca. 75 ramets exists, the colony is very close to a high-use area of the park. A plan to transplant ca. 12 ramets to a remote area of the park will be developed and implemented. Once new stations are established, regular tier 2 monitoring will begin.

Exotic Species Management

Goal: Remove exotic and invasive plants and animals from the park and conduct needed maintenance control.

DRP actively removes invasive exotic species from state parks, with priority being given to those causing the ecological damage. Removal techniques may include mechanical treatment, herbicides or biocontrol agents.

Objective: Annually treat at least 40 acres of exotic plant species in the park.

The FY 2009-2010 treatment of exotic plants by park staff exceeded 40 acres. The treated species include Brazilian pepper, cogongrass, torpedograss and tuberous sword fern.

Objective: Implement control measures on two nuisance and exotic animal species in the park.

A feral hog eradication program has already been implemented by park staff. This program includes consistent trapping, utilizing more than five hog traps in rotation. Within the core area in which this program was implemented, both the number and average size of individual hogs has declined. This program will be expanded to all affected areas.

The removal effort of nine-banded armadillos has also increased during the 2009-2010 FY. Thirty-five individuals were removed during that time. These efforts will also continue. Research on effective armadillo trapping would be beneficial to the removal program.

Coyotes (*Canis latrans*) have been observed within the Park. They are classified as an exotic species and are very difficult to control. All coyote sightings by park staff should be reported to the park biologist. Coyotes should be removed as opportunity permits.

Addison Blockhouse Historic State Park: A program to remove hogs and nine-banded armadillos from the Addison Blockhouse site would, at best, be temporarily effective. As animals are removed from the site, they would be replaced by cohorts from the surrounding woodlands. The only feasible method to control exotic animals is to fence this property. Although fencing detracts from scenic quality, it may become necessary in the near future to protect cultural resources from human impacts associated with the development of the Ormond Beach urban area.

Bulow Plantation Ruins Historic State Park: Feral hogs and nine-banded armadillos comprise a significant threat to the cultural resources of the park due to their ground-disturbing activity. Both species are removed on an opportunistic basis by resident staff. On-site removal only achieves temporary control, however, as hogs and nine-banded armadillos in adjacent Bulow Creek State Park will readily find available forage in the open grounds of Bulow Plantation.

Bulow Creek State Park: There is a sizeable population of feral hogs in Bulow Creek that inhabit lowlands with soft, organic soils-wet flatwoods, hydric hammocks, hardwood swamps and tidal marsh, as well as uplands, particularly oak hammocks during the fall mast season. Park management has initiated a variety of control actions, but it is not feasible to sustain a consistent removal effort without establishing a contractual service to establish multiple trap stations for several years duration, to reduce the breeding population of feral hogs in the park. Once the major reduction is achieved, continuing removal effort will be needed to maintain the hog population at "low impact" levels. Consistent with this objective, a feral hog specialist with the USDA Wildlife Services began hog removal at Bulow Creek in December 2007. If DRP can expand this effort for several seasons, it should reduce the breeding population of hogs in the park.

Tomoka State Park: Feral hogs first appeared at Tomoka State Park in 2005. This may have been caused by a wide dispersal movement of feral hogs following the hurricanes of September-October 2004 that reduced acorn mast crops for several years. Overall, there have been very few observations of hogs on the east side of the Tomoka River, downriver at Tomoka Point or upriver at Johns Island.

House cats (*Felis catus*) are the most noticeable exotic animals in Tomoka State Park, especially adjacent to residential areas. The staff has captured numerous cats, free-ranging domestic and feral animals, which are transferred to the local animal control officer.

In summer 2001, there was an infestation of southern pine beetles (*Dendroctonus frontalis*), in Bulow Creek State Park. The main outbreak occurred in a stand of loblolly pines, comprising about 140 acres north of Korona Canal. A peripheral infestation spread into scattered pockets of slash pines, each less than an acre, until southern pine beetle activity declined during the fall months. At Bulow Creek, southern pine beetle activity was monitored by park staff and FFS personnel, including aerial surveys. In 2002 and following years, there have been no further southern pine beetle infestations at Tomoka Basin State Parks. FFS continues to monitor southern pine beetle activity and provides annual forecasts of southern pine beetle infestation potential for the northern and central counties. The southern pine beetle forecasts for Volusia County and Flagler County have remained at a low infestation level since 2003. DRP will continue working with FFS in monitoring and reporting southern pine beetle activity in pine stands at Bulow Creek and other multi-park units. Silvicultural methods for reducing the hazard of southern pine beetle infestations, such as thinning older pine stands, will be incorporated into timber harvest plans and other resource management programs, where feasible.

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 if the lead agency determines that timber management is not in conflict with the primary management objectives of the land. The feasibility of harvesting timber at this park during the period covered by this plan was considered in context of DRP's statutory responsibilities and an analysis of the park's resource needs and values. The long-term management goal for forest communities in the state park system is to maintain or re-establish old-growth characteristics to the degree practicable, with the exception of those communities specifically managed as early successional.

Bulow Creek State Park: Bulow Creek State Park has five stands of planted slash pines, comprising 109 acres (Burn Zone BC1), 63 acres (BC2/BC5), 108 acres (BC3/BC4), 101acres (BC6/BC7), and 54 acres (BC8), respectively. Addendum 8 contains a Timber Management Assessment for the pine plantations. All five stands, row planted in the late 1950s, have an even-age canopy of slash pine over an understory of cabbage palms. The dominance of palms- and absence of typical flatwoods understory vegetation (saw palmetto, gallberry, etc.) - is attributed to past disturbance by cattle grazing, site preparation for silviculture, and hydrological alteration by drainage ditches. All of the planted pine stands have burned since 1980, by wildfire or prescribed burning. The understories of stands that have had multiple fires do not appear to be any different from stands that have burned once. The growth of overstory slash pines, not cabbage palms, is influenced by high intensity fires. Under the assumption that prescribed fire would not affect the dominance of cabbage palms, park management developed a plan for the mechanical removal of palm trees with the assistance of FFS. In 2004, FFS solicited bids on a contract for the "Other State Lands Region 5 Cabbage Palm Sale" which included 280 acres at Bulow Creek and unspecified acreage in other counties in Region 5. In August 2005, the first

cabbage palms were harvested by a commercial contractor from pine stands BC1 and BC 5 along Pumphouse Road. The work continued until October 2005. A total of 3221 palm trees were removed from BC1 and BC5, opening approximately 30 acres in the understory. The initial vegetation response after the harvest was a "weedy" growth of grasses and herbs, particularly witchgrass (*Dichanthelium* sp.) and dogfennel (*Eupatorium* sp.) with some seedling regeneration of slash pine. At three years post-harvest, there is some scattered shrub growth, mainly of wax myrtle, (*Myrica cerifera*), and groundsel (*Baccharis halimifolia*). These species are typical of early vegetation succession in forest clearings; they are not representative of pine flatwoods that was the original native plant community prior to cattle grazing and pine silviculture. Further management will be needed, involving prescribed burning, hydrological restoration and seeding/planting of flatwoods species.

Tomoka State Park: There are 45 acres of sand pine on Tomoka bluff at Johns Island comprised of about 15 acres of mature sand pine growth and about 30 acres of young sand pines that regenerated from seed when a land clearing for a mobile home park was abandoned in the late 1970s. During the hurricanes of 2004, there was a heavy blow down of sand pines of all age classes, leaving a mixture of live growth and dead downed trees in both the mature scrub and regeneration stand. A site inspection by DRP biologists recommended that the entire 45-acre tract be mechanically cut then burned to reduce the slash fuels (wildfire hazard in an urban area) and create openings for the growth of scrub oaks and xeric herbaceous plants. The 45-acre tract exceeds the minimum size criterion of 40 acres for a recipient site for the relocation of gopher tortoises under the FFWCC 2008 Permitting Guidelines. The FFWCC criteria for percent canopy cover and herb cover for gopher tortoise habitat provide a quantitative objective for future resource management treatments at the scrub tract. One immediate objective for Tomoka bluff, identified by DRP biologists, is the removal or backfilling of open storm sewers that remain from the mobile home development.

Arthropod Control Plan

All Division lands are designated as "environmentally sensitive and biologically highly productive" in accordance with Ch. 388 and Ch. 388.4111. If a local mosquito control district proposes a treatment plan, the Division responds within the allotted time and reaches consensus with the mosquito control district. By policy of the Department since 1987, no aerial adulticiding is allowed, but larviciding and ground adulticiding (truck spraying in public use areas) is typically allowed. The Division does not authorize new physical alterations of marshes through ditching or water control structures. Mosquito control plans temporarily may be set aside under declared threats to public or animal health, or during a Governor's Emergency Proclamation.

Additional Considerations

Preservation of Historic Roads: Bulow Plantation Ruins Historic State Park. Plantation Road, the entrance road to Bulow Plantation Ruins, is a significant historical feature. This roadway dates back to the Bulow era (1821-1836) and is well documented in early maps and historical descriptions (Daniel et al. 1980). The east-west road connected the nucleus of Bulow Plantation - the main residence, sugar mill and boat landing - to the Kings Road that went north to St. Augustine and south to New Smyrna. Plantation Road is also the entrance road for visitors to Bulow Plantation Ruins. It must be given special consideration to preserve the historical integrity and plantation character of the roadway while maintaining an operational surface for vehicular

travel. The existing maintenance program, with periodic grading and use of local sand and shell materials, has preserved the historic character of Plantation Road. As is occurring state wide, however, urban expansion and tourism are placing additional demands on park resources and facilities. Proposals for road "improvements" - paving, straightening, and widening - will inevitably confront the managers of Bulow Plantation Ruins. Innovative management approaches may be needed to meet the increasing demand for visitor access without sacrificing the character or integrity of the historic Plantation Road.

Cultural Resource Management

Cultural Resource Management

Cultural resources are individually unique, and collectively, very challenging for the public land manager whose goal is to preserve and protect them in perpetuity. DRP is implementing the following goals, objectives and actions, as funding becomes available, to preserve the cultural resources found in the parks.

Goal: Protect, preserve and maintain the cultural resources of the park.

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. All activities related to land clearing, ground disturbing activities, major repairs or additions to historic structures listed or eligible for listing in the National Register of Historic Places and collections care must be submitted top the DHR for review and comment before to undertaking the proposed project. Recommendations may include, but are not limited to concurrence with the project as submitted, pre-testing of the project site by a certified archaeological monitor, cultural resource assessment survey by a qualified professional archaeologist, modifications to the proposed project to avoid or mitigate potential adverse effect. In addition, any demolition or substantial alteration to any historic structure or resource must be submitted to DHR for consultation and DRP must demonstrate that there is no feasible alternative to removal and must provide a strategy for documentation or salvage of the resource. Florida law further requires that DRP consider the reuse of historic buildings in the park in lieu of new construction and must undertake a cost comparison of new development versus rehabilitation of a building before electing to construct a new or replacement building. This comparison must be accomplished with the assistance of DHR.

Objective: Assess and evaluate three of 84-recorded cultural resources in the park.

Eighty-one of the Parks' cultural resource sites have been assessed through the efforts of park staff in conjunction with DHR, BNCR, and Lori Collins and Travis Doering of the University of South Florida. Three of the 84 sites were not evaluated during monitoring surveys conducted throughout 2009. These are the Keeney House Site (newly discovered) VO 9230, Weeks Place VO 7223, and Stevens Inc. Brick Site VO 0258. These three sites will be assessed and evaluated during the current Management Plan cycle.

Objective: Compile reliable documentation for all recorded historic and archaeological resources.

Similarly, to the previous objective, this objective has already been largely met through the efforts of park staff in conjunction with DHR, BNCR, and Lori Collins and Travis Doering of the

University of South Florida. As new sites are found, updating the Florida Master Site File will be an ongoing process.

Objective: Bring three of 84-recorded cultural resources into good condition.

Many of the park's resources are shell middens. As these middens have been looted in the past, and the presence of looting indicates a "poor" condition, nothing can be done to "un-do" this condition status. There are, however, five known coquina block structures within the Parks. Two of these, the Bulow Mill and the Dummett Mill, have been stabilized. Of the three remaining, one (the McHardy Mill) is beyond stabilization. The two remaining block structures, Addison Blockhouse and the Addison/McRae Mill, would benefit from stabilization efforts.

Additionally, the Spring House portion of the Bulow Plantation Site (FL 007 complex) is in need of stabilization and could benefit from a permanent shelter. It is proposed that the funding to accomplish these tasks be sought and the work completed.

The parks currently have four staff members who have been trained and certified as archaeological monitors. In the future, as the composition of staff changes, efforts should be made to insure that there is always at least one staff member who is a certified archaeological monitor.

Because of the likelihood for prehistoric sites in the park and surrounding areas, park staff and District staff should routinely visit known sites to protect them from vandalism. Monitoring sites using photopoints is encouraged. Reports of activities should be filed at both the park and District offices.

The management of vegetation growth is essential for the preservation of historic ruins at the Tomoka Basin parks. DRP has funded landscape contractors to remove trees and overhanging limbs that threaten standing structures at the Bulow sugar mill, Dummett mill and McCrae ruins. Tree removal is needed at the Addison Blockhouse, and further work is recommended for all the plantation sites. The growth of mosses and other small plants, which retain moisture and leach organic acids, are also a threat to masonry surfaces, particularly coquina rock. The removal of the tree canopy surrounding the Dummett mill, opening the ruins to sunlight, has significantly reduced the growth of mosses and algae on the coquina walls. In shaded locations, BNCR recommends the construction of a roof-shelter over the ruins to shade out vegetation growth and deflect falling tree debris.

Any plans for prescribed burning should be reviewed for impacts to cultural resources before their implementation. Ground-disturbing activities will be conducted in accordance with the DHR policy.

Vandalism should be discouraged using interpretive signage that includes warnings against collecting artifacts in both terrestrial and aquatic environments.

Management of cultural resources at each park should be accomplished according to cyclical schedules developed for different zones. Appropriate cyclical management schedules for each element of the various plantation structures should be developed and implemented. Approved methodologies for executing the plan should be outlined and staff and volunteers trained to

implement them. Management should develop a site-specific manual for use by staff and volunteers in managing the cultural resources of the park. Schedules should be periodically reviewed and updated in conjunction with the BNCR Historic Preservationist and District 3 staff.

Appropriate materials and techniques for maintaining each element should be developed and implemented. Park staff should consult with a historic preservation architect to develop materials and techniques use in performing routine maintenance functions. These should be periodically reviewed and updated in conjunction with the BNCR Historic Preservationist and District 3 staff to ensure appropriateness of chemical compounds, materials used to apply and remove such compounds, and reversibility of processes performed.

Bulow Plantation Ruins Historic State Park: A summary of repairs, restoration work and preservation treatments conducted between 2003 and 2006 was discussed under Cultural Resources. The sugar mill and springhouse will require further rehabilitation work based on recommendations of preservation specialists familiar with the present condition of the ruins. Park staff will perform regular maintenance to remove vegetation growth and debris. A structural engineer should be consulted to evaluate the overall stability of the architectural elements and design a support framework, if needed, to maintain the standing ruins for the near future.

There are several catfaced pine trees evident throughout the property. Park staff should rake around the perimeter of cat-faced pines to reduce the fuel load around the base of the trees and thus reduce the likelihood of damaging evidential trees.

Bulow Creek State Park: The repair and restoration of the twin chimneys at Dummett Mill was competed in 2004, as described in the Cultural Resources Inventory. This first phase of the Dummett Mill rehabilitation, with fencing and tree removal, is a notable accomplishment after years of vandalism and neglect, but underlying problems persist in the unstable condition of the standing structure. The Southarc, Inc. Stabilization Study (2001) indicated that “the north wall of the factory and surviving chimneys stand at risk of partial collapse” and recommended that a structural engineer be contracted to work with a preservation architect to design a supporting framework to reinforce the north wall and freestanding chimneys.

In early 2011, a partnership between DEP/DRP and the National Park Service brought the NPS historical structure renovation crew into the park. They stabilized the Dummett Mill, greatly reducing the threat of imminent collapse, and brought the status of the resource up to good.

Recent additions to Bulow Creek State Park form a corridor of protected uplands between Bulow Plantation Ruins and Tomoka State Park. However, a number of significant outparcels remain, some of which contain important historic remains. It is recommended that the park continue to pursue acquisition efforts and easements for these parcels.

Addison Blockhouse Historic State Park: The present unstable condition of the Addison Blockhouse structure is described in the Cultural Resources Inventory. Park management has proposed a site improvement plan to remove all tree growth inside the earthworks of the Fort McRae site and to install a perimeter fence to prevent vandalism and unintentional damage to the ruins, which could be hazardous to the unauthorized visitor as well as the Blockhouse itself. In

February 2008, BNCR staff worked with District 3 AmeriCorps to start removing trees at the Blockhouse site. Further tree removal and installation of a chain link perimeter fence will assist in preserving the structure.

Tomoka State Park: The deteriorating condition of the Tomokie statue was described in the Collections Section of the Cultural Resources Inventory. Local efforts to raise funds for the repair of the statue have been unsuccessful. Without prospects for funding, future restoration is uncertain and park management and BNCR are presently evaluating alternatives for relocation or removal of the statue and reflection pool that comprise the "Tomokie Fountain." In September 2008, BNCR documented the statue for state archival records using high definition laser technology to develop a 3-dimensional digital model of Chief Tomokie and the other figures around the coquina base structure.

The Tomoka Museum temporarily closed with the transfer of the works of Fred Dana Marsh to the Wolfsonian collection at Florida International University in Miami Beach. A conceptual plan for future renovation, developed by museum design group in 2001, features a Tomoka History Center with multi-media exhibits on the pre-historic settlements and colonial plantations of the Tomoka Basin. The new exhibit themes would include the park's flora and fauna, and the challenges in managing natural resources in an urban environment.

Resource Management Schedule

A priority schedule for conducting all management activities that is based on the purposes for which these lands were acquired, and to enhance the resource values, is located in the Implementation Component of this management plan.

Land Management Review

Section 259.036, Florida Statutes, established land management review teams to determine whether conservation, preservation and recreation lands titled in the name of the Board of Trustees are being managed for the purposes for which they were acquired and in accordance with their approved land management plans. The managing agency shall consider the findings and recommendations of the land management review team in finalizing the required update of its management plan.

The four contiguous units that comprise the 2003 Multi-Park Unit Management Plan was combined into one entity, the parks was subject to a land management review on July 2007. The review team made the following determinations:

1. The land is being managed for the purpose for which it was acquired.
2. The actual management practices, including public access, complied with the management plan for this site.

LAND USE COMPONENT

INTRODUCTION

Land use planning and park development decisions for the state park system are based on the dual responsibilities of the Florida Department of Environmental Protection (DEP), Division of Recreation and Parks (DRP). 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, and then proceeds through the creation of a conceptual land use plan to guide the location and extent of future park development. Input to the plan is provided by experts in environmental sciences, cultural resources, park operation and management, and through public workshops, and user groups. With this approach, DRP objective is to provide quality development for resource-based recreation with a high level of sensitivity to the natural and cultural resources at each park throughout the state.

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, regional demographics, adjacent land uses and park interaction with other facilities.

The area encompassing Bulow Plantation Ruins Historic State Park, Bulow Creek State Park, Addison Blockhouse Historic State Park and Tomoka State Park referred to, collectively, as the Tomoka Basin Parks (TBP) is located within Flagler County, Volusia County and the City of Ormond Beach. In addition to Ormond Beach, at least seven incorporated areas are within ten miles of the parks, the two most populous of which are Daytona Beach and Port Orange. The area is located in the northeast part of the state.

Resource based recreation opportunities within the vicinity of the Tomoka Basin Parks include hiking, biking and equestrian trails at Tiger Bay State Forest, 10 miles south west of the parks. Primitive camping, fishing, boating and hunting are also available within the State Forest. North of the Parks, along State Road A1A is North Peninsula State Park and Gamble Rogers Memorial State Recreation Area at Flagler Beach. Both parks offer beach and

Intracoastal Waterway access for swimming and fishing, as well as hiking trails, picnic areas and wildlife viewing.

The area has great potential to become a regional center of heritage-based tourism. The residents of Volusia County approved funding for the Environmental, Cultural, Heritage and Outdoors (ECHO) Program to generate revenue to protect important resources and develop their recreation potential. The parks discussed in this plan play an important role in this countywide tourism initiative. The proximity to major tourist attractions and world-renowned beaches, anticipated increases in resident population, and a growing interest in heritage-based tourism will only serve to support future increases in visitation at each of these state parks.

Existing Use of Adjacent Lands

A private campground and manufactured home community is located north of Bulow Plantation Ruins Historic State Park. A series of large, low-density residential developments stretch the length of the western boundary of Bulow Creek State Park covering nearly 5,000 acres of adjacent land. Two of the most significant projects qualify as developments of regional impact (DRI). Halifax Plantation is a 1,625-acre project that includes a commercial center, golf course and subdivision with 2,834 approved residential units. Further south is the 1,034-acre Plantation Oaks of Ormond Beach subdivision with 1,577 approved residential units, a part of the National Gardens DRI. Several land tracts in the original 2,392-acre DRI development area have been sold by National Gardens Trust to the state or donated as wetland mitigation parcels.

Established residential subdivisions also occur along the southeastern boundary of Tomoka State Park. A few large residences are also located along Old Dixie Highway overlooking Tomoka Basin just north of the bridge that crosses the Tomoka River. In addition, across the street from these residences is a 31-lot subdivision named Toscana that is partially occupied and surrounded by Bulow Creek State Park.

The Tomoka River is bordered by Bulow Creek State Park to the west and Tomoka State Park on the east and forms the Tomoka Basin at its confluence with the Halifax River. The Halifax River and Tomoka Basin buffer the southeastern boundaries of Bulow Creek and Tomoka State Parks. A small subdivision (35 lots) comprised of an outparcel within Bulow Creek State Park is situated on the western edge of the Tomoka Basin. North of the basin lies the 1,100-Acre Mosquito Impoundment, a privately-owned tidal marsh and open water area that was actively managed for mosquito control purposes until 1980.

Several roads run along park boundaries and/or bisect park land. North Beach Street runs north through Tomoka State Park, crosses the Tomoka River as Old Dixie Highway, continues through the southern portion of Bulow Creek State Park, then turns north and runs nearly 3.5 miles along the middle portion of the western boundary of Bulow Creek State Park before turning west toward Interstate Highway 95. Walter Boardman Lane runs east from Old Dixie Highway, through the northern half of Bulow Creek State Park and across Bulow Creek to Highbridge Road. Highbridge continues south from this intersection, then east towards Smith Creek and eventually A1A. Pine Tree Drive (formerly Addison Drive)

cuts through the southern portion of Bulow Creek State Park connecting U.S. Highway 1 with Old Dixie Highway. U.S. Highway 1 runs along the southwestern boundary of Tomoka State Park.

Planned Use of Adjacent Lands

The Bulow Plantation DRI has been approved on 323 acres along the northern boundary of Bulow Plantation Ruins Historic State Park. The project calls for 1,020 manufactured housing units, a permanent commercial campground on forty-five acres, 23,000 square feet of commercial space, and 20 boat docks along a manmade canal system. To preserve a quality visitor experience it will become increasingly important to buffer use areas from development north of the park.

Additional residential development is anticipated along Bulow Creek State Park's western boundary as Halifax Plantation continues toward full build out and Plantation Oaks starts construction on 1,577 planned units. The Toscana subdivision along Old Dixie Highway is also expected to reach full build out within the life of this management plan. The Ormond Lakes subdivision west of Addison Blockhouse is in the final phase of development. At present, there is no public access to Addison Blockhouse and no ingress-egress. Park vehicles must cross private property to reach the interior woods road to the blockhouse and McCrae Mill.

In July 2007, the Secretary of FDOT designated the Ormond Scenic Loop and Trail (OSLT) as a Florida Scenic Highway. The OSLT, locally known as "The Loop," is a circular corridor of interconnected roadways, 34 miles in length, which extends north from Ormond Beach through Tomoka State Park and Bulow Creek State Park then east to connect with the AIA Scenic Coastal Byway and return south along the ocean to Ormond Beach. The Tomoka Basin State Parks comprise a major part of OSLT corridor. The OSLT has a Corridor Management Plan, which outlines objectives and specific actions for the preservation and interpretation of the natural, cultural and scenic values of the OSLT, as well as promoting public access and outdoor recreation. Park management is represented on the Corridor Management Entity (CME) steering committee to implement The Corridor Management Plan, which was incorporated into the Volusia County Comprehensive Plan to require compatibility of future land use planning with OSLT objectives. The CME received National Scenic Byway status in October 2009. OSLT partnered with Halifax River Audubon to complete two projects on state park lands--clearing a trail to Summer Pond, creation and installation of an interpretive sign at the trailhead and building a wildlife observation deck overlooking Summer Pond. They also created and installed an interpretive sign at the trailhead to Boardman Pond observation deck.

According to the Future Land Use Map for Volusia County (2009), the lands surrounding the Tomoka Basin Parks are designated for low-medium density single-family development, low intensity urban development and rural uses. Within the City of Ormond Beach, the Future Land Use Map (2010) designates the lands surrounding the Tomoka Basin Parks as open space/conservation or single-family residential, which includes medium density (5 units per acre) single-family development. According to the Future Land Use

Map of Flagler County (2010), most of the lands surrounding the parks are designated for conservation, agriculture or low intensity commercial development.

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.

Land Area

The four parks combine for nearly 7,500 acres of coastal lowlands, comprising a mix of oak-dominated hammocks, mixed hardwood forests and tidally influenced wetland communities. Wetlands comprise roughly 54 percent of park lands, primarily estuarine tidal marshes and hydric hammocks. Park uplands are dominated by xeric hammocks and upland mixed forests. The parks provide an exceptional natural setting for resource-based recreation with high-quality forested communities on the higher elevations to the west and along the Tomoka peninsula and the presence of abundant water resources. The landscape bears evidence of a long history of human occupation, with nearly 800 acres of ruderal areas that include remnant pine plantations and manmade canals and ditches. Plantation ruins and shell mounds are scattered throughout the area, providing opportunities for learning about aboriginal culture and the rise and fall of plantation agriculture along Florida's northeast coastline. The ruins are a testimony to a bygone era of magnificent frontier plantations in Florida and to the destruction wrought during the Second Seminole War. In that short time, the land was transformed from rugged wilderness into thriving and profitable plantations and back again.

Bulow Creek and Tomoka State Parks contain examples of estuarine tidal swamp-palm forests, which are uniquely scenic natural communities of cabbage palms and scattered red cedar trees. However, these areas are difficult to access due to wet conditions.

Water Area

The open water and grasses of the tidal marshes of the parks provide a scenic contrast to the forested communities. The marshes are very productive ecological systems and are sensitive to human impact. Recreational activities in this community should be limited to canoeing, fishing and nature study.

Four waterbodies account for over 18 miles of shoreline along park boundaries: Bulow Creek (26,000 ft.), Tomoka River (40,000 ft.) Halifax River (12,000 ft.) and the Tomoka Basin (18,000 ft.). These waterbodies are all included within the 8,000-acre Tomoka Marsh Aquatic Preserve that is a valuable nursery area for fishes, shrimp and crabs caught commercially and recreationally in the Atlantic Ocean. The preserve is utilized by over 120 species of fish as well as manatees, marine turtles, bottlenose dolphin, wood storks, numerous wading birds and a variety of other wildlife.

Bulow Creek is a highly scenic waterbody that flows approximately six miles along the eastern boundary of Bulow Plantation Ruins and a portion of Bulow Creek State Park before it flows into the upper Halifax River. The creek provided an important mode of transportation for the historic cotton and sugar crops at Bulow Plantation, which were loaded onto seagoing schooners destined for the Caribbean and Southeast U.S., via Ponce Inlet to the south. The 13-mile Bulow Creek Canoe Trail begins at Bulow Plantation Ruins, leads upstream and back, and then proceeds downstream to the Halifax River. This easy to moderately difficult trip takes paddlers through salt marshes bounded by hardwood hammocks of mature oak and magnolia. Both saltwater and freshwater fish and crab species are present in the brackish waters of Bulow Creek, providing opportunities for recreational fishing.

The Tomoka River is bordered by Bulow Creek State Park to the west and Tomoka State Park on the east and forms the Tomoka Basin at its confluence with the Halifax River. Most of the shoreline along the Halifax River has been manipulated by dredge, fill operations and does not offer visitors the same natural charm as does the Tomoka River. Water recreation is popular on both water bodies, but the Tomoka River is more suitable for wildlife observation and paddlers desiring calm water. Although swimming is not allowed in the Tomoka River due to frequent water quality concerns, boating, canoeing, fishing or picnicking along the brackish river allows visitors to experience the natural beauty of the marshes and hammocks. Visitors can travel upstream by canoe/kayak or by park-operated tour boat. The 13-mile Tomoka River Canoe Trail begins at the State Road 40 Bridge, four miles west of U.S. Highway 1, heads upstream two miles then downstream to Tomoka State Park. The park has several riverside picnic areas and fishing docks that provide anglers easy access to the river. Estuarine conditions support a healthy fishery that contains the highest diversity of fish species in Volusia County.

Two additional tidal tributaries of the Tomoka River provide opportunities for paddling and fishing. Strickland Creek is a nearly three-mile ditched waterbody that runs along the west side of Tomoka peninsula and joins the Tomoka River just south of the Old Dixie Hwy Bridge. Thompson Creek is an approximately two-mile natural tributary that flows between the Tomoka River and the junction of Strickland Creek and Dodson Canal near the southern end of Tomoka State Park.

Small ponds and lakes dotted with cabbage palm islands present opportunities for nature observation and quiet reflection within Bulow Creek State Park. Boardman Pond is easily accessible off Highbridge Road and is connected to the Bulow Woods Trail. Addison

Branch is a particularly scenic tidal tributary with a 7-acre marsh lake at the southern end of the park. However, wet conditions make the latter area difficult to access.

Natural Scenery

The natural scenery of the area can be considered exceptional with oak and palm forests, tidal marshes, rivers and creeks combining to form an amazingly scenic landscape. The parks preserve the largest stand of old-growth live oak hammock along the East Coast of Florida. The hydric hammocks of Bulow Creek State Park contain hundreds of Cathedral-like live oaks, many with trunks over five feet in diameter and crowns more than 100 feet high. The Fairchild Oak is located at the main use area of the park and is thought to be almost 500 years old. With a trunk circumference of 25 feet and canopy spread of 150 feet, this magnificent oak captures the interest of even the most casual visitor. Amateur and seasoned botanists are attracted to the unique plant life of the hammocks, such as coontie, Indian pipe, various ground orchids and ferns. At Tomoka State Park, the hammocks provide a beautiful setting for the campground and contain shell mounds on the west side of the Tomoka peninsula that are a special natural feature. These mounds support populations of locally rare tropical flora that are normally found in south Florida and the West Indies.

The Tomoka Tunnel, a canopy road through the xeric hammock along North Beach Road, is an impressive entryway to Tomoka State Park. This section of roadway is a part of the OSLT, a scenic roadway experience that is popular with local and visiting motorists and bicyclists.

Significant Wildlife Habitat

Wildlife in the parks is abundant and varied. The higher elevations support whitetail deer, turkey, raccoon, opossum, grey squirrel, rabbit, quail, marsh hare and the occasional Eastern indigo snake. Coastal hammocks provide important habitat for migrating songbirds along the Atlantic Coastal Flyway, such as the painted bunting--one of most colorful songbirds in the eastern U.S. The area's significance for birding is evident by the inclusion of Bulow Creek and Tomoka State Parks within the East Section of the Great Florida Birding Trail.

The estuarine tidal marsh may be the single most important contributor to biological productivity in the area, and is responsible for the abundant marine and bird life around the park. Wading birds are numerous in the salt marsh, and include a variety of listed species such as the endangered wood stork. Bald eagles, swallow-tailed kites and peregrine falcons are seasonally observed. Surrounding rivers and tributaries support both freshwater and saltwater fish species and provide important habitat for manatees, particularly for calving and nursing.

The Tomoka River and tributaries (Strickland Creek, Thompson Creek and Dodson Canal) are a designated manatee sanctuary. Established speed zones aimed at protecting the endangered manatee affect boating within these waterways. Preserving the abundant wildlife habitats of the park is becoming increasingly important in light of expanding urban development in the surrounding area. Aside from their ecological importance, opportunities to view wildlife greatly enhance the visitor's experience at all parks.

Archaeological and Historical Features

Park lands contain evidence of an extensive history of human occupation beginning with early native cultures and continuing through the region's brief but impressive period of plantation development. As detailed in the Resource Management Component, prehistoric and historic archaeological sites are located throughout the parks. The land is, quite literally, covered with shell mounds, middens, and the ruins of plantation buildings and remnant agricultural landscapes. Many of these sites have limited recreational value given their inaccessibility, lack of notable features, sensitivity to disturbance, or unsafe condition. However, a variety of features is currently providing both recreational and interpretive opportunities or has the potential to add significantly to the visitor experience. The following discussion focuses on those features that are actively being interpreted or with significant potential to expand cultural interpretation at the parks.

Bulow Plantation Ruins Historic State Park is located on what was one of the most extensive holdings on the Florida East Coast in the early 19th Century. All that is left of the once magnificent plantation is the extensive coquina ruins of the great sugar mill, several well-preserved wells, the ruins of a unique springhouse, and the crumbling foundation of the former grand mansion. Controlled access is provided to the impressive coquina stone sugar mill ruins. Interpretive signs and a small, open-air interpretive center educate visitors to the historic significance of this site. Catfaced pines are visible within the pine flatwoods near the ruins that serve as a living interpretive exhibit. A nature trail provides access to this area. Well-preserved historic boat slips remain near the main use area on Bulow Creek.

The main use area of Bulow Creek State Park lies on land that was part of James Ormond's plantation, Damietta. Although no structures remain from the plantation, the area includes the magnificent Fairchild Oak and coquina ruins of the Conrad Oates Company land office. James Ormond's gravesite is located across Old Dixie Highway in a county park and provides an added attraction for park visitors.

The McHardy Plantation lies a short distance to the south. Features include the ruins of several plantation buildings and a sugar mill. A rice field complex with dikes and dams is located in nearby marshlands. The isolation of these sites and environmental constraints may limit future access.

John Bunch established his plantation on land that formerly supported the Rosetta Plantation. While structures associated with the Bunch Plantation are located on adjacent private property, the remains of a slave worker's village lie within park boundaries just east of Old Dixie Highway. This and other known villages present an opportunity to interpret the African-American experience during the plantation period.

Thomas H. Dummett purchased Bunch's operation and developed a sugar factory and rum distillery a short distance south. A recently completed small parking area and short trail off Old Dixie Highway provide access to the coquina remains of the Dummett Sugar Mill ruins.

Addison Blockhouse Historic State Park is significant historically as the location of a battle between Seminole Indians and a Carolina Regiment of Volunteers. Major features at the

Addison Blockhouse site include the coquina ruins of the blockhouse structure with surrounding earthworks, the ruins of a house foundation with tabby floors, and a coquina well. While Addison Blockhouse has an interesting story to tell, onsite visitation is restricted due to lack of public access. Visitors must land canoes or small boats on the Tomoka River shoreline to reach the site. A jeep road provides upland access to the site for park management purposes, but traverses an area that is seasonally wet and is not suitable for year-round use.

Tomoka State Park contains several archaeological features with interpretive potential. The Tomoka Mounds and Midden Site, located on the west side of the peninsula, is a broken series of mounds that may have been a continuous midden two miles in length prior to disturbance. The Tomoka peninsula is also the site of the Timucuan village of Nocoroco. A large midden associated with the village lies buried beneath several inches of topsoil. An interpretive sign at the point marks the location of this site. Unfortunately, there are no remaining structures associated with either the Mount Oswald or Gabriel Perpal plantation settlement on the Tomoka peninsula. However, the Johns Island Dam site, also known as the Lost Causeway, is an earthen dam that was part of Oswald's rice fields. The site is located at the north end of John's Island marsh, and, though currently inaccessible, future access may be possible via Strickland Creek.

Although not a historical feature, the 45-foot tall Fred Dana Marsh sculpture, Legend of Tomokie, is a highly visible structure at Tomoka Point that draws attention to the use of these lands by native people long before Europeans arrived.

The Tomoka State Park museum previously contained works of the late artist, with some exhibit space dedicated to natural and cultural resources. The museum was closed in 2008 and the artwork relocated to the Wolfsonian-Florida International University Museum in Miami Beach. The future use of this now empty building is discussed in the Potential Uses and Proposed Facilities section of this plan.

Assessment of Use

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

Past Uses

Much of the land was cleared for plantation agriculture in the late 18th and early 19th century. In later years, hardwood hammocks were thinned for timber, cattle grazed the open land and pine plantations and turpentine operations replaced the indigo, sugar and rice plantations. Citrus was a grown in Bulow Creek State Park in the late 1800s to mid-1900s. Dragline operations in the 1950s altered tidal marshes as part of mosquito control efforts. The Addison Blockhouse site was part of the Tomoka River Jungle Cruise. The cruise was a private excursion boat operation that ran for many years on the Tomoka River.

Future Land Use and Zoning

DRP works with local governments to establish designations that provide both consistency between comprehensive plans and zoning codes and permit typical state park uses and facilities necessary for the provision of resource-based recreation opportunities.

According to the Future Land Use Maps for Flagler County, Volusia County and the City of Ormond Beach, the vast majority of the properties that make up these four state parks are designated Conservation (Volusia County), Recreation/Open Space (Flagler County) or Open Space/Conservation (Ormond Beach). The western end of Bulow Plantation Ruins Historic State Park is designated Residential-Medium Density (Flagler County). In addition, portions of the south end of Bulow Creek State Park and all of Addison Blockhouse Historic State Park are either Urban Low Density (Volusia County) or Low Density Residential (Ormond Beach).

Similarly, the Zoning Maps indicate that most of these park properties are zoned Conservation (Volusia County), Agriculture (Flagler County) or Special Environmental (Ormond Beach). And, the west end of Bulow Plantation Ruins Historic State Park, portions of the south end of Bulow Creek State Park as well as all of Addison Blockhouse Historic State Park are zoned as Mobile Home Park District (Flagler County), Rural Agricultural Estate (Volusia County), Urban Single-Family Residential (Volusia County) or Single-Family Medium Density (Ormond Beach). All of these zoning designations allow typical state park development as either a permitted use or conditional use.

Current Recreational Use and Visitor Programs

Visiting historic ruins, picnicking, camping, hiking, biking, fishing, boating, canoe/kayaking and nature study are the primary recreational uses of the parks. At Bulow Plantation Ruins, an open-air interpretive center located near the sugar mill ruins provides information on the historic significance of the site. Guided walking tours are also conducted upon request. At Tomoka State Park, tour boat excursions are available on the Tomoka River. At Addison Blockhouse State Historic Site, recreational uses are restricted due to the lack of public access. On occasion, staff from Tomoka State Park provides guided canoe tours to this historic site.

By DRP estimates, the FY 2010/2011 visitors contributed over $9 million in direct economic impact and the equivalent of 180.6 jobs to the local economy (Florida Department of Environmental Protection, 2011). Visitation is highest between February and May and peaks during Daytona Bike Week, the “world’s largest motorcycle event” in early March. This event attracts an estimated 500,000 motorcycle enthusiasts to the area, many of which visit the parks and stay overnight at the Tomoka State Park campground

Other Uses

Three utility easements occur within Bulow Creek State Park. Florida Power and Light maintains a power line easement at the southwestern end of Tomoka State Park. Bulow Creek and Tomoka State Park are bisected by Old Dixie Highway, a county designated scenic road. The former is also crossed by Pine Tree Drive, Walter Boardman Lane and Highbridge Road.

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.

The historic ruins and shell mounds in all parks have been designated as protected zones due to their cultural significance. The wetland communities (basin swamp, baygall, depression marsh, hydric hammock, seepage slope, slough, wet flatwoods, lakes, streams and estuarine communities), and scrub in all parks, and the undisturbed portions of xeric hammock at Tomoka State Park, have also been designated protected zones.

Existing Facilities

Recreation Facilities

The following provides a park-by-park summary of existing recreation facilities. See individual base maps for precise locations.

Bulow Plantation Ruins Historic State Park. The park contains two primary use areas. The picnic area is located next to Bulow Creek and provides a covered picnic shelter, scattered tables and grills, fishing dock and restrooms. Canoes are available for rent and a boat ramp provides access to Bulow Creek. A short nature trail connects this area to the sugar mill ruins, passing through a pine forest with many catfaced trees. A concrete pathway provides controlled access to the ruins. A unique open-air interpretive center with restrooms contains exhibits educating visitors about life on the plantation. Basic support facilities are located south of the entrance road loop. The northern trailhead for the Bulow Woods Trail (see Bulow Creek State Park) is also located at the park.

Main Picnic Area
Mill Ruins Trail (.25 mi.)
Combination screened picnic shelter (5 tables) with restrooms and office
Boat ramp
Fishing dock
Scattered picnic tables (11) and grills (7)
Unpaved picnic area parking (approximately 25 spaces)

Sugar Mill Ruins
Open-air interpretive center
Interpretive path with signage
Unpaved parking (approximately 15 spaces)

Bulow Creek State Park. The park contains one primary use area at the site of the Fairchild Memorial Oak and the coquina ruins of the Conrad Oates Company land title office. The use area has a small picnic shelter and restroom as well as a trailhead that serves as a starting

Pine Tree Road

ADDISON BLOCKHOUSE RUINS

HIKING TRAIL

Ormand Lakes Blvd

Tomoka River

ADDISON & MCRAE MILL RUINS

Legend

Park Boundary

Roads

County Road

Park Road Unpaved

Structures

Trails

Parking Lots

ADDISON BLOCKHOUSE HISTORIC STATE PARK

N

0 125 250 500 750 1,000 Feet

Florida Department of Environmental Protection
Division of Recreation and Parks
Date of aerial: 2009

BASE MAP

FLAGLER COUNTY

John Anderson Way

BULOW WOODS TRAIL

Walter Boarman Lane

High Bridge Rd

WALKWAY

INTERPRETIVE AREA
WALKWAY

PAVILION

SHOP
BATHHOUSE

RESTROOMS

INTERCOASTAL WATERWAY

ATLANTIC OCEAN

Tomoka Basin

INTERPRETIVE AREA

95

US-1

Old Dixie Rd

Pine Tree Road

VOLUSIA COUNTY

ADDISON & MCRAE
MILL RUINS

Tomoka River

Legend

- Park Boundary

Roads

- Interstate
- US HIGHWAY
- County Road
- Park Road Unpaved
- Hiking
- Structures
- Walkways
- Parking Lots

BULOW CREEK STATE PARK

N

0 625 1,250 2,500 3,750 5,000 Feet

Florida Department of Environmental Protection
Division of Recreation and Parks
Date of aerial: 2009

BASE MAP

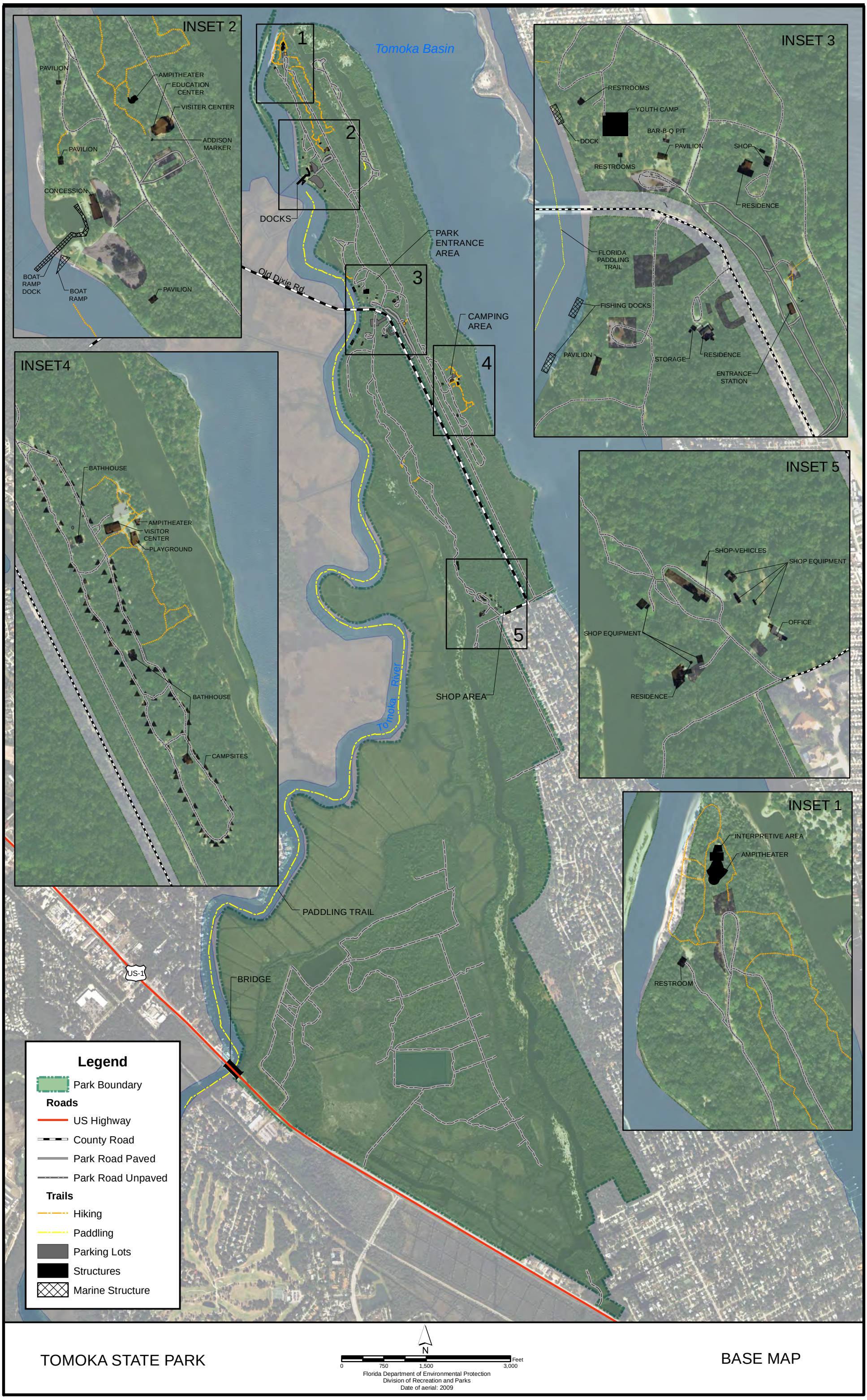
BULOW PLANTATION RUINS HISTORIC STATE PARK

N

0 100 200 400 600 800 Feet

Florida Department of Environmental Protection
Division of Recreation and Parks
Date of aerial: 2009

BASE MAP


INSET 2
PAVILION
AMPITHEATER
EDUCATION CENTER
VISITER CENTER
ADDISON MARKER
PAVILION
CONCESSION
BOAT RAMP DOCK
BOAT RAMP
PAVILION
1
2
3
4
5
Tomoka Basin
DOCKS
PARK ENTRANCE AREA
Old Dixie Rd
CAMPING AREA
INSET 3
RESTROOMS
YOUTH CAMP
DOCK
BAR-B-Q PIT
PAVILION
SHOP
RESTROOMS
RESIDENCE
FLORIDA PADDLING TRAIL
FISHING DOCKS
PAVILION
STORAGE
RESIDENCE
ENTRANCE STATION
INSET4
BATHHOUSE
AMPITHEATER
VISITOR CENTER
PLAYGROUND
BATHHOUSE
CAMPSITES
INSET 5
SHOP-VEHICLES
SHOP EQUIPMENT
SHOP EQUIPMENT
OFFICE
RESIDENCE
SHOP AREA
Tomoka River
INSET 1
INTERPRETIVE AREA
AMPITHEATER
RESTROOM
PADDLING TRAIL
US-1
BRIDGE
Legend
Park Boundary
Roads
US Highway
County Road
Park Road Paved
Park Road Unpaved
Trails
Hiking
Paddling
Parking Lots
Structures
Marine Structure
TOMOKA STATE PARK
N
0
750
1,500
3,000
Feet
Florida Department of Environmental Protection
Division of Recreation and Parks
Date of aerial: 2009
BASE MAP

point for the Skip Wahlin Nature Trail (hiking only) and the Bulow Woods Trail (hiking and biking), the latter of which is maintained by the Florida Trail Association. A small parking area and interpretive kiosk have recently been established at the Dummett Sugar Mill ruins. Support facilities are located adjacent to the Fairchild Oak Use Area.

As a partner of the Ormond Scenic Loop and Trail, the Halifax River Audubon and local volunteers coordinated to construct two wildlife overlooks and interpretive panels at the Summer and Boardman Ponds.

Fairchild Oak Use Area
Skip Wahlin Nature Trail (0.5 mi.)
Picnic shelter (2 tables)
Small restroom
Unpaved parking (approximately 20 spaces)

Dummett Interpretive Site
Interpretive kiosk
Unpaved parking (approximately 5 spaces)

Summer Pond Trailhead
Wildlife Overlook
Interpretive Panel

Boardman Pond Trailhead
Wildlife Overlook
Interpretive Panel

Trails
Bulow Woods Trail (6.7 mi.)
Unpaved parking (approximately 5 spaces)

Addison Blockhouse Historic State Park. There are currently no facilities located at the park. A small interpretive sign provides information about the blockhouse ruins. Its isolated location and lack of public access has limited the development of additional facilities.

Tomoka State Park. Multiple use areas support visitation at the park. The park contains four picnic areas; a marina area with concession, boat and canoe/kayak launching facilities; museum; group camp and standard campground. The concession includes a small restaurant facility and offers boat tours, canoe/kayak rentals and bike rentals. Shop and support facilities are located near the middle of the park along Strickland Creek.

Tomoka Point/Nocoroco Picnic Area
Legend of Tomokie sculpture
Partnership Nature Trail (0.5 mi.)
Picnic shelter (2 tables)
Scattered tables (6) and grills (7)
Restroom
Unpaved parking (approximately 20 spaces)

Pine Picnic Area
Picnic shelter (6 tables)
Scattered picnic tables (6) and grills (7)
Paved parking (20 spaces)

Marina Area
Boat ramp/dock
Canoe/kayak launch
Fishing docks (2)
Concession building with restrooms (approx. 4500 sq.ft.)
Picnic shelter (6 tables)
Scattered tables (5) and grills (5)
Paved concession parking (30 spaces)
Paved boat trailer parking (23 spaces)

Museum
Museum building (approx. 4000 sq.ft.)
Paved parking (20 spaces)

Oak Picnic Area
Picnic shelter (6 tables)
Scattered tables (3) and grills (7)
Cooking shelter/BBQ pit
Unpaved parking (approximately 20 spaces)

Group Camp
Campsites (35-person capacity)
Fishing dock
Restroom with outdoor showers

Sunset Picnic Area
Combination picnic shelter (4 tables) and restrooms
Fishing docks (2)
Scattered picnic tables (6) and grills (5)
Unpaved picnic area parking (20 spaces)

Camping Area
Campsites (100)
Bathhouses (3)
Visitors program building with unpaved parking (approximately 20 spaces)
Playground equipment

Support Facilities

The following provides a park-by-park summary of existing support facilities. See the individual base maps for precise locations.

Bulow Plantation Ruins Historic State Park

Ranger residence
Shop building
Pump house
Utility shed
Unpaved entrance road (Plantation Road)

Bulow Creek State Park
Ranger residence
Park office
Storage building
Unpaved entrance road (Fairchild Oak Use Area)

Addison Blockhouse Historic State Park
There are currently no support facilities located at the park.

Tomoka State Park
Ranger station
Administrative offices
Ranger residences
Shop building
Storage buildings (3)
Flammable storage building
Unpaved park road (2.2 mi.)

CONCEPTUAL LAND USE PLAN

The following narrative represents the current conceptual land use proposal for this park. As new information is provided regarding the environment of the park, 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.

The conceptual land use plan described here is the long-term, optimal development plan for the park, based on current conditions and knowledge of the park's resources, landscape and social setting. The development plan will be reassessed during the next update of the park management plan, and modified to address new conditions, as needed.

During the development of the management plan, DRP assessed potential impacts of proposed uses or development on the park resources and applied that analysis to decisions on the future physical plan of the park as well as the scale and character of proposed development. Potential impacts are more thoroughly identified and assessed as part of the site planning process once funding is available for facility development. At that stage, design elements (such as existing topography and vegetation, sewage disposal and stormwater management) and design constraints (such as imperiled species or cultural site locations) are more thoroughly investigated. Municipal sewer connections, 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. This includes the design of all new park facilities consistent with the universal access requirements of the Americans with Disabilities Act (ADA). After new facilities are constructed, the park staff monitors conditions to ensure that impacts remain within acceptable levels

Potential Uses

Public Access and Recreational Opportunities

Goal: Provide public access and recreational opportunities in the park.

The existing recreational activities and programs of The Tomoka Basin Parks, along with on-going maintenance and continued work towards ADA Compliance among all park facilities, are appropriate to the parks' natural and cultural resources and should be continued. To expand recreation opportunities at the parks, new recreation and support facilities are proposed for development at the Tomoka Basin Parks as discussed below.

Objective: Maintain the parks' current recreational carrying capacity of 2,537 users per day.

The concentration of cultural resources within the park boundaries establishes these state parks as a center for heritage based tourism in the region. The existing recreation uses within the parks are appropriate and should be continued.

Objective: Expand the parks' recreational carrying capacity by 391 users per day.

Additional facilities include an upgraded and expanded trail system, new camping, picnicking and shoreline fishing facilities, roadway and support facility improvements. Proposed new use areas include a new group camp and day-use area at Tomoka State Park. No additional facilities are proposed for Addison Blockhouse Historic State Park until public access is improved.

Objective: Continue to provide the current repertoire of 24 interpretive, educational and recreational programs on a regular basis.

The current interpretive, educational and recreational programs at the park present a wide variety of opportunities for visitors of all ages and abilities. These programs include ranger led tours, presentations, and outreach programs with local schools. The park also provides regular guided nature walks, tours and talks that focus on the plants and animals found in the park as well as resource management efforts designed to protect them. These programs will continue to be offered to park visitors.

Objective: Develop ten new interpretive, educational and recreational programs.

There is a need for improved natural and cultural resource interpretation at all four parks. To provide a quality educational experience, DRP recommends developing a comprehensive, interpretive master plan for these state parks. The plan should include natural resource interpretation, but focus primarily on the prehistoric and historic cultural resources found on the park lands. The plan would be holistic in its approach, viewing park lands as a unified

Sugar Mill Ruins
- Interpretive Improvements
- ADA Improvements to walkway

Picnic Area
- Restroom

Primitive Campsite

Boardman Pond Trailhead
- Nature Trail
- Parking

Fairchild Oak Use Area
Interpretive Kiosk -

Group Camp

Primitive Campsite

Summer Pond Trailhead
Nature Trail -
Parking -

Primitive Campsite

PLANTATION ROAD
OLD KINGS ROAD
BULOW CREEK
WALTER BOARDMAN LANE
HIGHBRIDGE ROAD
SMITH CREEK
ATLANTIC OCEAN
OLD DIXIE HIGHWAY
95
PINE TREE DRIVE
TOMOKA BASIN
NORTH BEACH STREET
TOMOKA RIVER
HALIFAX RIVER
STRICKLAND CREEK
THOMPSON CREEK
1
A1A

SEE SHEET 2

Legend

- PROPOSED FACILITIES
- PROPOSED TRAILS
- EXISTING TRAILS
- ORMOND SCENIC LOOP & TRAIL
- TOMOKA STATE PARK
- ADDISON BLOCKHOUSE HISTORIC STATE PARK
- BULOW CREEK STATE PARK
- BULOW PLANTATION RUINS HISTORIC STATE PARK

TOMOKA BASIN STATE PARKS

N

0 1,250 2,500 5,000 Feet

DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF RECREATION AND PARKS

CONCEPTUAL LAND USE PLAN
SHEET 1 OF 2

TOMOKA BASIN

Tomoka Point
- Interpretive Kiosk
- Fill Pond

Primitive Campsite

Boardwalk

Group Camp
- 2 Tent Areas (30 Campers Each)
- Picnic Shelters
- Bathhouse
- Canoe/Kayak Launch
- Fishing Platform

Museum
- Renovate
- Interpretive Exhibits
- Restroom Improvements

Cedar Point Fishing Area
- Picnic Shelters
- Fishing Platforms
- Canoe/Kayak Launch
- Restroom
- Parking

Oak Picnic Area
- Relocate Group Camp to Cedar Point
- Picnic Shelter
- Playground

Sunset Picnic Area
- Interpretive Kiosk
- Restroom

Family Camping Area
- Renovate Bathhouse

TOMOKA RIVER

HALIFAX RIVER

NORTH BEACH STREET

STRICKLAND CREEK

OUT

Legend

- PROPOSED FACILITIES
- PROPOSED DEVELOPMENT AREA
- EXISTING TRAILS
- ORMOND SCENIC LOOP & TRAIL
- TOMOKA STATE PARK
- ADDISON BLOCKHOUSE HISTORIC STATE PARK
- BULOW CREEK STATE PARK
- BULOW PLANTATION RUINS HISTORIC STATE PARK

TOMOKA BASIN STATE PARKS

N

0 500 1,000 2,000 Feet

DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF RECREATION AND PARKS

CONCEPTUAL LAND USE PLAN
SHEET 2 OF 2

cultural landscape and integrating interpretive opportunities at all of the parks. The interpretive plan would address exhibits, signage, tours, on and off-site programming and other educational media content to produce a consistent, comprehensive program that serves to better educate the public about the area's rich cultural heritage.

In a larger context, the opportunity exists for establishing an integrated interpretive program that recognizes and symbolizes the connections that existed between other plantations in the region during the Colonial Era. DRP will continue to participate with other plantation site managers in the creation of interpretive programs and heritage-based tourism opportunities that strive to tell the history of Florida's colonial plantations along the state's northeastern coast.

Visitor education and interpretation regarding the proper storage and disposal of food and garbage will be conducted to prevent the habituation of bears to humans. Though it is not currently a problem, efforts should be made to obtain bear-proof garbage cans and dumpsters when funds become available as a preventative measure. The FFWCC will be consulted for recommendations regarding bear management measures to be taken at the park.

Bulow Plantation Ruins Historic State Park. The sugar mill ruins at this park are the most accessible and extensive remains of the historic plantation era within this complex of parks. Therefore, interpretation at this site is crucial to telling the story of the rise and fall of the sugar plantations of East Florida. Recommendations include upgrading the exhibits housed within the open-air interpretive center and improving the signage placed along the walkway surrounding the ruins.

Bulow Creek State Park. An interpretive kiosk is proposed in the Fairchild Oak Use Area to provide information about the massive oak tree and the history this tree has witnessed during its lifetime.

Tomoka State Park. While Tomoka Point is a natural draw for park visitors due to its views of the surrounding basin, picnic facilities and Legend of Tomokie sculpture, there is a lack of interpretive information in this area. An interpretive kiosk is recommended in the vicinity that could provide information on the cultural resources, particularly the Timucuan village of Nocoroco and the Mount Oswald Plantation.

Sunset Picnic Area is significant for being a segregated use area for African-Americans during the 1950s and 1960s. Interpretive signage is recommended to acknowledge this history.

The Fred Dana Marsh Museum was closed in 2008. The new vision for this building is to serve a multi-purpose function that supports both the interpretive program of the park and provide a multi-purpose space for a wide range of functions. A portion of the 3,900 square-foot building should be renovated to serve as an orientation area for visitors interested in learning about the abundant natural and cultural resources and the available recreational opportunities of the Tomoka Basin parks and surrounding area. Plans should include new interpretive exhibits that provide a comprehensive overview of the parks' resources. These exhibits should be designed with the intention of inspiring visitors to investigate further and

explore points of interest throughout the parks. This location could serve as an origin for organized or self-guided tours along the OSLT with bikes available for rent across the street at the concession building.

The remainder of the building should be renovated to provide a large open-space that can be used for education programs, meetings and special events. This would likely involve the removal and/or relocation of interior walls in order to create a more efficient floor plan. In addition, the existing restrooms within this building should be upgraded to meet universal accessibility requirements.

Proposed Facilities

Capital Facilities and Infrastructure

Goal: Develop and maintain the capital facilities and infrastructure necessary to implement the recommendations of the management plan.

The existing facilities of this state park are appropriate to the natural and cultural resources contained in the park and should be maintained. New construction, as discussed further below, is recommended to improve the quality and safety of the recreational opportunities that visitors enjoy while in the park, to improve the protection of park resources, and to streamline the efficiency of park operations.

The following is a summary of improved or renovated facilities needed to implement the conceptual land use plan for the Tomoka Basin State Parks:

Objective: Maintain all public and support facilities in the park.

All capital facilities, trails and roads within the park will be kept in proper condition through the daily or regular work of park staff and/or contracted help.

Objective: Improve/repair five existing facilities and .1 miles of trail.

Major repair projects for park facilities may be accomplished within the 10-year term of this management plan, if funding is made available. These include the modification of existing park facilities to bring them into compliance with the Americans with Disabilities Act (a top priority for all facilities maintained by DRP). The following discussion of other recommended improvements and repairs are organized by use area and park.

Bulow Creek State Park. The restroom in the Fairchild Oak Use Area and the nearby ranger residence should be connected to central sewer when it becomes available.

Bulow Plantation Ruins Historic State Park: The walkway around the sugar mill ruins should be evaluated for potential accessibility improvements. Additionally, it is proposed to upgrade the restroom facility in the picnic area for modern universal accessibility.

Tomoka State Park: As discussed in the Resource Management Component of this plan, DRP is evaluating alternatives for relocation or removal of the *Legend of Tomokie* sculpture and reflection pool. Once the statue is removed, the pond should be filled and planted with

grass. The stone terraced walls around the pool should remain and could be used to support programming and special events.

Additionally, proposed improvements in the family camping area include renovating the bathhouse for universal accessibility, and improving two campsites for ADA

Objective: Construct 28 new facilities and approximately 10 miles of trail.

Bulow Creek State Park: A primitive campsite for up to ten persons is proposed at a scenic location overlooking Bulow Creek. The site is less than one mile south of the boat ramp at Bulow Plantation Ruins, and would be accessible by either canoe/kayak or hiking via the Bulow Woods Trail. A second primitive campsite of equal size is recommended near the eastern boundary in the central portion of the park. The site would overlook tidal marshes and be linked to an extension of the Bulow Woods Trail (see *Trails* section below).

A group camping area for up to sixty people is recommended roughly 0.7 miles south of Walter Boardman Lane near the eastern boundary of the park. The area lies at the end of a service road (Mound Grove Road), part of the Bulow Woods Trail. Public vehicular access is available from Walter Boardman Lane. The proposed site lies within a hammock that was formerly a citrus grove but has revegetated with well-spaced oaks and cabbage palms that provide a shaded, scenic setting suitable for camping. The extensive tidal marshes of an 1,100-Acre Impoundment lie immediately to the east and provide many opportunities for canoeing/kayaking and fishing. A canoe launch is recommended adjacent to the camping area to facilitate water access. The camp facility would include fire rings, and a restroom with outdoor showers.

To enhance trail opportunities at Bulow Creek State Park, a six-mile loop extension of the Bulow Woods Trail is recommended south of the Fairchild Oak Use Area. The project would utilize existing service roads and develop approximately 3.5 miles of new trail. This trail would provide access to a proposed primitive campsite overlooking tidal marshes along the eastern boundary. Portions of the trail will require boardwalks through wet areas.

Tomoka State Park: The Oak Picnic Area is directly adjacent to a group camp and visitors of both areas share a common restroom. In an effort to separate these incompatible uses, it is proposed that the group camp be relocated and the picnic area be expanded into the vacated area. A new picnic shelter and playground equipment should be added.

There is local demand for expanded group camping opportunities at Tomoka State Park. As discussed above, it is recommended that the existing group camp be relocated to provide better separation from other day-use areas. The north end of Cedar Point offers an ideal location for a new group camp with twice the capacity of the existing camp. The site should be designed as two separate areas with shared facilities. Each camp should accommodate up to 30 people and include a large picnic shelter and campfire circle. Shared facilities should include a canoe/kayak launch, a fishing platform and a restroom with showers. At the northern tip of Cedar Point, an elevated boardwalk is proposed to cross the narrow water body to the next spoil island. The proposed boardwalk would provide access to approximately five acres of previously disturbed area that campers could explore and fish from the shoreline.

A paddle-in primitive campsite is also proposed within the five-acres of disturbed area on the spoil island north of Cedar Point. This campsite should be provided to support the Florida Circumnavigational Saltwater Paddling Trail. Another paddle-in primitive campsite for up to ten persons is proposed along Thompson Creek on the Thompson Creek Bridge site on Grass Camp Road at John's Island. Allowing access to this plantation-era feature would provide an additional interpretive opportunity.

A new restroom facility in the Sunset Picnic Area is proposed to help improve the visitor experience for picnickers.

Cedar Point is a popular area for shoreline fishing but the existing amenities are limited to just a few scattered picnic tables and no designated parking spaces. This plan recommends improving and organizing the southern end of Cedar Point to support the current fishing activities. Proposed facilities include two fishing platforms, a canoe/kayak launch, two picnic shelters, a restroom and a stabilized parking area for up to 20 cars.

Access to John's Island is currently limited to a small gate along US-1 along a utility easement on the southwest corner of the parcel. Currently, it sees a low level of use from local shoreline fishers. The DRP will continue to monitor the level of use at John's Island, and parking along the shoulder of US-1. Division staff will work with FDOT and other Agencies to coordinate safe ingress and egress on to the property from US-1, should an increase in the level of use in the future warrant it.

Proposed facilities on John's Island include a primitive campsite less than 800 feet from paddling access on either Strickland or Thompson Creek. The primitive campsite would be tied to a proposed shared-use trail. The three-mile shared-use trail is recommended to provide hiking and wildlife viewing opportunities on John's Island. Site conditions preclude the construction of permanent restroom facilities at this location.

Trails

The Volusia County Trails Plan (1999) includes the concept of a Kings Highway Heritage Corridor that would "retrace, using bicycle, automobile or boat, the routes of colonial settlers who traveled the Kings Road and coastal waterways between New Smyrna and St. Augustine on their way to the sugar mills and plantations of East Florida." The plan envisions a paved trail providing access to bicyclists and pedestrians to waterfront parks and natural areas with scattered interpretive opportunities relating the story of the cultural landscape of the region. DRP supports a partnership with Volusia and Flagler Counties and the City of Ormond Beach to implement part of this vision that would connect Sanchez City Park, Tomoka State Park, Bulow Creek State Park, Bulow Plantation Ruins Historic State Park, Ormond Tomb County Park, North Peninsula State Park and adjacent communities. A designated trail along North Beach Street, Old Dixie Highway, Walter Boardman Lane, Highbridge Road and State Road A1A would serve as a complement to the existing Ormond Scenic Loop and Trail, increase bicycle and pedestrian safety, and provide an important contribution to Volusia County's proposed trails network. The presence of private lands, extensive wetlands and limited right-of-way along the proposed route will require a mix of

trail types. Preference should be given to establishing a separate paved trail within park boundaries or along existing county right-of-way to the extent possible. However, site constraints may limit the trail to paved bike lanes along road shoulders and will require creative engineering solutions, such as elevated boardwalks in certain sections. The two most challenging sections are located between the Tomoka River Bridge and Dummett Sugar Mill Ruins along Old Dixie Highway and east of the Bulow Creek Bridge on Walter Boardman Lane and Highbridge Road. Interpretive signs and kiosks at trailheads, and proposed interpretive stops would serve to educate visitors about park natural and cultural resources and establish the trail as a regional nature/heritage tourism amenity.

It should be emphasized that the completion of this trail will require significant intergovernmental coordination and support from the local community, particularly since the proposed route is not entirely within park boundaries. An important first step in this process is the completion of a feasibility study that would propose options for constructing the trail through areas of private ownership, across bridges and through tidal marshes. A variety of funding sources beyond DRP will have to be considered and may include Volusia County's ECHO Program and/or federal transportation enhancement dollars.

DRP will also encourage local governments to establish safe bicycle/pedestrian passage north along Old Kings Highway that would provide a link to Bulow Plantation Ruins Historic State Park.

Restoration Areas

The area including Cedar Point has been recommended as a partial spoil island restoration project. The 2001 Resource Management Evaluation recommends using portions of the dredged spoil on Cedar Point to fill previously dredged boat slips and adjoining channels. This project should be coordinated with the proposed development and presents a unique opportunity to create a showcase project that combines park development with environmental restoration.

Support Facilities

The existing shop building at Bulow Plantation Ruins Historic State Park needs to be replaced. A permanent ranger residence is recommended at the Fairchild Oak Use Area within Bulow Creek State Park. At Tomoka State Park, consideration should be given to paving the entire park road, parking areas and the camping area loop. Due to the archaeological sensitivity of this area, DRP should discuss ways to minimize stormwater retention requirements with the St. Johns River Water Management District to ensure protection of these resources. Finally, city sewer lines south of the Tomoka State Park boundary should be extended into the park to service all existing and proposed facilities.

FACILITIES DEVELOPMENT

Preliminary cost estimates for these recommended facilities, improvements are provided in the Implementation Component of this plan. These cost estimates are based on the most cost-effective construction standards available at this time. The preliminary estimates are provided to assist DRP in budgeting future park improvements, and may be revised as more information is collected through the planning and design processes. New facilities and improvements to existing facilities recommended by the plan include:

Recreation Facilities

Bulow Plantation Ruins Historic State Park

Recreation Facility Improvements

Sugar Mill Ruins
- Evaluate and revise walkway for universal accessibility
- Upgrade interpretive exhibits and signage

Picnic Area
- Upgrade restroom for universal accessibility

Bulow Creek State Park

New Recreation Facilities

Fairchild Oak Trailhead
- Interpretive kiosk

Group Camp (60-person capacity)
- Restroom with outside showers
- Canoe/kayak launch
- Campfire circle

Primitive campsites (2 locations, 10 person capacity/site)

Bulow Woods Trail extension (6 mi.)
- Wetland boardwalks
- Interpretive signs (2)

Tomoka State Park

Recreation Facility Improvements

Family Camping Area
- Bathhouse renovation
- ADA Accessible Campsites (2)

Tomoka Point
- Remove statue and fill Legend of Tomokie pond

Museum building
- Interior renovations
- Interpretive exhibits
- Multi-purpose space
- Restroom upgrade

New Recreation Facilities

Tomoka Point
- Interpretive Kiosk

Oak Picnic Area
- Medium picnic shelter
- Playground equipment

Sunset Picnic Area
- Interpretive sign
- Restroom

Cedar Point
- Fishing platforms (2)

Canoe/kayak launch
Medium picnic shelters (2)
Restroom
Parking (up to 20 spaces)

John's Island
Primitive Campsite (up to 10 People)
Portable restroom
Shared-use trail (3 mi.)
Interpretive kiosk

Group Camp Area
Two tent areas (30 people each)
Campfire circles (2)
Large picnic shelters (2)
Canoe/kayak launch
Fishing platform
Bathhouse
Boardwalk (140 ft.)

Cedar Point
Paddle-in primitive campsites (2 locations, 10 people/site)

Support Facilities

Bulow Plantation Ruins Historic State Park
Shop building (3-bay)

Bulow Creek State Park
Ranger residence

Tomoka State Park
Pave park road, parking lots and campground loop
Connect entire park to central sewer

Existing Use and Recreational 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 6).

The recreational 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 6.

Table 6--Existing Use and Recreational Carrying Capacity

ADDISON BLOCKHOUSE HISTORIC STATE PARK

	Existing Capacity		Proposed Additional Capacity		Estimated Recreational Capacity	
Activity/Facility	**One Time**	**Daily**	**One Time**	**Daily**	**One Time**	**Daily**
Interpretive Program						
Staff-Led Group Only	30	30			30	30
TOTAL	**30**	**30**			**30**	**30**

Table 6--Existing Use and Recreational Carrying Capacity

BULOW PLANTATION RUINS HISTORIC STATE PARK

	Existing Capacity		Proposed Additional Capacity		Estimated Recreational Capacity	
Activity/Facility	**One Time**	**Daily**	**One Time**	**Daily**	**One Time**	**Daily**
Interpretation/Trails	60	240			60	240
Picnicking	64	128			64	128
Shoreline Fishing	10	20			10	20
Boating						
Power Boat	20	20			20	20
Canoe/Kayak	20	40			20	40
TOTAL	**174**	**448**			**174**	**448**

Table 6--Existing Use and Recreational Carrying Capacity

BULOW CREEK STATE PARK

	Existing Capacity		Proposed Additional Capacity		Estimated Recreational Capacity	
Activity/Facility	**One Time**	**Daily**	**One Time**	**Daily**	**One Time**	**Daily**
Trails						
Hiking	42	84	36	72	78	156
Shared-Use	18	36			18	36
Interpretive Areas						
Dummett Ruins	12	48			12	48
Boardman Pond	15	60			15	60
Summer Pond	15	60			15	60
Fairchild Oak	60	120			60	120
Camping						
Group Camp			60	60	60	60
Primitive Camping			20	20	20	20
Picnicking	40	80			40	80
TOTAL	**202**	**488**	**116**	**152**	**258**	**640**

Table 6--Existing Use and Recreational Carrying Capacity

TOMOKA STATE PARK

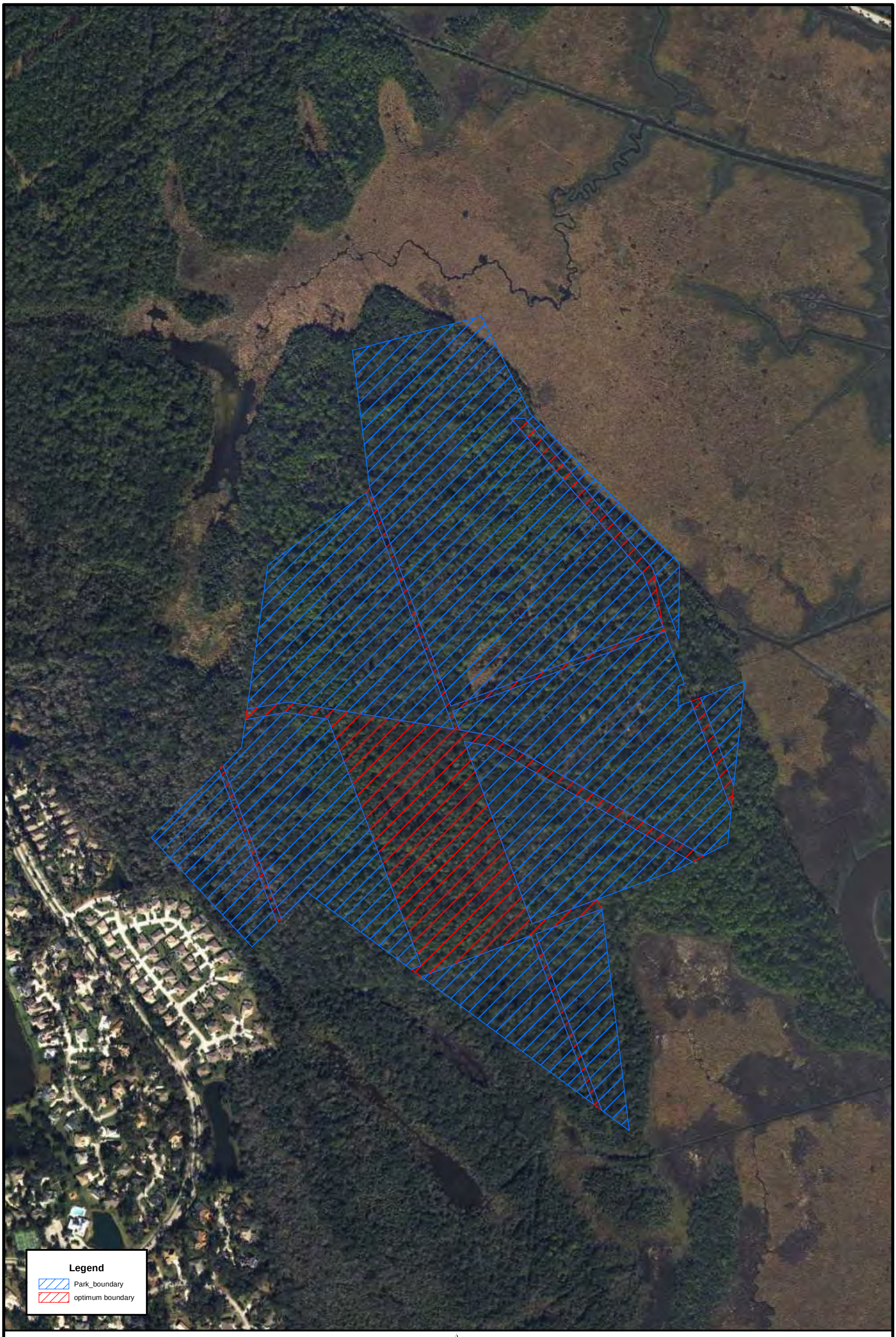
Activity/Facility	Existing Capacity		Proposed Additional Capacity		Estimated Recreational Capacity	
	One Time	Daily	One Time	Daily	One Time	Daily
Interpretation/ Meeting Area						
Museum Building	100	200			100	200
Camping						
Standard Camping	800	800			800	800
Group Camp	35	35	25	25	60	60
Pimitive Camping			30	30	30	30
Trails						
Hiking	10	40			10	40
Shared-Use			20	40	20	40
Picnicking	160	320	48	96	208	416
Shoreline Fishing	40	80	20	40	60	120
Boating						
Motor Boat	68	68			68	68
Canoe/Kayak	28	28	8	8	36	36
TOTAL	**1241**	**1571**	**151**	**239**	**1392**	**1810**

Optimum Boundary

The optimum boundary map reflects lands that have been identified as desirable for direct management by DRP as part of the state park. These parcels may include public as well as privately owned lands that improve the continuity of existing parklands, provide the most efficient boundary configuration, improve access to the park, provide additional natural and cultural resource protection or allow for future expansion of recreational activities. The map also identifies lands that are potentially surplus to the management needs of DRP. As additional needs are identified through park use, development, or research, and changes to land use on adjacent private property occurs, modification of the park's optimum boundary may be necessary.

Identification of parcels on the optimum boundary map is intended solely for planning purposes. It is not to be used in connection with any regulatory purposes. Any party or governmental entity should not use a property's identification on the optimum boundary map to reduce or restrict the lawful rights of private landowners. Identification on the map does not empower or suggest that any government entity should impose additional or more restrictive environmental land use or zoning regulations. Identification should not be used as the basis for permit denial or the imposition of permit conditions.

The parcels identified adjacent to Bulow Creek State Park and Addison Blockhouse Historic State Park would serve to enhance the natural and cultural resource base of these units, facilitate resource management, provide buffering from encroaching development and allow for future expansion of public access and recreational activities. There is no optimum boundary identified for Tomoka State Park or Bulow Plantation Ruins Historic State Park. At this time, no lands are considered surplus to the needs of these parks



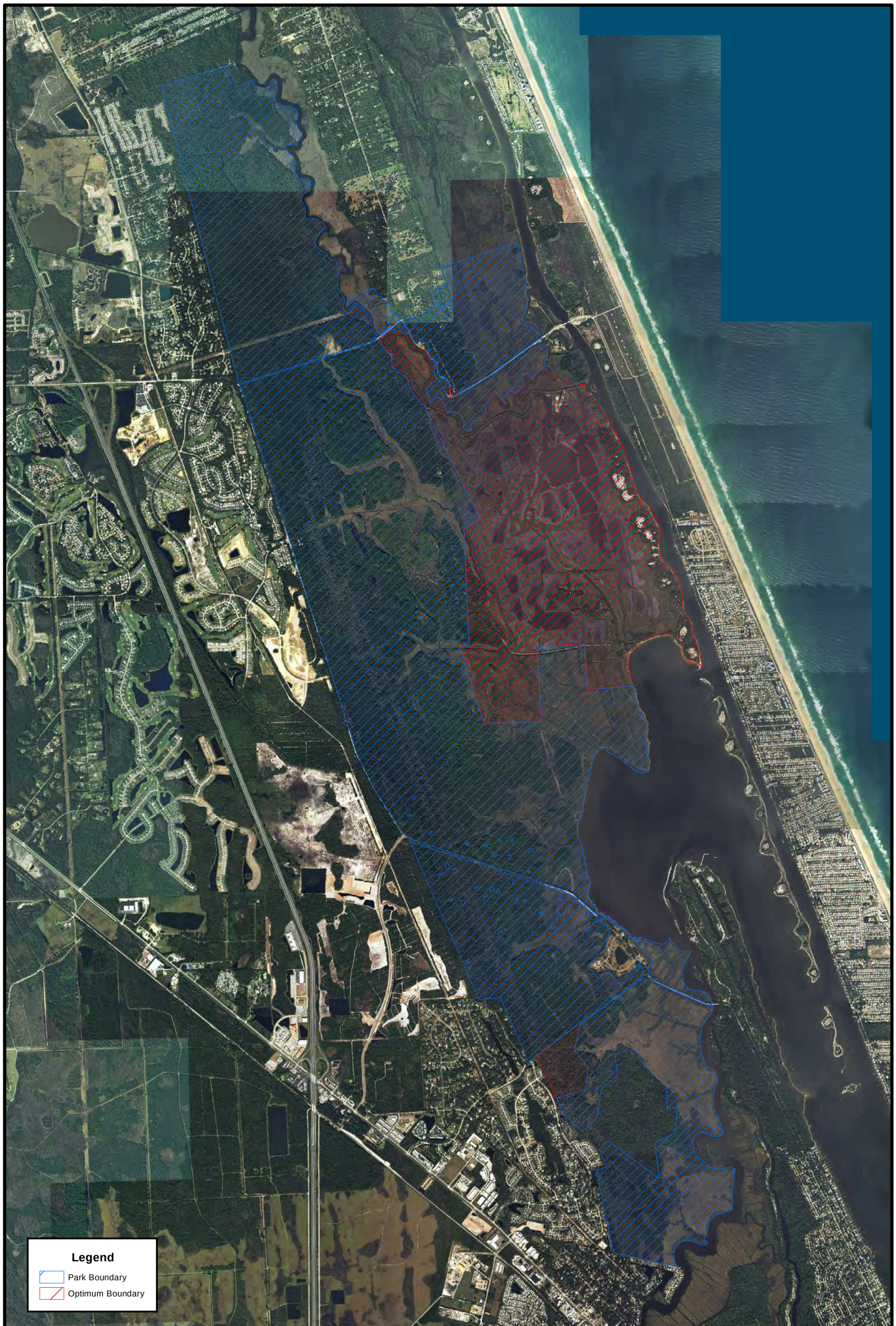
ADDISON BLOCKHOUSE
HISTORIC STATE PARK

N

0 250 500 1,000 Feet

Florida Department of Environmental Protection
Division of Recreation and Parks
Date of aerial: 2009

OPTIMUM BOUNDARY MAP



BULOW CREEK STATE PARK

N

0 1,600 3,200 6,400 Feet

Florida Department of Environmental Protection
Division of Recreation and Parks
Date of aerial: 2009

OPTIMUM BOUNDARY MAP

IMPLEMENTATION COMPONENT

The resource management and land use components of this management plan provide a thorough inventory of the park's natural, cultural and recreational resources. They outline the park's management needs and problems, and recommend both short and long-term objectives and actions to meet those needs. The implementation component addresses the administrative goal for the park and reports on the Division of Recreation and Parks (DRP) progress toward achieving resource management, operational and capital improvement goals and objectives since approval of the previous management plan for this park. This component also compiles the management goals, objectives and actions expressed in the separate parts of this management plan for easy review. Estimated costs for the ten-year period of this plan are provided for each action and objective, and the costs are summarized under standard categories of land management activities.

MANAGEMENT PROGRESS

Since the approval of the last management plan for the Tomoka Basin State Parks in 2003, significant work has been accomplished and progress made towards meeting DRP's management objectives for the park. These accomplishments fall within three of the five general categories that encompass the mission of the park and DRP.

Acquisition

- 2005 – Tall Pines and Mission Pines Tracts (405 acres)
- 2008 – Birdshead Tract (140.85 aces)

Park Administration and Operations

- Administrative complex expansion.
- Closure of museum building and relocation of all Fred Dana Marsh artwork to the Wolfsonian Collection at Florida International University

Resource Management

Natural Resources

- Increase in identification of new imperiled plant species.
- Successfully completed 536 acres of prescribed burning at all four parks.
- Successfully removed 796 acres of exotic plants at all four parks.
- Successfully removed 754 exotic animals at all four parks.

Cultural Resources

- Addition of 24 new cultural sites
- Worked with USF students/staff on GPS scanning and ground penetrating radar.
- Further stabilization of Dummett Sugar Mill.
- In coordination with USF, completed archaeological resource sensitivity model for all four parks.

Recreation and Visitor Services

- ADA renovations at Tomoka State Park ranger station.
- Interpretive signage improvements at Bulow Creek State Park.
- Informational kiosks for the Tomoka scenic canoe trail.

Park Facilities

- Completed construction of wildlife observation deck at Summer Pond through coordination with the Boy Scouts of America and the Halifax Audubon Society.
- Completed interpretive kiosks at the Summer and Boardman Pond trailheads through coordination with the Boy Scouts of America and the Halifax Audubon Society.

MANAGEMENT PLAN IMPLEMENTATION

This management plan is written for a timeframe of ten years, as required by Section 253.034 Florida Statutes. The Ten-Year Implementation Schedule and Cost Estimates (Table 7) summarize the management goals, objectives and actions that are recommended for implementation over this period, and beyond. Measures are identified for assessing progress toward completing each objective and action. A time frame for completing each objective and action is provided. Preliminary cost estimates for each action are provided and the estimated total costs to complete each objective are computed. Finally, all costs are consolidated under the following five standard land management categories: Resource Management, Administration and Support, Capital Improvements, Recreation Visitor Services and Law Enforcement.

Many of the actions identified in the plan can be implemented using existing staff and funding. However, a number of continuing activities and new activities with measurable quantity targets and projected completion dates are identified that cannot be completed during the life of this plan unless additional resources for these purposes are provided. The plan's recommended actions, time frames and cost estimates will guide DRP's planning and budgeting activities over the period of this plan. It must be noted that these recommendations are based on the information that exists at the time the plan was prepared. A high degree of adaptability and flexibility must be built into this process to ensure that DRP can adjust to changes in the availability of funds, improved understanding of the park's natural and cultural resources, and changes in statewide land management issues, priorities and policies.

Statewide priorities for all aspects of land management are evaluated each year as part of the process for developing DRP's annual legislative budget requests. When preparing these annual requests, DRP considers the needs and priorities of the entire state park system and the projected availability of funding from all sources during the upcoming fiscal year. In addition to annual legislative appropriations, DRP pursues supplemental sources of funds and staff resources wherever possible, including grants, volunteers and partnerships with other entities. DRP's ability to accomplish the specific actions identified in the plan will be determined largely by the availability of funds and staff for these purposes, which may vary from year to year. Consequently, the target schedules and estimated costs identified in Table 7 may need to be adjusted during the ten-year management planning cycle.

Table 7
Tomoka Basin State Parks
Ten-Year Implementation Schedule and Cost Estimates

NOTE: THE DIVISION'S ABILITY TO COMPLETE THE OBJECTIVES OUTLINED BY THE MANAGEMENT PLAN IS CONTINGENT ON THE AVAILABILITY OF FUNDING AND OTHER RESOURCES FOR THESE PURPOSES.

Goal I: Provide administrative support for all park functions.		**Measure**	**Planning Period**	**Estimated Manpower and Expense Cost* (10-years)**
Objective A	**Continue day-to-day administrative support at current levels.**	Administrative support ongoing	C	**$2,060,458**
Objective B	**Expand administrative support as new lands are acquired, new facilities are developed, or as other needs arise.**	Administrative support expanded	UFN	**$317,556**
Goal II: Protect water quality and quantity in the park, restore hydrology to the extent feasible, and maintain the restored condition.		**Measure**	**Planning Period**	**Estimated Manpower and Expense Cost* (10-years)**
Objective A	**Conduct/obtain an assessment of the park's hydrological restoration needs.**	Assessment conducted	C	**$6,500**
Action 1	Develop protocols to assess the impact of Korona Canal and Frenchman's Ditch on local groundwater levels.	Protocols developed	LT	$6,500
Objective B	**Develop an erosion prevention plan to supplement the current efforts at Tomoka Point and on Tomoka Bluff.**	**Plan developed**	**LT**	**$4,100**
Objective B	**Restore natural hydrological conditions and function to approximately 460 acres of tidal marsh natural community.**	**# Acres restored or with restoration underway**	**ST**	**$1,000**
Objective C	**Develop a partnership with local and state agencies for water quality monitoring and sampling in the Bulow Creek/Korona Canal area within the Tomoka River and surrounding tributaries.**	**Coordination protocols developed**	**LT**	**$4,820**

* 2012 Dollars
ST = actions within 2 years
LT = actions within 10 years
C = long term or short term actions that are continuous or cyclical
UFN = currently unfunded need

Table 7
Tomoka Basin State Parks
Ten-Year Implementation Schedule and Cost Estimates

NOTE: THE DIVISION'S ABILITY TO COMPLETE THE OBJECTIVES OUTLINED BY THE MANAGEMENT PLAN IS CONTINGENT ON THE AVAILABILITY OF FUNDING AND OTHER RESOURCES FOR THESE PURPOSES.

Goal III: Restore and maintain the natural communities/habitats of the park.		**Measure**	**Planning Period**	**Estimated Manpower and Expense Cost* (10-years)**
Objective A	**Within 10 years have 1,724 acres of the park maintained within optimal fire return interval.**	# Acres within fire return interval target	LT	**$306,000**
Action 1	Develop/update annual burn plan.	Plan updated	C	$16,000
Action 2	Manage fire dependent communities for ecosystem function, structure and processes by burning between 235 - 580 acres annually, as identified by the annual burn plan.	Average # acres burned annually	C	$290,000
Objective B	**Conduct habitat/natural community restoration activities on 238 acres of mesic flatwoods and scrub communities.**	# Acres restored or with restoration underway	LT	**$46,000**
Action 1	Develop/update site specific restoration plan	Plan developed/updated	ST	$16,000
Action 2	Implement restoration plan for 36 acres of scrub community.	# Acres with restoration underway	ST	$20,000
Action 3	Implement restoration plan for 202 acres of mesic and scrubby flatwood communities.	# Acres with restoration underway	LT	$10,000
Goal IV: Maintain, improve or restore imperiled species populations and habitats in the park.		**Measure**	**Planning Period**	**Estimated Manpower and Expense Cost* (10-years)**
Objective A	**Develop/ update baseline imperiled species occurrence inventory lists for plants and animals, as needed.**	List updated	C	**$8,200**
Objective B	**Monitor and document 1 selected imperiled animal species in the park.**	# Species monitored	C	**$15,000**
Action 1	Conduct a tier-3 level survey of gopher tortoises in the park.	# Species monitored	C	$15,000
Objective C	**Monitor and document 23 selected imperiled plant species in the park.**	# Species monitored	C	**$5,000**
Action 1	Implement tier-1 monitoring protocols for 20 imperiled plant species including Chapman's sedge, Florida butterfly orchid, Green-fly orchid, Garberia, Angle pod, Spiked crested coralroot, Southern twayblade, Cardinalflower, Pigmypipes, Shellmound prickly-pear, Cinnamon fern, Royal Fern, Widespread polypody, Plume polypody, Comb polypody, Southern tubercled orchid, Giant orchid, Levy pinkroot, Giant airplant, and Coontie.	# Species monitored	C	$1,000
Action 2	Implement tier-2 monitoring protocols for 3 selected imperiled plant species including toothed spleenwort, eared spleenwort and coastal mock vervain.	# Species monitored	C	$4,000
Objective D	**Protect and expand the current populations of coastal mock vervain and toothed spleenwort within the Park.**	# of individuals protected or introduced	LT	**$21,000**

* 2012 Dollars
ST = actions within 2 years
LT = actions within 10 years
C = long term or short term actions that are continuous or cyclical
UFN = currently unfunded need

Table 7
Tomoka Basin State Parks
Ten-Year Implementation Schedule and Cost Estimates

NOTE: THE DIVISION'S ABILITY TO COMPLETE THE OBJECTIVES OUTLINED BY THE MANAGEMENT PLAN IS CONTINGENT ON THE AVAILABILITY OF FUNDING AND OTHER RESOURCES FOR THESE PURPOSES.

Goal V: Remove exotic and invasive plants and animals from the park and conduct needed maintaince-control.		**Measure**	**Planning Period**	**Estimated Manpower and Expense Cost* (10-years)**
Objective A	**Annually treat 40 acres of exotic plant species in the park.**	# Acres treated	C	**$66,400**
Action 1	Develop and annually update exotic plant management annual work plan.	Plan developed/updated	C	$16,000
Action 2	Implement annual work plan by treating 40 acres in park, annually, and continuing maintenance and follow-up treatments, as needed.	# Acres treated	C	$50,400
Objective B	**Implement control measures on 2 exotic and nuisance animal species in the park.**	# Species for which control measures implemented	C	**$20,000**
Goal VI: Protect, preserve and maintain the cultural resources of the park.		**Measure**	**Planning Period**	**Estimated Manpower and Expense Cost* (10-years)**
Objective A	**Assess and evaluate the remaining 3 of 85 recorded cultural resources in the park.**	Documentation complete	LT	**$1,000**
Objective B	**Compile reliable documentation for all recorded historic and archaeological sites.**	Documentation complete	LT	**$8,200**
Action 1	Ensure all known sites are recorded or updated in the Florida Master Site File.	# Sites recorded or updated	LT	$8,200
Objective C	**Bring 3 of 85 recorded cultural resources into good condition.**	# Sites in good condition	LT	**$210,000**
Action 1	Develop and implement a cyclical monitoring and maintenance program for each plantation and homestead cultural resource.	# Sites monitored	C	$2,500
Action 2	Conduct hardwood removal and establish fence perimeter around the Addison Blockhouse and MacRae Mill.	Project completed	LT	$7,500
Action 3	Stabilize and construct a permanent structure to protect the Spring House at Bulow Plantation Ruins Historic State Park.	Project completed	UFN	$200,000

* 2012 Dollars
ST = actions within 2 years
LT = actions within 10 years
C = long term or short term actions that are continuous or cyclical
UFN = currently unfunded need

Table 7
Tomoka Basin State Parks
Ten-Year Implementation Schedule and Cost Estimates

NOTE: THE DIVISION'S ABILITY TO COMPLETE THE OBJECTIVES OUTLINED BY THE MANAGEMENT PLAN IS CONTINGENT ON THE AVAILABILITY OF FUNDING AND OTHER RESOURCES FOR THESE PURPOSES.

Goal VII: Provide public access and recreational opportunities in the park.		**Measure**	**Planning Period**	**Estimated Manpower and Expense Cost* (10-years)**
Objective A	**Maintain the park's current recreational carrying capacity of 2,537 users per day.**	# Recreation/visitor	C	**$2,060,458**
Objective B	**Expand the park's recreational carrying capacity by 391 users per day.**	# Recreation/visitor	UFN	**$319,856**
Objective C	**Continue to provide the current repertoire of 24 interpretive, educational and recreational programs on a regular basis.**	# Interpretive/education programs	C	**$27,000**
Objective D	**Develop 10 new interpretive, educational and recreational programs.**	# Interpretive/education programs	LT	**$9,500**
Action 1	Update and implement an interpretive concept	Document completed/implemented	ST	$1,500
Action 2	Develop and implement Interpretive Master Plan.	Plan implemented	LT	$8,000
Goal VIII: Develop and maintain the capital facilities and infrastructure necessary to meet the goals and objectives of this management plan.		**Measure**	**Planning Period**	**Estimated Manpower and Expense Cost* (10-years)**
Objective A	**Maintain all public and support facilities in the parks.**	Facilities maintained	C	**$2,307,713**
Objective B	**Continue to implement the park's transition plan to ensure facilities are accessible in accordance with the American with Disabilities Act of 1990.**	Plan implemented	ST or LT	**$10,000**
Objective C	**Improve and/or repair 5 existing facilites, and .1 miles of trail as identified in the Land Use Component.**	# Facilities/Miles of Trail	LT	**$465,000**
Objective D	**Construct 28 new facilites and 10 miles of trail as identified in the Land Use Component.**	# Facilities/Miles of Trail	UFN	**$3,997,357**
Objective E	**Expand maintenance activities as existing facilities are improved and new facilities are developed.**	Facilities maintained	UFN	**$355,663**

* 2012 Dollars
ST = actions within 2 years
LT = actions within 10 years
C = long term or short term actions that are continuous or cyclical
UFN = currently unfunded need

Table 7
Tomoka Basin State Parks
Ten-Year Implementation Schedule and Cost Estimates

NOTE: THE DIVISION'S ABILITY TO COMPLETE THE OBJECTIVES OUTLINED BY THE MANAGEMENT PLAN IS CONTINGENT ON THE AVAILABILITY OF FUNDING AND OTHER RESOURCES FOR THESE PURPOSES.

Summary of Estimated Costs

Management Categories		Total Estimated Manpower and Expense Cost* (10-years)
Resource Management		**$723,220**
Administration and Support		**$2,378,014**
Capital Improvements		**$4,472,357**
Recreation Visitor Services		**$2,416,814**
Law Enforcement Activities[1]		**$0**
	[1]Law enforcement activities in Florida State Parks are conducted by the DEP Division of Law Enforcement and by local law enforcement agencies.	

* 2012 Dollars
ST = actions within 2 years
LT = actions within 10 years
C = long term or short term actions that are continuous or cyclical
UFN = currently unfunded need

Addendum 1 — Acquisition History

Sequence of Acquisition

On June 11, 1937, the Florida Board of Forestry (FBF) obtained title to a 3.51-acre property that became the initial area of Tomoka State Park (Park). The FBF purchased this property from Irving W. Bonbright and Elizabeth C. Bonbright for $ 50.00 using old money. Since this initial purchase, FBF and its successor agencies have acquired many parcels using old money, dedicated sovereignty lands, and P2000 land acquisition funds and added them to the Park. The current area of Tomoka State Park is 1,620 acres.

On September 16, 1949, the FBF conveyed and transferred its title and interest in Tomoka State Park to the Florida Board of Parks and Historic Memorials (FBPHM), predecessor in interest to the Florida Department of Environmental Protection's (DEP), Division of Recreation and Parks (DRP). On September 28, 1967, FBPHM transferred its title and interest in the park to the State of Florida (State), now commonly referred to as the Board of Trustees of the Internal Improvement Trust Fund of the State of Florida (Trustees).

Management Leases

On January 31, 1968, the State leased all recreational lands it had been managing, including Tomoka State Park, to FBPHM under a 99-year generic lease (also known as grandfather lease), Lease No. 2324. on December 21, 1984, the Trustees amended this lease as it applied to Tomoka State Park and made the term of the lease 50 (fifty) years effective December 21, 1984. This lease, as amended, would expire on December 20, 2034.

On August 24, 1988, the Trustees changed Lease No. 2324 as it applied to Tomoka State Park to Lease No. 3644, Tomoka State Park specific lease, without changing any of the terms and conditions of Lease No. 2324. Lease No. 3644 will expire on December 20, 2034.

Before June 24, 2003, the DRP had been managing Addison Blockhouse Historic State Park and Bulow Creek State Park under Lease No. 3606 and Lease No.3195 respectively. On June 24, 2003, the Trustees and the DRP executed Amendment No. 8 to Lease No. 3644, to incorporate Addison Blockhouse Historic State and Bulow Creek State Park into the Tomoka lease. On the same date, the parties cancelled Lease No. 3606 and 3195.

According to Lease No. 3644, the DRP manages Tomoka State Park for the purposes of developing, operating and maintaining this property for public outdoor recreational, park, historic, conservation and related purposes.

Title Interest

The Trustees hold fee simple title to Tomoka State Park.

Special Conditions on Use

Tomoka State Park is designated single-use to provide resource-based public outdoor recreation and other park related uses. Uses such as water resource development projects, water supply projects, storm-water management projects, and linear facilities and sustainable agriculture and forestry (other than those forest management activities specifically identified in this plan) are not consistent with this plan.

Outstanding Reservations

Instrument: .....Easement
Instrument Holder: .....City of Ormond Beach
Beginning Date:.....April 9, 1979
Ending Date:.....For a period coterminous with Lease No. 3644**.**
Outstanding Rights, Uses, Etc.: .....This easement enables the city of Ormond Beach to construct, operate and maintain water lines and booster pump station on a certain portion of Tomoka State Park. The easement also grants the right to ingress to and egress from the subject area for the purposes of removing, relocating and/or reconstructing the lines.

Instrument: .....General Permit
Instrument Holder: .....Southern Bell Telephone and Telegraph Company
Beginning Date:.....July 27, 1959
Ending Date:.....There is no specific ending date given.
Outstanding Rights, Uses, Etc.: .....The General Permit grants unto the Southern Bell Telephone and Telegraph Company the rights, privileges and authority to construct, operate and maintain a line of communication including , but not limited to, poles, wires, cables, conduits, guy and anchors upon, across and under a certain portion of Tomoka State Park (Permit Area) and the right to ingress to and egress from the Permit Area for the purpose of inspecting and maintaining said lines and to clear trees and undergrowth or other obstructions in the Permit Area.

Instrument: .....Indenture
Instrument Holder: .....Muriel Bay Estates, Inc.
Beginning Date:.....November 27, 1943
Ending Date:.....Forever
Outstanding Rights, Uses, Etc.: .....The indenture prohibits placing a filling station or other building for business purposes on the property.

Addendum 2—Advisory Group Members and Report

Elected Officials

The Honorable Ed Kelley
Mayor, City of Ormond Beach
22 South Beach Street
Ormond Beach, Florida 32174

Represented by:
The Honorable Bill Partington
Deputy Mayor,
City of Ormond Beach
22 South Beach Street
Ormond Beach, Florida 32174

The Honorable Alan Peterson
Chair, Flagler County Board of County Commissioners
1769 E. Moody Blvd
Bldg. 2, Suite 301
Bunnell, Fl 32110

Represented by:
Tim Telfer, Environmental Planner
Flagler County
1769 E. Moody Boulevard
Bldg. 2, Suite 301
Bunnell, Fl 32110

The Honorable Frank T. Bruno, Jr.
Chair, Volusia County Council
Volusia County Council
123 W. Indiana Avenue
Deland, FL 32720-4612

Represented by:
Katrina Locke, Natural Resources Director
Volusia County
123 W. Indiana Avenue
Deland, FL 32720-4612

Agency Representatives

Phil Rand, Park Manager
Tomoka Basin State Parks
2099 N. Beach Street
Ormond Beach, Florida 32174

Mike Abbott, Regional Biologist
Florida Fish and Wildlife Conservation Commission
Northeast Region
1239 S.W. 10th Street
Ocala, Florida 34474-2797

Represented by:
Alex Pries
Florida Fish and Wildlife Conservation Commission
Northeast Region
1239 S.W. 10th Street
Ocala, Florida 34474

Cathy Lowenstein
Forestry Resource Administrator
Florida Forest Service
5458 North Highway 17
De Leon Springs, Fl 32130

Paul Haydt, Program Manager
St. Johns River Water Management District
Northern Coastal Basins Program
4049 Reid Street
Palatka, Florida 32177

Mike Wisenbaker, Historic Preservationist
Florida Division of Historical Resources
500 South Bronough Street
Mail Station 8
Tallahassee, Florida 32399-0250

Alan Burton, Chair
Volusia Soil and Water Conservation District
101 Heaven's Gate Road, Suite F
Deland, Fl 32720

Matt Seay, Chair
Flagler County Soil and Water Conservation District
150 Sawgrass Road
Bunnell, Florida 32110

Deborah Shelley, Preserve Manager
Tomoka Marsh Aquatic Preserve
8300 West State Road 46
Sanford, Florida 32771

Represented by:
Gary Raulerson, Environmental Specialist
Tomoka Marsh Aquatic Preserve
8300 West State Road 46
Sanford, Florida 32771

Cultural Resource Representatives

Ms. Suzanne Heddy
Ormond Beach Historical Trust, Inc.
38 East Granada Boulevard
Ormond Beach, Florida 32176

Represented by:
Dan Smith
Ormond Beach Historical Society
9 Sunset Boulevard
Ormond Beach, Fl 32176

Environmental Organizations

Marjorie Byron
Volusia-Flagler Sierra Club
755 S. Dexter Ave.
Deland, Fl 32720

Paula Wehr, President
Halifax River Audubon
1229 Londonerry Cir
Ormond Beach, Fl 32174

Tourism Development Representative

Liz Grindell, Interim President
Daytona Beach Area Convention and Visitors Bureau
126 East Orange Ave.
Daytona Beach, Florida 32112-0910

User Group Representatives

Candace Hill
Halifax-St. Johns Chapter
Florida Trail Association
1390 Lodge Terrace
Deltona, Fl. 32738

Peter Blichfeldt, Commodore
Florida Sport Paddling Club
9226 McDavid Court
Windermere, FL 34786

Park Volunteer

Susan Jarosik
224 Vista Della Toscana
Ormond Beach, Florida 32174

Represented by:
Ann Collins
2249 Old Dixie Highway
Ormond Beach, Fl 32174

Adjacent Landowners

Parker Mynchenberg
1729 Ridgewood Ave.
Holly Hill, Florida 32117

Dave Robinson
27 Sycamore Circle
Ormond Beach, Florida 32174

The Advisory Group meeting to review the proposed land management plan for the Tomoka Basin State Parks was held at the recreation hall at Tomoka State Park on March 28, 2012 at 9:00 AM.

The Honorable Frank Bruno of the Volusia County Council was represented by Katrina Locke. The Honorable Alan Peterson of the Flagler County Board of County Commissioners was represented by Tim Telfer. Mike Abbott of the Florida Fish and Wildlife Conservation Commission was represented by Alex Pries. Deborah Shelley of the Tomoka Marsh Aquatic Preserve was represented by Gary Raulerson. Suzanne Heddy of the Ormond Beach Historical Society was represented by Dan Smith. Susan Jarosik was represented by Ann Collins. The Honorable Ed Kelley (City of Ormond Beach), Mike Wisenbaker (Florida Division of Historic Resources), Alan Burton (Volusia County Soil and Water Conservation District), Matt Seay (Flagler County Soil and Water Conservation District), Peter Blichfeldt (Florida Sport Paddling Club) and Dave Robinson (Adjacent Landowner) were not in attendance. All other appointed Advisory Group members were present. Attending staff were Robert Yero, Phil Rand, Beth Willett, John Kunzer, Joe Isaacs, Emily Wehr, Carol Detrick and Joe Blazina.

Mr. Blazina began the meeting by explaining the purpose of the Advisory Group and reviewing the meeting agenda. He provided a brief overview of the Division's planning process and summarized public comments received during the previous evening's public workshop. He then asked each member of the advisory group to express his or her comments on the plans.

Summary of Advisory Group Comments

Ms. Wehr (Halifax River Audubon) began her comments commending the plan for being extremely thorough with a lot of great information. She asked about the existing facilities in the plan, and whether the new "red trail" that was created by park volunteers in the plan. Ms. Wehr also asked about the interpretive programming listed in the plan, and commented that it would be helpful if there was a little more discussion on what programs were offered at the park. To conclude her comments, Ms. Wehr also provided written editorial revisions for the plan.

Ms. Hill (Florida Trail Association) began her comments complimenting the plan and Park Staff on their work managing the resources at the parks. She commended the plan for the detailed discussion on hydrology, adding that it is extremely important because hydrology is tied to everything within the Tomoka Basin. Ms. Hill discussed feral hogs in the region, commenting that they are capable of doing a lot of damage to the sensitive natural and cultural resources, and asked Park Staff what type of long range management actions are being taken. She concluded her comments stating that continuing to educate the public about feral hogs will be important for the

management, and commended Park Staff on their continued work treating the exotic plants and animals at the parks.

Mr. Raulerson (Tomoka Marsh Aquatic Preserve) commended Park Staff for their continued partnership with the Tomoka Marsh Aquatic Preserve, and appreciated the mentioning of the cooperative work between the Division of Recreation and Parks and Coastal and Aquatic Managed Areas. Mr. Raulerson began his comments stating that he understands there is a lot of research going on within the Tomoka Basin State Parks, but there isn't any mentioning of it in the plan. He provided comments for revisions to maps in the plan, for accuracy in managed lands boundaries and proper labels. Mr. Raulerson also discussed the visitation of the parks, and suggested showing past years' attendance to show the trends in visitation with the recent economic downturn. He continued his comments regarding invasive native aquatic plant species, mentioning that they should also be mentioned in the plan. To conclude her comments, Mr. Raulerson also provided written editorial revisions for the plan.

Ms. Byron (Volusia-Flagler Sierra Club) commended the plan for being very detailed and thorough, commenting that the plan looks well done. She concluded her comments in support of paving the park drive at Tomoka State Park, for easier access for cyclists.

Ms. Grindell (Daytona Beach Convention and Visitors Bureau) began her comments commending the staff that put all of the work into putting the unit management plan together. She continued her comments, adding that the Daytona Beach Convention and Visitors Bureau can provide a lot of support to the Tomoka Basin Parks, in the form of local community outreach, advertising and providing volunteer groups looking for work in the area.

Ms. Collins (Park Volunteer) commented that the plan looked very well put together, and added as an adjacent land owner on the Tomoka Basin, she would love to see a connection with the Ormond Scenic Loop and Trail (OSLT) continue up to Flagler County.

Mr. Mynchenburg (Adjacent Landowner) stated he has been a resident in the area for a lot of his life, and thoroughly enjoyed the information that was in the plan. He continued his comments, adding that as an adjacent landowner and design professional in the area, and has been involved with several developments of regional impact in the area. Mr. Mynchenburg offered additional information regarding the history of acquisitions and land ownership in the area that he would like to see it mentioned in the plan for reference and future plan updates. He concluded his comments, providing written comments for map revisions.

Mr. Telfer (Flagler County) began his comments complimenting the staff responsible for putting the plan together. He continued his comments, commending the objective planning level goals and objectives that are outlined in the plan, and said that it turned out excellent.

Ms. Lowenstein (Florida Forest Service) commended the plan for being well done and the staff time involved in putting it together. She suggested adding summary tables and additional mentioning of the reference map so that people unfamiliar with the park would be able to understand the discussions in the plan that refer to specific areas of the parks. Ms. Lowenstein continued her comments, adding that the natural communities section should be ordered by significance or acreage, commenting that it is slightly confusing right now. She continued her comments discussing the general management measures of the different natural communities, suggesting them to be more park specific. To conclude her comments, Ms. Lowenstein also provided written editorial revisions for the plan.

Ms. Locke (Volusia County) began her comments commending the plan on being very well written and easy to read, adding that there is a lot of great information included. Ms. Locke concluded her comments discussing the reference map, mentioning that she found herself flipping back and forth frequently to figure out where the discussions in the plan were referring to. She suggested ensuring that references are consistent throughout the plan, and to make sure that everything mentioned in the plan is mentioned on the reference map.

Summary of Written Comments

Mr. Wisenbaker (Division of Historic Resources) commended staff on doing an exceptional job putting the plan together for the Tomoka Basin State Parks. He discussed the significance of the Tomoka Basin, and noted that the cultural resources found at the parks are highly significant. He continued his comments, commending Park Staff for their continued stabilization work on archaeological sites and historic structures at the parks. He encouraged Division Staff to move forward with nominating Tomoka State Park to the National Register of Historic Places. Mr. Wisenbaker concluded his comments suggesting Park Staff to always have more than one certified archaeological monitor on staff at the Tomoka Basin State Parks, due to the amount and complexity of historic resources found at the Parks.

Mr. Pries (Florida Fish and Wildlife Conservation Commission) provided comments regarding the natural communities discussion in the plan, and made suggestions for revisions in the descriptions and management of mesic flatwoods, pine scrub, xeric hammock and salt marsh. Mr. Pries made recommendations for the imperiled species section of the plan, including removing the discussion in the plan regarding the Florida Panther, and adding discussion regarding the Florida Black Bear due to the parks'

proximity to the Ocala National Forest. He continued his imperiled species discussion, adding that Park Staff should work with FFWCC to conduct wading bird monitoring, and to be mindful of any management actions that may be in or near large wading bird colonies at the parks. Mr. Pries concluded his comments by recommending Park Staff also monitor the Painted Bunting at the parks; utilizing FFWCC's monitoring protocols that have already been developed.

Mr. Haydt (St. Johns River Water Management District) commended the management plan update for being well put together and thorough. He submitted written comments regarding arthropod control and saltmarsh restoration techniques.

Staff Recommendations

The staff recommends approval of the proposed management plans for the Tomoka Basin State Parks as presented, with the following changes:

Division staff will revise the resource management component to include park specific management measures, and revisions to the imperiled species inventory and management objectives.

The land use component will include language regarding bear proofing trash cans at the parks due to proximity of the Tomoka Basin to the Ocala National Forest. Division staff will continue to work to protect the boundaries of all park lands to manage access.

Minor cartographic, typographical and grammatical changes and corrections were also completed as a result of the public workshop and Advisory Group review.

Notes on Composition of the Advisory Group

Florida Statutes Chapter 259.032 Paragraph 10(b) establishes a requirement that all state land management plans for properties greater than 160 acres will be reviewed by an advisory group:

"Individual management plans required by s. 253.034(5), for parcels over 160 acres, shall be developed with input from an advisory group. Members of this advisory group shall include, at a minimum, representatives of the lead land managing agency, co-managing entities, local private property owners, the appropriate soil and water conservation district, a local conservation organization, and a local elected official."

Advisory groups that are composed in compliance with these requirements complete the review of State park management plans. Additional members may be appointed to

the groups, such as a representative of the park's Citizen Support Organization (if one exists), representatives of the recreational activities that exist in or are planned for the park, or representatives of any agency with an ownership interest in the property. Special issues or conditions that require a broader representation for adequate review of the management plan may require the appointment of additional members. The Division's intent in making these appointments is to create a group that represents a balanced cross-section of the park's stakeholders. Decisions on appointments are made on a case-by-case basis by Division of Recreation and Parks staff.

Addendum 3—References Cited

Ames, B. 1959. Drawings of Florida orchids with explanatory notes by Oakes Ames. Second Edition. Botanical Museum of Harvard University, Cambridge, Massachusetts.

Bermes, B.J., G.W. Leve, and G.R. Tarver. 1963. Geology and ground water resources of Flagler, Putnam and St. Johns Counties, Florida. Report of Investigations No. 32. Florida Geological Survey, Tallahassee, Florida.

Bowman, C. 2000. The Tomoka History Center at the Fred Dana Marsh Museum. Conceptual design prepared for Tomoka Basin Geopark, Ormond Beach, Florida.

Camp, Dresser & McKee. 1995. Volusia County, Tomoka River watershed management plan. Report prepared for the County Council, Volusia County, Florida.

Carr, A. F., Jr., and C. J. Goin. 1942. Rehabilitation of *Natrix sipedon taeniata* Cope. Proc. New England Zool. Club 21:47-54.

Cooke, C.W. 1945. Geology of Florida. Bulletin No. 29. Florida Geological Survey Tallahassee, Florida.

Cope, E.D. 1895. On some new North American snakes, *Natrix compressicauda taeniata* subsp. nov. American Naturalist 29:676-680.

Daniel, R., D., Ferro, and F. Sicius. 1980. An archaeological and historical survey of the proposed Halifax Plantation Development, Volusia and Flagler Counties, Florida. Prepared for Bellemead Development Corporation by the Bureau of Historic Sites and Properties, Florida Division of Archives, History, and Records Management, Department of State, Tallahassee, Florida.

Daniel, R. and J. Haviser. 1979. Florida Master Site File report, Tomoka State Park mounds, Volusia County. Bureau of Archaeological Research, Division of Historical Resources, Tallahassee, Florida.

Douglass, A. E. 1881-1185. Florida diaries. Unpublished manuscript on file, Library of Florida History, Gainesville, Florida.

Florida Department of Environmental Protection. 2011. Florida State Park System Economic Impact Assessment for Fiscal Year 2010/2011. Tallahassee, Florida.

Florida Department of Natural Resources. 1991. Tomoka State Park unit management plan. Report on file. Division of Recreation and Parks, Tallahassee, Florida.

Florida Department of State. Florida Master Site Files: 8FL7, 8FL17, 8FL18, 8FL19, 8FL20, 8VO63, 8VO81, 8VO82, 8VO193, 8VO241, 8VO244, 8VO245, 8VO246, 8VO248, 8VO249, 8VO250, 8VO251, 8VO252, 8VO257, 8VO258, 8VO639, 8VO2571, 8VO2588, 8VO3453, 8VO4310, 8VO4366, 8VO5270, 8VO5271, 8VO5272, and 8VO7072. Bureau of Archaeological Research, Division of Historical Resources, Tallahassee, Florida.

Florida Exotic Pest Plant Council. 2009. List of invasive species.

Gannon, M. 1996. The new history of Florida. University Press of Florida, Gainesville Florida.

Gluckman, S. J. and H. A. Baker. 1967. Archaeological investigations at Bulow Plantation Ruins State Park: a preliminary report. Florida Division of Archives, History, and Records Management, Bureau of Historic Sites and Properties, Miscellaneous Project Report Series 52, Tallahassee, Florida.

Griffin, J.W. 1952. The Addison Blockhouse. The Florida Historical Quarterly 30(3): 276-293.

Griffin, J. W. 1952. Bulow house ruins. Unpublished drawings on file, St. Augustine Historical Society, St. Augustine, Florida.

Griffin, J. W. and H. G. Smith. 1949. Nocoroco, a Timucua village of 1605 now in Tomoka State Park. Florida Historical Quarterly 27:340-361.

Gomberg, D. N. 1981. Water resources and available groundwater at Halifax Plantation, Volusia and Flagler Counties, Florida. Prepared for Bellemead Development Corporation, Daytona Beach, Florida.

Gomberg, D. N., 1985. Hydrogeology and water sources at National Gardens, Volusia County, Florida. Prepared for National Gardens Trust DRI, Requested Supplemental Information, June 1986, East Central Florida Regional Planning Council.

Humphrey, S.R. (ed.). 1992. Rare and endangered biota of Florida, Volume I. Mammals. University Presses of Florida, Gainesville, Florida.

Knochenmus, D. D. 1968. Surface drainage characteristics in Volusia County, Florida. U. S. Geological Survey in cooperation with the Division of Geology, Florida Board of Conservation, Tallahassee, Florida.

Marois, K. 1999. June 1999 tracking list of rare, threatened, and endangered plants and animals and natural communities of Florida. Florida Natural Areas Inventory Tallahassee, Florida.

Milanich, J. T. 1995. Florida Indians and the invasion from Europe. University Press of Florida, Gainesville, Florida.

Miller, J.D. 2004. Status and trends of water quality in the Northern Coastal Basin. SJRWMD….Palatka, Florida.

Myers, R. L. and J.J. Ewel (eds.). 1990. Ecosystems of Florida. University of Central Florida Press, Orlando, Florida.

National Oceanic and Atmospheric Administration. 1996. NOAA's estuarine eutrophication survey. Vol. 1: South Atlantic region. Office of Ocean Resources Conservation Assessment. Silver Spring, MD.

Norman, E.M. 1976. An analysis of vegetation at Turtle Mound. Florida Scientist 39(1): 19-31.

Norman, E.M. and S.A. Hawley. 1995. An analysis of the vegetation at Turtle Mound, Volusia County, Florida: twenty years later. Florida Scientist 58(3): 258-269.

Paperno, R. 1998. Ichthyfaunal survey of the Halifax River, Volusia County, Florida. Final report (FC119). Florida Marine Research Institute, Florida Department of Environmental Protection, Tallahassee, Florida.

Payne, T. M. 1996a. Investigations at the Moultrie/Bunch/Dummett plantations of the British through Territorial periods: a preliminary report. Paper presented at the 48th annual meeting of the Florida Anthropological Society, Sarasota, Florida.

Payne, T. M. 1996b. Limited archaeological investigations at 8VO244 to establish a construction date for Structure 1; Bulow Creek State Park, Volusia County, Florida. Report prepared for the Florida Department of State, Bureau of Archaeological Research by American Preservation Consultants, Inc., St. Augustine, Florida.

Payne, T. M. 1997. Preliminary investigations to locate Mount Oswald: A British Period plantation settlement in Tomoka State Park, Volusia County, Florida. Report on file. Division of Recreation and Parks, Florida Department of Environmental Protection, Tallahassee.

Payne, T. M. 1998. Some insights into the lifeways of the owners and workers while residing at the Bunch and later Dummett plantations on Tomoka Basin during the early nineteenth century. Paper presented at the 48th annual meeting of the Florida Anthropological Society, Sarasota, Florida.

Payne, T. M. 1999. Preliminary archaeological investigations at the Moultrie/Bunch/Dummett British through Territorial-period plantations. The Florida Anthropologist 52(1-2): 103-113.

Phelps, G.G. 1990. Geology, hydrology, and water quality of the surficial aquifer system in Volusia County, Florida. Water Resources Investigations Report 90-4069. U.S. Geological Survey, Tallahassee, Florida.

Piatek, B.J. 1992. The Tomoka Point archaeological survey. Report on file, Division of Recreation and Parks, Florida Department of Natural Resources, Tallahassee, Florida.

Piatek, B.J. 1995. Tomoka archaeological survey II, Tomoka Basin Geopark, Volusia County, Florida. Report on file, Florida Department of Environmental Protection, Tallahassee, Florida.

Puri, H.S., and Vernon, R.O. 1964. Summary of the geology of Florida and a guidebook to the classic exposures. Special Publication 5. Florida Geological Survey, Tallahassee, Florida.

Rodgers, J.A., K.D. Meyer, and B.A. Millsap. 2008. *The Biological Status Report for the Peregrine Falcon (Falco peregrinus)*. Florida Fish and Wildlife Conservation Commission Report.

Russo, M. and D. Ste. Claire. 1992. Tomoka Stone: Archaic Period coastal settlement in
East Florida. The Florida Anthropologist 45(4): 336-346.

Scott, T.M. 1979. Environmental geology series, Daytona Beach sheet. Bureau of Geology Map Series 93. Florida Department of Natural Resources, Tallahassee Florida.

Scott, T. M. 1992a. Geologic map of Flagler County, Florida. P.G.# 99, Florida Geological Survey, Florida Department of Natural Resources, Tallahassee Florida.

Scott, T.M., 1992b. Geologic map of Volusia County, Florida. Florida Geological Survey, Tallahassee, Florida.

Southarc, Inc, 2001. Sugar Plantation Heritage Tourism Plan: Task 1; Structural Stabilization Study, June 2001. On file at Administration Offices, Tomoka Basin State Parks, Ormond Beach, FL.

Subsurface Detection Investigations, Inc. 1994. Time domain electromagnetic mapping of salt water in the Floridan Aquifer in northeast and east central Florida. Prepared for St. Johns River Water Management District, Palatka, Florida.

U.S. Department of Agriculture. 1980. Soil Survey of Volusia County, Florida.

U.S. Department of the Interior. 1993. Recovery plan for the Atlantic salt marsh snake, *Nerodia clarkii taeniata*.

U.S. Fish and Wildlife Service, Southeast Region, Atlanta, Georgia U.S. Fish and Wildlife Service. 1995. Florida manatee recovery plan, *Trichechus manatus latirostris*, second revision. Prepared by the Manatee Recovery Team for Southeast Region, U.S. Fish and Wildlife Service, Atlanta, Georgia.

U.S. Geological Survey (1993) in cooperation with the Division of Geology, Florida Board of Conservation, Tallahassee, Florida.

Vergara, P.G. (ed.). 1998. Water supply assessment, 1998. Technical Publication SJ98-2. St. Johns River Water Management District, Palatka, Florida.

Volusia County. Volusia County manatee protection plan, draft six (5/2000). Prepared by Volusia County Environmental Management Services, Deland, Florida.

Woodward-Clyde Consultants. 1994. Biological resources of the Indian River Lagoon. Final technical report (vol.2). Prepared for the Indian River National Estuary Program, Melbourne, Florida.

Wunderlin, R.P. 1998. Guide to the vascular plants of Florida. University Presses of Florida, Tampa, Florida.

Addendum 4—Soil Descriptions

(69) Tuscawilla fine sand – This nearly level, poorly drained soil is in hammock forests near the coast. Tuscawilla soils are formed in sandy and loamy marine sediments containing shells and shell fragments. The water table is within a depth of 10 inches for 2 to 6 months in most years. Depressional areas of Tuscawilla soils may flood during the wet season. Natural fertility is medium, and the organic matter content is low.

The following soil types for Bulow Creek State Park are in Flagler County and Volusia County. Each county has a separate soil survey comprising a set of soil types identified by numerical symbols on the county soil maps. In the following list, a letter is added to the numerical symbol to identify the source of the soil description: V is for the Soil Survey of Volusia County; F is for the Soil Survey of Flagler County.

(4V) Astatula fine sand, 0 to 8 percent slopes – Astatula series are excessively drained sandy soils. They occur on sand ridges and moderate slopes. This map unit is comprised of layers of fine sand to 95 inches depth. The water table is always below 80 inches and permeability is very rapid. Astatula find sand is in hydrologic group A with a high infiltration rate and low runoff potential. The soil pH is acidic. Natural fertility and organic matter content are very low.

(8V) Basinger fine sand, depressional - This is a poorly drained soil found in depressions and poorly defined drainageways which are flooded seasonally. Basinger soils are deep sands in hydrological group A/D. In its natural state, the water table may rise to 2 feet above the surface during the wet season and produce runoff to local drainages (group D). If water levels are controlled, the fine sand surface layers have very rapid permeability (group A). Natural fertility and organic content are low.

(11V) Bulow sand, 0 to 5 percent slopes – Soils in the Bulow series are found on low sand ridges underlain by layers of coquina rock. The surface layers comprise several feet of sand. Coquina is found at a depth of 40 to 70 inches below the surface, the rock layer varying in thickness from 2 to 10 feet. The water table is below 72 inches. Bulow sand is in hydrologic group A. Water and air move rapidly through this soil. Natural fertility and organic matter content are low.

(13V, 27F) Cassia fine sand – This is a somewhat poorly drained soil that occurs on nearly level to gentle slopes on elevated positions in the flatwoods. The soil profile is comprised of surface layers of gray-white fine sand over a dark spodic horizon (hardpan) at 28-36 inches. The substratum is fine sand to a depth of 80 inches. The water table is between depths of 15 and 40 inches for about 6 months for most years; it recedes to below 40 inches in dry seasons. The Cassia fine sand is in hydrologic group C, having a slow infiltration rate due to the seasonal high water table and reduced permeability in the hardpan layer. The soil reaction is acidic. Natural fertility and organic matter content are very low.

(15F) Pomello fine sand, 0 to 5 percent slopes – Pomello soils consist of deep sands that occur on ridges and knolls in flatwoods. They are moderately well drained and are in hydrologic group C. The seasonal high water table is 24- 42 inches below the surface. All horizons of Pomello soils are acidic in reaction, and natural fertility is low.

(15V) Cocoa sand, 0 to 5 percent slopes – Cocoa sand is found on narrow, elongated ridges parallel to the Atlantic coast. The surface layers are sand textured. Deposits of coquina limestone occur at a depth of about 30 inches; they are 2 to 10 feet thick. Cocoa sand is in hydrologic group A. Infiltration is rapid; permeability is very rapid in the coquina limestone layer. The water table is below 80 inches.

(17V) Daytona sand, 0 to 5 percent slopes – Daytona soils are moderately drained sands on nearly level to gentle slopes on elevated rises in the flatwoods. The soil profile is comprised of sand layers to a depth of 80 inches. The water table is commonly at a depth of 40 to 50 inches for 1 to 4 months during the wet season and it 72 inches or more during the drier part of the year. Permeability is very rapid in the surface layer and moderately rapid in the subsoil. Daytona sand is in hydrologic group B. Natural fertility and organic matter content are low.

(20v) Eau Gallie fine sand – This nearly level, poorly drained soil is found in lower areas of flatwoods. It is comprised of a black and gray surface sands above a spodic horizon (hardpan) with variable amounts of clay. The water table fluctuates within 10 inches of the surface for periods of 1 to 4 months in most years and is within 40 inches for more than 6 months. Permeability is rapid in surface sands, and moderately rapid in subsoil horizons. EauGallie fine sand is in hydrologic group D. Natural fertility and organic matter content are low.

(29V, 13F) Immokalee fine sand – These are poorly drained sandy soils of the flatwoods. Immokalee soils have surface layers of black-light gray sand above a spodic horizon (hardpan) at 30-50 inches. The water table is within 10 inches of the surface for 1 to 2 months and between 10 and 40 inches for over 6 months of the year. In very wet seasons, Immokalee soils may flood for a few days. Permeability is rapid in the surface sand layers (6 –20inches/hour) and moderately rapid (.6 –2.0 inches/hour) in spodic horizons. Immokalee fine sand is hydrologic group D due to the seasonal high water table. Natural fertility and the organic matter content are low.

(32V) Myakka fine sand – The Myakka series are poorly drained soils of the flatwoods. Myakka fine sand consists of layers of fine sand to a depth of about 80 inches with a spodic horizon (hardpan) at 30-50 inches below the surface. The water table is within 12 inches of the surface from June to November and commonly within 40 inches of the surface the rest of the year except during extended droughts. Permeability is rapid in surface layers, but moderate in the subsoil due to an accumulation of humus and/or clay in the spodic horizon, which forms the hardpan layer. Myakka fine sand is in hydrologic Group D. Infiltration is impeded by the seasonal high table, and runoff is slow due to the flat topography. The organic matter content and natural fertility are low.

(33V) Myakka fine sand, depressional – This soil unit is a variant of Myakka fine sand that occurs in shallow depressions, 12 to 18 inches deep, in flatwoods terraces. These soils are ponded for 6 to 9 months in most years. There is a hardpan layer about 25 inches below the surface. The hardpan layer and high water table impede downward movement of soil water. Myakka depressional sands are in hydrologic group D. Organic matter content and natural fertility are low.

(36f) Bimini sand – Bimini sand is a somewhat poorly drained soil found on low coast-parallel ridges. Bimini sand has a surface layer of sand and loamy subsoil. The seasonal high water table ranges from 18-42 inches below the surface in most years. Permeability is slow due to the clay layers in the subsoil. Bimini sand is in hydrologic group C with a slow infiltration rate. The surface sands are acidic, the lower horizons are neutral-alkaline. The natural fertility is very low.

(37V, 20F) Orsino fine sand, 0 to 5 percent slopes – Orsino soils are moderately well drained sands that occur on low ridges and gentle slopes. The water table is 40 to 60 inches below the soil surface in wet seasons. It recedes to below 60 inches in dry seasons. Orsino fine sand is in hydrologic group A. They have a high infiltration rate and permeability is very rapid, >20inches/hour. The organic matter content and natural fertility are very low.

(42V) Paola fine sand, 0 to 8 percent slopes – This is an excessively drained, nearly level to sloping sandy soil. The water table is below a depth of 72 inches. Permeability is very rapid in Paola soils which are in hydrologic group A. The organic matter content and natural fertility are very low.

(47V) Pinellas fine sand - Pinellas sands are nearly level, poorly drained soils. The surface layer is black fine sand; the subsurface layers are sand with accumulations of carbonate with an alkaline pH. The hydrologic group is B/D. In its natural state, Pinellas soils support flatwoods vegetation with cabbage palms which are associated with calcareous subsoil. The water table is close to the surface, but not ponded during the wet season (group D). With management, Pinellas fine sand can be maintained as group B soils, with moderately rapid permeability, for pasture and range.

(60V) Smyrna fine sand - This is a poorly drained, nearly level sandy soil. The surface and subsurface layers are sand-fine sand with an acidic pH. It is in hydrologic group A/D. In its natural state, Smyrna sands support flatwoods with a high water table within 10 inches of the surface during the wet season (group D). With artificial drainage, the sandy soils are moderately permeable (group B) and can be managed for improved pasture and vegetable crops.

(61V) St. Johns fine sand - This is a poorly drained, nearly level sandy soil. The surface and subsurface layers are sand-fine sand with an acidic pH. It is in

hydrologic group B/D. In its natural state, St. Johns soil supports flatwoods vegetation with pond pine and loblolly bay in lower areas. The water table is within 10 inches for 2 to 6 months and may rise to the surface in the rainy season (group D). With water control (group B), St. Johns fine sand can be managed for improved pasture and slash pine plantations.

(63V) Tavares fine sand, 0 to 5 percent slopes – Tavares soils are moderately well drained sandy soils. The surface layer is dark gray sand about 8 inches thick. The subsoil consists of deep sand and fine sand layers to a depth of 80 inches or more. The water table is between 40 and 60 below ground inches during wet seasons. Permeability is very rapid; Tavares soils are in hydrologic group A. Natural fertility and the organic matter content are low.

(67V) Turnbull muck – Turnbull muck is a poorly drained organic soil in tidal marshes subject to flooding by brackish water. The surface layer is dark gray muck over a thick layer (to 36 inches) of dark greenish gray clay. Below this "gumbo clay" as it is locally called, there are sand and shell estuarine deposits. Turnbull muck is in hydrologic group D; the soils are always waterlogged and permeability is very slow in the clay subsoil.

(69V, 37F) Tuscawilla fine sand – This nearly level, poorly drained soil is in hammock forests near the coast. Tuscawilla soils are formed in sandy and loamy marine sediments containing shells and shell fragments. The water table is within a depth of 10 inches for 2 to 6 months in most years. Depressional areas of Tuscawilla soils may flood during the wet season. Natural fertility is medium, and the organic matter content is low.

(13) Immokalee fine sand – These are poorly drained sandy soils of the flatwoods. Immokalee soils have surface layers of black-light gray sand above a spodic horizon (hardpan) at 30-50 inches. The water table is within 10 inches of the surface for 1 to 2 months and between 10 and 40 inches for over 6 months of the year. In very wet seasons, Immokalee soils may flood for a few days. Permeability is rapid in the surface sand layers (6 –20inches/hour) and moderately rapid (.6 –2.0 inches/hour) in spodic horizons. Immokalee fine sand is hydrologic group D due to the seasonal high water table. Natural fertility and the organic matter content are low.

(26) Turnbull and Pellicer soils, tidal – This soil unit is found in the tidal marshes of upper Bulow Creek in Flagler County. These marshes are contiguous with wetlands along lower Bulow Creek in Volusia County which are mapped as 67V, Turnbull muck.
Turnbull muck is a poorly drained organic soil in tidal marshes subject to flooding by brackish water. The surface layer is dark gray muck over a thick layer (to 36 inches) of dark greenish gray clay. Below this "gumbo clay" as it is locally called, there are sand and shell estuarine deposits. Turnbull muck is in hydrologic group D; the soils are always waterlogged and permeability is very slow in the clay subsoil.

(27) Cassia fine sand – This is a somewhat poorly drained soil that occurs on nearly level to gentle slopes on elevated positions in the flatwoods. The soil profile is comprised of surface layers of gray-white fine sand over a dark spodic horizon (hardpan) at 28-36 inches. The substratum is fine sand to a depth of 80 inches. The water table is between depths of 15 and 40 inches for about 6 months for most years; it recedes to below 40 inches in dry seasons. The Cassia fine sand is in hydrologic group C, having a slow infiltration rate due to the seasonal high water table and reduced permeability in the hardpan layer. The soil reaction is acidic. Natural fertility and organic matter content are very low.

(36) Bimini sand – Bimini sand is a somewhat poorly drained soil found on low coast-parallel ridges. Bimini sand has a surface layer of sand and loamy subsoil. The seasonal high water table ranges from 18-42 inches below the surface in most years. Permeability is slow due to the clay layers in the subsoil. Bimini sand is in hydrologic group C with a slow infiltration rate. The surface sands are acidic, the lower horizons are neutral-alkaline. The natural fertility is very low.

(37) Tuscawilla fine sand – This nearly level, poorly drained soil is in hammock forests near the coast. Tuscawilla soils are formed in sandy and loamy marine sediments containing shells and shell fragments. The water table is within a depth of 10 inches for 2 to 6 months in most years. Depressional areas of Tuscawilla soils may flood during the wet season. Natural fertility is medium, and the organic matter content is low.

(4) Astatula fine sand, 0 to 8 percent slopes – Astatula series are excessively drained sandy soils. They occur on sand ridges and moderate slopes. This map unit is comprised of layers of fine sand to 95 inches depth. The water table is always below 80 inches and permeability is very rapid. Astatula find sand is in hydrologic group A with a high infiltration rate and low runoff potential. The soil pH is acidic. Natural fertility and organic matter content are very low.

(8) Bassinger fine sand, depressional – These are poorly drained sandy soils in wet flatwoods. The surface layer is gray fine sand about 5 inches thick. The underlying soil is sand to a depth of more than 80 inches. The water table is above the surface for several months in most years. Undrained Bassinger sands are in hydrologic group D. Permeability is very rapid under low water table conditions or with drainage systems. Natural fertility and organic matter content are low.

(11) Bulow sand, 0 to 5 percent slopes – Soils in the Bulow series are found on low sand ridges underlain by layers of coquina rock. The surface layers comprise several feet of sand. Coquina is found at a depth of 40 to 70 inches below the surface, the rock layer varying in thickness from 2 to 10 feet. The water table is below 72 inches. Bulow sand is in hydrologic group A. Water and air move rapidly through this soil. Natural fertility and organic matter content are low.

(13) Cassia fine sand – This is a somewhat poorly drained soil that occurs on nearly level to gentle slopes on elevated positions in the flatwoods. The soil profile is comprised of surface layers of gray-white fine sand over a dark spodic horizon (hardpan) at 28-36 inches. The substratum is fine sand to a depth of 80 inches. The water table is between depths of 15 and 40 inches for about 6 months for most years; it recedes to below 40 inches in dry seasons. The Cassia fine sand is in hydrologic group C, having a slow infiltration rate due to the seasonal high water table and reduced permeability in the hardpan layer. The soil reaction is acidic. Natural fertility and organic matter content are very low.

(17) Daytona sand, 0 to 5 percent slopes – Daytona soils are moderately drained sands on nearly level to gentle slopes on elevated rises in the flatwoods. The soil profile is comprised of sand layers to a depth of 80 inches. The water table is commonly at a depth of 40 to 50 inches for 1 to 4 months during the wet season and it 72 inches or more during the drier part of the year. Permeability is very rapid in the surface layer and moderately rapid in the subsoil. Daytona sand is in hydrologic group B. Natural fertility and organic matter content are low.

(20) Eau Gallie fine sand – This nearly level, poorly drained soil is found in lower areas of flatwoods. It is comprised of a black and gray surface sands above a spodic horizon (hardpan) with variable amounts of clay. The water table fluctuates within 10 inches of the surface for periods of 1 to 4 months in most years and is within 40 inches for more than 6 months. Permeability is rapid in surface sands, and

moderately rapid in subsoil horizons. EauGallie fine sand is in hydrologic group D. Natural fertility and organic matter content are low.

(22) Electra fine sand. 0 to 5 percent slopes – Electra soils are comprised of surface layers of fine sand over a clay loam subsoil about 35 inches. This map unit is found in slightly evaluated areas of flatwoods. The water table is depth of 20 to 40 inches for about 4 months during most years; it recedes below 40 inches during drier periods. Internal drainage is poor due to slow permeability in clay loam horizons. Electra fine sand is in hydrologic group C, indicating a slow infiltration rate. The organic matter content and natural fertility are low.

(25) Gator muck – This is an organic soil in freshwater swamp that is saturated or flooded for most of the year. The surface layer is black muck, about 34 inches thick, above a stratified subsoil of loam and fine sand layers. Internal drainage is slow. Gator muck is in hydrologic group D with very slow infiltration rate due to the high water table and clay content of the subsoil. The organic matter content is high, 55-80%, and natural fertility is moderate.

(29) Immokalee fine sand – These are poorly drained sandy soils of the flatwoods. Immokalee soils have surface layers of black-light gray sand above a spodic horizon (hardpan) at 30-50 inches. The water table is within 10 inches of the surface for 1 to 2 months and between 10 and 40 inches for over 6 months of the year. In very wet seasons, Immokalee soils may flood for a few days. Permeability is rapid in the surface sand layers (6 –20inches/hour) and moderately rapid (.6 –2.0 inches/hour) in spodic horizons. Immokalee fine sand is hydrologic group D due to the seasonal high water table. Natural fertility and the organic matter content are low.

(32) Myakka fine sand – The Myakka series are poorly drained soils of the flatwoods. Myakka fine sand consists of layers of fine sand to a depth of about 80 inches with a spodic horizon (hardpan) at 30-50 inches below the surface. The water table is within 12 inches of the surface from June to November and commonly within 40 inches of the surface the rest of the year except during extended droughts. Permeability is rapid in surface layers, but moderate in the subsoil due to an accumulation of humus and/or clay in the spodic horizon, which forms the hardpan layer. Myakka fine sand is in hydrologic Group D. Infiltration is impeded by the seasonal high table, and runoff is slow due to the flat topography. The organic matter content and natural fertility are low.

(36) Myakka Variant fine sand (36) – Myakka Variant soils are poorly drained sands on gentle rises in flatwoods. They consist of the layers of fine sand with a spodic horizon (hardpan) over basal layers of sand and shell about 45 inches below the surface. The water table fluctuates to within 10 inches of the surface in the rainy season. Myakka Variant fine sand is in hydrologic group D. The upper sand layers,

including the spodic horizon are acidic in reaction (pH), whereas the basal layers of the sand and shell are neutral alkaline in reaction

(37) Orsino fine sand, 0 to 5 percent slopes – Orsino soils are moderately well drained sands that occur on low ridges and gentle slopes. The water table is 40 to 60 inches below the soil surface in wet seasons. It recedes to below 60 inches in dry seasons. Orsino fine sand is in hydrologic group A. They have a high infiltration rate and permeability is very rapid, >20inches/hour. The organic matter content and natural fertility are very low.

(64) Tequesta muck – Tequesta muck is a poorly drained organic soil of freshwater marshes and swamps. The surface layer has about 12 inches of black muck over gray sand and loam subsoil. A mineral layer of mixed sand and shell is found 35-70 inches below the surface. Tequesta muck is in hydrological group D. These organic soils are seasonally flooded; internal drainage is impeded by a high water table within 10 inches of the surface for 6 to 9 months in most years.

(67) Turnbull muck – Turnbull muck is a poorly drained organic soil in tidal marshes subject to flooding by brackish water. The surface layer is dark gray muck over a thick layer (to 36 inches) of dark greenish gray clay. Below this "gumbo clay" as it is locally called, there are sand and shell estuarine deposits. Turnbull muck is in hydrologic group D; the soils are always waterlogged and permeability is very slow in the clay subsoil.

(68) Turnbull Variant sand – This man-made soil consists of dredge material from coastal waterways and tidal marshes. The surface layers are mixed sand and shells, about 42 inches thick, over organic muck and clayey and sandy sediments. The water table is at a depth of about 40 inches, or to the base of the sand-shell overburden. Permeability is very rapid in the sand-shell surface deposits, and slow in the underlying clay layers. Turnbull Variant sand is in hydrologic group C. Natural fertility and organic matter are very low in the sand-shell surface deposits.

(69) Tuscawilla fine sand – This nearly level, poorly drained soil is in hammock forests near the coast. Tuscawilla soils are formed in sandy and loamy marine sediments containing shells and shell fragments. The water table is within a depth of 10 inches for 2 to 6 months in most years. Depressional areas of Tuscawilla soils may flood during the wet season. Natural fertility is medium, and the organic matter content is low.

Addendum 5—Plant And Animal List

Common Name	*Scientific Name*	Primary Habitat Codes (for imperiled species)

PTERIDOPHYTES

Giant leather fern	*Acrostichum danaeifolium*	
Toothed spleenwort	*Asplenium dentatum*	MEH
Eared spleenwort	*Asplenium erosum*	SSL
Bicolored spleenwort	*Asplenium heterochroum*	
Ebony spleenwort	*Asplenium platyneruon*	
Mosquito fern	*Azolla filiculoides*	
Swamp fern	*Blechnum serrulatum*	
Southern grape-fern	*Botrychium biternatum*	
Watersprite*	*Ceratopteris thalictroides*	
Japanese netvein holly fern*	*Cyrtomium falcatum*	
Southern wood fern	*Dryopteris ludoviciana*	
Japanese climbing fern*	*Lygodium japonicum*	
Old world climbing fern*	*Lygodium microphyllum*	
Mariana maiden fern*	*Macrothelypteris torresiana*	
Asian sword fern*	*Nephrolepis brownii*	
Tuberous sword fern*	*Nephrolepis cordifolia*	
Stalked adder's-tongue	*Ophioglossum petiolatum*	
Cinnamon fern	*Osmunda cinnamomea*	HH, WF
Royal fern	*Osmunda regalis* var. *spectabilis*	HH, WF
Widespread polypody	*Pecluma dispersa*	UHF
Plume polypody	*Pecluma plumula*	MEH, UHF
Comb polypody	*Pecluma ptilodon* var. *bourgeauana*	MEH
Golden polypody	*Phlebodium aureum*	
Resurrection fern	*Pleopeltis polypodioides* var. *michauxiana*	
Whisk-fern	*Psilotum nudum*	
Tailed bracken	*Pteridium aquilinum* var. *pseudocaudatum*	
Giant brake*	*Pteris tripartita*	
Chinese ladder brake*	*Pteris vittata*	
Water spangles*	*Salvinia minima*	
Hairy maiden fern	*Thelypteris hispidula* var. *versicolor*	
Willdenow's fern	*Thelypteris interrupta*	
Widespread maiden fern	*Thelypteris kunthii*	
Ovate marsh fern	*Thelypteris ovata*	
Marsh fern	*Thelypteris palustris* var. *pubescens*	
Shoestring fern	*Vittaria lineata*	
Netted chain fern	*Woodwardia areolata*	
Virginia chain fern	*Woodwardia virginica*	

GYMNOSPERMS

* Non-Native Species

Common Name	*Scientific Name*	Primary Habitat Codes (for imperiled species)
Southern redcedar	*Juniperus virginiana*	
Sand pine	*Pinus clausa*	
Slash pine	*Pinus elliottii*	
Loblolly pine	*Pinus taeda*	
Bald cypress	*Taxodium distichum*	
Coontie	*Zamia pumila*	MF, SC, SCF, UHF

ANGIOSPERMS

MONOCOTS

Blue maidencane	*Amphicarpum muhlenbergianum*
Florida bluestem	*Andropogon floridanus*
Purple bluestem	*Andropogon glomeratus* var. *glaucopsis*
Bushy bluestem	*Andropogon glomeratus* var. *hirsutior*
Bushy bluestem	*Andropogon glomeratus* var. *pumilus*
Elliott's bluestem	*Andropogon gyrans*
Splitbeard bluestem	*Andropogon ternarius*
Broomsedge bluestem	*Andropogon virginicus* var. *decipiens*
Broomsedge bluestem	*Andropogon virginicus*
Chalky bluestem	*Andropogon virginicus* var. *glaucus*
Nodding nixie	*Apteria aphylla*
Greendragon	*Arisaema dracontium*
Jack-in-the-pulpit	*Arisaema triphyllum*
Big threeawn	*Aristida condensata*
Corkscrew threeawn	*Aristida gyrans*
Woolysheath threeawn	*Aristida lanosa*
Red threeawn	*Aristida longespica* var. *geniculata*
Arrowfeather threeawn	*Aristida purpurascens*
Hillsboro threeawn	*Aristida purpurascens* var. *tenuispica*
Arrowfeather threeawn	*Aristida purpurascens* var. *virgata*
Bottlebrush threeawn	*Aristida spiciformis*
Switchcane	*Arundinaria gigantea*
Sprenger's asparagus-fern*	*Asparagus aethiopicus*
Common asparagus-fern*	*Asparagus setaceus*
Common carpetgrass	*Axonopus fissifolius*
Big carpetgrass	*Axonopus furcatus*
Hedge bamboo*	*Bambusa multiplex*
Pinguin*	*Bromelia pinguin*
Watergrass*	*Bulbostylis barbata*
Capillary hairsedge	*Bulbostylis ciliatifolia*
Sandyfield hairsedge	*Bulbostylis stenophylla*
Bandanna-of-the-Everglades	*Canna flaccida*

* Non-Native Species

Common Name	*Scientific Name*	Primary Habitat Codes (for imperiled species)
Broadwing sedge	*Carex alata*	
Bromelike sedge	*Carex bromoides*	
Chapman's sedge	*Carex chapmannii*	HH, SST
Longhair sedge	*Carex comosa*	
Sandywoods sedge	*Carex dasycarpa*	
Hammock sedge	*Carex fissa* var. *aristata*	
Gholson's sedge	*Carex gholsonii*	
Clustered sedge	*Carey glaucescens*	
Godfrey's sedge	*Carex godfreyi*	
Bristlystalked sedge	*Carex leptalea*	
Long's sedge	*Carex longii*	
False hop sedge	*Carex lupuliformis*	
Blackedge sedge	*Carex nigromarginata* var. *floridana*	
Peninsula sedge	*Carex paeninsulae*	
Awlfruit sedge	*Carex stipata*	
Southern sandbur	*Cenchrus echinatus*	
Coastal sandbur	*Cenchrus spinifex*	
Slender woodoats	*Chasmanthium laxum*	
Longleaf woodoats	*Chasmanthium laxum* var. *sessiliflorum*	
Shiny woodoats	*Chasmanthium nitidum*	
Sawgrass	*Cladium jamaicense*	
Wild taro*	*Colocasia esculenta*	
Common dayflower*	*Commelina difusa*	
Whitemouth dayflower	*Commelina erecta*	
Spring coralroot	*Corallorhiza wisteriana*	
Pampas grass*	*Cortaderia selloana*	
String-lily	*Crinum americanum*	
Bermudagrass*	*Cynodon dactylon*	
Poorland flatsedge	*Cyperus compressus*	
Baldwin's flatsedge	*Cyperus croceus*	
Swamp flatsedge	*Cyperus distinctus*	
Yellow nutgrass*	*Cyperus esculentus*	
Haspan flatsedge	*Cyperus haspan*	
Swamp flatsedge	*Cyperus ligularis*	
Fragrant flatsedge	*Cyperus odoratus*	
Pinebarren flatsedge	*Cyperus ovatus*	
Manyspike flatsedge	*Cyperus polystachyos*	
Strawcolored flatsedge	*Cyperus strigosus*	
Tropical flatsedge	*Cyperus surinamensis*	
Fourangle flatsedge	*Cyperus tetragonus*	
Durban crowfootgrass*	*Dactyloctenium aegyptium*	
Needleleaf witchgrass	*Dichanthelium aciculare*	
Variable witchgrass	*Dichanthelium commutatum*	

* Non-Native Species

Common Name	*Scientific Name*	Primary Habitat Codes (for imperiled species)
Cypress witchgrass	*Dichanthelium dichotomum*	
Cypress witchgrass	*Dichanthelium ensifolium*	
Cypress witchgrass	*Dichanthelium ensifolium* var. *unciphyllum*	
Openflower witchgrass	*Dichanthelium laxiflorum*	
Eggleaf witchgrass	*Dichanthelium ovale*	
Hemlock witchgrass	*Dichanthelium portoricense*	
Roughhair witchgrass	*Dichanthelium strigosum* var. *glabrescens*	
Asian crabgrass*	*Digitaria bicornis*	
Southern crabgrass	*Digitaria ciliaris*	
Slender crabgrass	*Digitaria filiformis*	
Indian crabgrass*	*Digitaria longiflora*	
Air-potato*	*Dioscorea bulbifera*	
Saltgrass	*Distichlis spicata*	
Threeway sedge	*Dulichium arundinaceum*	
Jungle rice	*Echinochloa colona*	
Barnyardgrass*	*Echinochloa crus-galli*	
Florida cockspur	*Echinochloa paludigena*	
Coast cockspur	*Echinochloa walteri*	
Common water-hyacinth*	*Eichhornia crassipes*	
Baldwin's spikerush	*Eleocharis baldwinii*	
Yellow spikerush	*Eleocharis flavescens*	
Canada spikerush	*Eleocharis geniculata*	
Viviparous spikerush	*Eleocharis vivipara*	
Indian goosegrass*	*Eleusine indica*	
Butterfly orchid	*Encyclia tampensis*	MEH, AF
Green-fly orchid	*Epidendrum conopseum*	MEH, UHF, AF
Feather lovegrass*	*Eragrostis amabilis*	
Gophertail lovegrass*	*Eragrostis ciliaris*	
Elliott's lovegrass	*Eragrostis elliottii*	
Red lovegrass	*Eragrostis secundiflora* subsp. o*xylepis*	
Purple lovegrass	*Eragrostis spectabilis*	
Coastal lovegrass	*Eragrostis virginica*	
Centipedegrass*	*Eremochloa ophiuroides*	
Michaux's cupgrass	*Eriochloa michauxii*	
Saltmarsh fingergrass	*Eustachys glauca*	
Pinewoods fingergrass	*Eustachys petraea*	
Slender fimbry	*Fimbristylis autumnalis*	
Carolina fimbry	*Fimbristylis caroliniana*	
Marsh fimbry	*Fimbristylis spadicea*	
Dwarf umbrellasedge	*Fuirena pumila*	
Southern umbrellasedge	*Fuirena scirpoidea*	
Toothpetal false reinorchid	*Habenaria floribunda*	
Shoalweed	*Halodule wrightii*	

* Non-Native Species

Common Name	*Scientific Name*	Primary Habitat Codes (for imperiled species)
White gingerlily*	*Hedychium coronarium*	
Spiked crested coralroot	*Hexalectris spicata*	SHM
Hydrilla*	*Hydrilla verticillata*	
Whitesands spiderlily	*Hymenocallis duvalensis*	
Common yellow stargrass	*Hypoxis curtissii*	
Cogongrass*	*Imperata cylindrica*	
Dixie iris	*Iris hexagona*	
Forked rush	*Juncus dichotomus*	
Soft rush	*Juncus effusus* subsp. *solutus*	
Bog rush	*Juncus elliottii*	
Shore rush	*Juncus marginatus*	
Bighead rush	*Juncus megacephalus*	
Florida rush	*Juncus paludosus*	
Lesser creeping rush	*Juncus repens*	
Needle rush	*Juncus roemerianus*	
Needlepod rush	*Juncus scirpoides*	
Shortleaf spikesedge*	*Kyllinga brevifolia*	
Carolina redroot	*Lachnanthes caroliana*	
Dotted duckweed*	*Landoltia punctata*	
Southern cutgrass	*Leersia hexandra*	
Whitegrass	*Leersia virginica*	
Lesser duckweed	*Lemna aequinoctialis*	
Little duckweed	*Lemna obscura*	
Valdivia duckweed	*Lemna valdiviana*	
Frog's-bit	*Limnobium spongia*	
Smallflower halfchaff sedge	*Lipocarpha micrantha*	
Southern twayblade	*Listera australis*	HH
Italian ryegrass*	*Lolium perenne*	
Twoflower melicgrass	*Melica mutica*	
Rose natalgrass*	*Melinis repens*	
Nakedstem dewflower*	*Murdannia nudiflora*	
Monk orchid*	*Oeceoclades maculata*	
Basketgrass	*Oplismenus hirtellus*	
Goldenclub	*Orontium aquaticum*	
Beaked panicum	*Panicum anceps*	
Fall panicgrass	*Panicum dichotomiflorum*	
Fall panicgrass	*Panicum dichotomiflorum* var. *bartowense*	
Maidencane	*Panicum hemitomon*	
Panicgrass	*Panicum longifolium*	
Guineagrass*	*Panicum maximum*	
Torpedograss*	*Panicum repens*	
Redtop panicgrass	*Panicum rigidulum*	
Warty panicgrass	*Panicum verrucosum*	

* Non-Native Species

Common Name	*Scientific Name*	Primary Habitat Codes (for imperiled species)
Switchgrass	*Panicum virgatum*	
Sour paspalum	*Paspalum conjugatum*	
Dallisgrass*	*Paspalum dilatatum*	
Florida paspalum	*Paspalum floridanum*	
Field paspalum	*Paspalum laeve*	
Brunswickgrass*	*Paspalum nicorae*	
Bahiagrass*	*Paspalum notatum* var. *saurae*	
Early paspalum	*Paspalum praecox*	
Thin paspalum	*Paspalum setaceum*	
Vaseygrass*	*Paspalum urvillei*	
Seashore paspalum	*Paspalum vaginatum*	
Green arrow arum	*Peltandra virginica*	
Senegal date palm*	*Phoenix reclinata*	
Common reed	*Phragmites australis*	
Blackseed needlegrass	*Piptochaetium avenaceum*	
Southern tuberculed orchid	*Platanthera flava*	HH
Jug orchid	*Platythelys latifolia*	
Annual bluegrass*	*Poa annua*	
Rabbitsfootgrass*	*Polypogon monspeliensis*	
Pickerelweed	*Pontederia cordata*	
Hairy shadow witch	*Ponthieva racemosa*	
Giant orchid	*Pteroglossaspis ecristata*	UHF, ALC
Anglestem beaksedge	*Rhynchospora caduca*	
Starrush whitetop	*Rhynchospora colorata*	
Shortbristle horned beaksedge	*Rhynchospora corniculata*	
Savannah beaksedge	*Rhynchospora debilis*	
Fascicled beaksedge	*Rhynchospora fascicularis*	
Sandyfield beaksedge	*Rhynchospora megalocarpa*	
Southern beaksedge	*Rhynchospora microcarpa*	
Bunched beaksedge	*Rhynchospora microcephala*	
Millet beaksedge	*Rhynchospora miliacea*	
Shortbeak beaksedge	*Rhynchospora nitens*	
Wright's beaksedge	*Rhynchospora wrightiana*	
Widgeongrass	*Ruppia maritima*	
Scrub palmetto	*Sabal etonia*	
Dwarf palmetto	*Sabal minor*	
Cabbage palm	*Sabal palmetto*	
Sugarcane plumegrass	*Saccharum giganteum*	
Indian cupscale*	*Sacciolepis indica*	
American cupscale	*Sacciolepis striata*	
Threadleaf arrowhead	*Sagittaria filiformis*	
Grassy arrowhead	*Sagittaria graminea*	
Bulltongue arrowhead	*Sagittaria lancifolia*	

* Non-Native Species

Common Name	*Scientific Name*	Primary Habitat Codes (for imperiled species)
Crimson bluestem	*Schizachyrium sanguineum*	
Little bluestem	*Schizachyrium scoparium*	
American bulrush	*Schoenoplectus americanus*	
Saltmarsh bulrush	*Schoenoplectus robustus*	
Softstem bulrush	*Schoenoplectus tabernaemontani*	
Woolgrass	*Scirpus cyperinus*	
Drooping bulrush	*Scirpus lineatus*	
Fringed nutrush	*Scleria ciliata*	
Littlehead nutrush	*Scleria oligantha*	
Netted nutrush	*Scleria reticularis*	
Whip nutrush	*Scleria triglomerata*	
Saw palmetto	*Serenoa repens*	
Coral bristlegrass	*Setaria macrosperma*	
Giant bristlegrass	*Setaria magna*	
Yellow bristlegrass	*Setaria parviflora*	
Narrowleaf blue-eyed grass	*Sisyrinchium angustifolium*	
Annual blue-eyed grass*	*Sisyrinchium rosulatum*	
Earleaf greenbrier	*Smilax auriculata*	
Saw greenbrier	*Smilax bona-nox*	
Cat greenbrier	*Smilax glauca*	
Sarsaparilla vine	*Smilax pumila*	
Jackson vine	*Smilax smallii*	
Bristly greenbrier	*Smilax tamnoides*	
Slender Indiangrass	*Sorghastrum elliottii*	
Johnsongrass*	*Sorghum halepense*	
Saltmarsh cordgrass	*Spartina alterniflora*	
Sand cordgrass	*Spartina bakeri*	
Marshhay cordgrass	*Spartina patens*	
Prairie wedgescale	*Sphenopholis obtusata*	
Swamp wedgescale	*Sphenopholis pensylvanica*	
Greenvein ladiestresses	*Spiranthes praecox*	
Common duckweed	*Spirodela polyrhiza*	
Smutgrass*	*Sporobolus indicus*	
West Indian dropseed*	*Sporobolus indicus* var. *pyramidalis*	
Seashore dropseed	*Sporobolus virginicus*	
St. Augustine grass*	*Stenotaphrum secundatum*	
Bartram's ariplant	*Tillandsia bartramii*	
Ballmoss	*Tillandsia recurvata*	
Florida airplant	*Tillandsia simulata*	
Spanish moss	*Tillandsia usneoides*	
Giant airplant	*Tillandsia utriculata*	MH, UHF
Florida airplant	*Tillandsia* x *floridana*	
Bluejacket	*Tradescantia ohiensis*	

* Non-Native Species

Common Name	*Scientific Name*	Primary Habitat Codes (for imperiled species)
Purplequeen*	*Tradescantia pallida*	
Tall redtop	*Tridens flavus*	
Arrowgrass	*Triglochin striata*	
Purple sandgrass	*Triplasis purpurea*	
Fakahatcheegrass	*Tripsacum dactyloides*	
Southern cattail	*Typha domingensis*	
Broadleaf cattail	*Typha latifolia*	
Tropical signalgrass*	*Urochloa distachya*	
Columbian watermeal	*Wolffia columbiana*	
Shortleaf yelloweyed grass	*Xyris brevifolia*	
Carolina yelloweyed grass	*Xyris caroliniana*	
Fringed yelloweyed grass	*Xyris fimbriata*	
Richard's yelloweyed grass	*Xyris jupicai*	
Spanish bayonet*	*Yucca aloifolia*	
Adam's needle	*Yucca filamentosa*	
Horned pondweed	*Zannichellia palustris*	
Lawn orchid*	*Zeuxine strateumatica*	

DICOTS

Slender threeseed mercury	*Acalypha gracilens*	
Pineland threeseed mercury	*Acalypha ostryifolia*	
Box elder	*Acer negundo*	
Red maple	*Acer rubrum*	
Oppositeleaf spotflower	*Acmella oppositifolia* var. *repens*	
Red buckeye	*Aesculus pavia*	
Beach false foxglove	*Agalinis fasciculata*	
Tenlobe false foxglove	*Agalinis obtusifolia*	
Pipestem	*Agarista populifolia*	
Hammock snakeroot	*Ageratina jucunda*	
Alligatorweed*	*Alternanthera philoxeroides*	
Sessile joyweed*	*Alternanthera sessilis*	
False moneywort*	*Alyssicarpus ovalifolius*	
Southern amaranth	*Amaranthus australis*	
Spiny amaranth*	*Amaranthus spinosus*	
Slender amaranth*	*Amaranthus viridis*	
Common ragweed	*Ambrosia artemisiifolia*	
Pink redstem	*Ammannia latifolia*	
Bastard false indigo	*Amorpha fruticosa*	
Peppervine	*Ampelopsis arborea*	
Chaffweed	*Anagallis minima*	
Groundnut	*Apios americana*	
Indianhemp	*Apocynum cannabinum*	

* Non-Native Species

Common Name	*Scientific Name*	Primary Habitat Codes (for imperiled species)
Devil's walkingstick	*Aralia spinosa*	
Coral ardisia*	*Ardisia crenata*	
Marlberry	*Ardisia escallonioides*	
Spreading sandwort	*Arenaria lanuginosa*	
Thymeleaf sandwort*	*Arenaria serpyllifolia*	
Virginia snakeroot	*Aristolochia serpentaria*	
Florida Indian plantain	*Arnoglossum floridanum*	
Scarlet milkweed*	*Asclepias curassavica*	
Swamp milkweed	*Asclepias incarnata*	
Swamp milkweed	*Asclepias perennis*	
Velvetleaf milkweed	*Asclepias tomentosa*	
Bigflower pawpaw	*Asimina obovata*	
Smallflower pawpaw	*Asimina parviflora*	
Black mangrove	*Avicennia germinans*	
Saltwater falsewillow	*Baccharis angustifolia*	
Silverling	*Baccharis glomeruliflora*	
Sea myrtle	*Baccharis halimifolia*	
Herb-of-grace	*Bacopa monnieri*	
Saltwort	*Batis maritima*	
Tarflower	*Bejaria racemosa*	
Rattan vine	*Berchemia scandens*	
Beggarticks	*Bidens alba*	
Spanish needles	*Bidens bipinnata*	
Smallfruit beggarticks	*Bidens mitis*	
Crossvine	*Bignonia capreolata*	
Samphire	*Blutaparon vermiculare*	
Bog nettle	*Boehmeria cylindrica*	
Red spiderling	*Boerhavia diffusa*	
Bushy seaside oxeye	*Borrichia frutescens*	
Leaf mustard*	*Brassica juncea*	
Beauty berry	*Callicarpa americana*	
Straggler daisy*	*Calyptocarpus vialis*	
Trumpet creeper	*Campsis radicans*	
Hairy bittercress*	*Cardamine hirsuta*	
Pennsylvania bittercress	*Cardamine pensylvanica*	
Papaya*	*Carica papaya*	
Vanillaleaf	*Carphephorus odoratissimus*	
American hornbeam	*Carpinus caroliniana*	
Water hickory	*Carya aquatica*	
Pignut hickory	*Carya glabra*	
Australian-pine*	*Casuarina equisetifolia*	
Madagascar periwinkle*	*Catharanthus roseus*	
Sugarberry	*Celtis laevigata*	

* Non-Native Species

Common Name	*Scientific Name*	Primary Habitat Codes (for imperiled species)
Spadeleaf	*Centella asiatica*	
Spurred butterfly-pea	*Centrosema virginianum*	
Common buttonbush	*Cephalanthus occidentalis*	
Sticky chickweed*	*Cerastium glomeratum*	
Florida rosemary	*Ceratiola ericoides*	
Coontail	*Ceratophyllum demersum*	
Partridge pea	*Chamaecrista fasciculata*	
Sensitive pea	*Chamaecrista nictitans* var. *aspera*	
Limestone sandmat	*Chamaesyce blodgettii*	
Pillpod sandmat	*Chamaesyce hirta*	
Hyssopleaf sandmat	*Chamaesyce hyssopifolia*	
Spotted sandmat	*Chamaesyce maculata*	
Florida hammock sandmat	*Chamaesyce ophthalmica*	
Prostrate sandmat	*Chamaesyce prostrata*	
Mexican tea*	*Chenopodium ambrosioides*	
Spotted water hemlock	*Cicuta maculata*	
Camphortree*	*Cinnamomum camphora*	
Purple thistle	*Cirsium horridulum*	
Nuttall's thistle	*Cirsium nuttallii*	
Sour orange*	*Citrus* x *aurantium*	
Tangerine*	*Citrus reticulata*	
Skyrocket*	*Clerodendrum indicum*	
Tread-softly	*Cnidoscolus stimulosus*	
Mistflower	*Conoclinium coelestinum*	
Cancerroot	*Conopholis americana*	
Canadian horseweed	*Conyza canadensis*	
Leavenworth's tickseed	*Coreopsis leavenworthii*	
Cilantro*	*Coriandrum sativum*	
Swamp dogwood	*Cornus foemina*	
Smallflower fumewort	*Corydalis micrantha* subsp. *australis*	
Smooth rattlebox*	*Crotalaria pallida* var. *obovata*	
Showy rattlebox*	*Crotalaria spectabilis*	
Rabbitbells	*Crotalaria rotundifolia*	
Vente comingo	*Croton glandulosus*	
Michaux's croton	*Croton michauxii*	
Carrotwood*	*Cupaniopsis anacardioides*	
Colombian waxweed*	*Cuphea carthagenensis*	
Bigseed alfalfa dodder	*Cuscuta indecora*	
Marsh parsley*	*Cyclospermum leptophyllum*	
Gulf Coast swallowwort	*Cynanchum angustifolium*	
Leafless swallowwort	*Cynanchum scoparium*	
Swamp loosetrife	*Decodon verticillatus*	
Climbing hydrangea	*Decumaria barbara*	

* Non-Native Species

Common Name	*Scientific Name*	Primary Habitat Codes (for imperiled species)
Western tansymustard	*Descurainia pinnata*	
Hoary ticktrefoil	*Desmodium canescens*	
Zarzabacoa comun*	*Desmodium incanum*	
Panicled ticktrefoil	*Desmodium paniculatum*	
Dixie ticktrefoil*	*Desmodium tortuosum*	
Threeflower ticktrefoil*	*Desmodium triflorum*	
Carolina ponysfoot	*Dichondra carolinensis*	
Smallflowered ponysfoot*	*Dichondra micrantha*	
Poor Joe	*Diodia teres*	
Virginia buttonweed	*Diodia virginiana*	
Persimmon	*Diospyros virginiana*	
Dwarf sundew	*Drosera brevifolia*	
West Indian chickweed*	*Drymaria cordata*	
False daisy	*Eclipta prostrata*	
Carolina elephantsfoot	*Elephantopus carolinianus*	
Tall elephantsfoot	*Elephantopus elatus*	
Carolina scalystem	*Elytraria caroliniensis*	
Florida tassleflower*	*Emilia fosbergii*	
Lilac tassleflower*	*Emilia sonchifolia*	
Earpod tree*	*Enterolobium contortisiliquum*	
Fireweed	*Erichtites hieraciifolius*	
Oakleaf fleabane	*Erigeron quercifolius*	
Prairie fleabane	*Erigeron strigosus*	
Loquat*	*Eriobotrya japonica*	
Baldwin's eryngo	*Eryngium baldwinii*	
Coralbean	*Erythrina herbacea*	
White stopper	*Eugenia axillaris*	
Dogfennel	*Eupatorium capillifolium*	
Falsefennel	*Eupatorium leptophyllum*	
Semaphore thoroughwort	*Eupatorium mikanioides*	
Mohr's thoroughwort	*Eupatorium mohrii*	
Lateflowering thoroughwort	*Eupatorium serotinum*	
Grassleaf spurge*	*Euphorbia graminea*	
Slender flattop goldenrod	*Euthamia caroliniana*	
Buckwheat*	*Fagopyrum esculentum*	
Narrowleaf yellowtops	*Flaveria linearis*	
Florida swampprivet	*Forestiera segregata*	
Pop ash	*Fraxinus caroliniana*	
Green ash	*Fraxinus pennsylvanica*	
Cottonweed	*Froelichia floridana*	
Elliott's milkpea	*Galactia elliottii*	
Eastern milkpea	*Galactia regularis*	
Coastal bedstraw	*Galium hispidulum*	

* Non-Native Species

Common Name	*Scientific Name*	Primary Habitat Codes (for imperiled species)
Hairy bedstraw	*Galium pilosum*	
Stiff marsh bedstraw	*Galium tinctorium*	
Caribbean purple everlasting	*Gamochaeta antillana*	
Pennsylvania cudweed*	*Gamochaeta pensylvanica*	
Spoonleaf cudweed	*Gamochaeta purpurea*	
Garberia	*Garberia heterophylla*	SC
Southern beeblossom	*Gaura angustifolia*	
Dwarf huckleberry	*Gaylussacia dumosa*	
Blue huckleberry	*Gaylussacia frondosa* var. *tomentosa*	
Yellow jessamine	*Gelsemium sempervirens*	
Carolina cranesbill	*Geranium carolinianum*	
Coastal mock vervain	*Glandularia maritima*	UHF
Prostrate globe amaranth*	*Gomphrena serrata*	
Angularfruit milkvine	*Gonolobus suberosus*	MF, HH, SSL
Loblolly bay	*Gordonia lasianthus*	
Rough hedgehyssop	*Gratiola hispida*	
Shaggy hedgehyssop	*Gratiola pilosa*	
Pinebarren frostweed	*Helianthemum corymbosum*	
East Coast dune sunflower	*Helianthus debilis*	
Seaside heliotrope	*Heliotropium curassavicum*	
Camphorweed	*Heterotheca subaxillaris*	
Queen-devil	*Hieracium gronovii*	
Innocence	*Houstonia procumbens*	
Largeleaf marshpennywort	*Hydrocotyle bonariensis*	
Floating marshpennywort	*Hydrocotyle ranunculoides*	
Manyflower marshpennywort	*Hydrocotyle umbellata*	
Whorled marshpennywort	*Hydrocotyle verticillata*	
Roundpod St.John's wort	*Hypericum cistifolium*	
St.Andrew's cross	*Hypericum hypericoides*	
Dwarf St.John's wort	*Hypericum mutilum*	
Atlantic St.John's wort	*Hypericum tenuifolium*	
Fourpetal St.John's wort	*Hypericum tetrapetalum*	
Clustered bushmint	*Hyptis alata*	
Tropical bushmint*	*Hyptis mutabilis*	
Carolina holly	*Ilex ambigua*	
Dahoon	*Ilex cassine*	
Gallberry	*Ilex glabra*	
American holly	*Ilex opaca*	
Scrub holly	*Ilex opaca* var. *arenicola*	
Yaupon	*Ilex vomitoria*	
Carolina indigo	*Indigofera caroliniana*	
Trailing indigo*	*Indigofera spicata*	
Anil de pasto*	*Indigofera suffruticosa*	

* Non-Native Species

Common Name	*Scientific Name*	Primary Habitat Codes (for imperiled species)
Tievine	*Ipomoea cordatotriloba*	
Largeroot morning-glory*	*Ipomoea macrorhiza*	
Man-of-the-earth	*Ipomoea pandurata*	
Saltmarsh morning-glory	*Ipomoea sagittata*	
Juba's bush	*Iresine diffusa*	
Virginia willow	*Itea virginica*	
Bigleaf sumpweed	*Iva frutescens*	
Piedmont marshelder	*Iva microcephala*	
Shrimp plant*	*Justicia brandegeana*	
Looseflower waterwillow	*Justicia ovata*	
Virginia saltmarsh mallow	*Kosteletzkya pentacarpos*	
Virginia dwarfdandelion	*Krigia virginica*	
Woodland lettuce	*Lactuca floridana*	
Grassleaf lettuce	*Lactuca graminifolia*	
White mangrove	*Laguncularia racemosa*	
Shrubverbena*	*Lantana camara*	
Trailing shrubverbena*	*Lantana montevidensis*	
Hairy pinweed	*Lechea mucronata*	
Piedmont pinweed	*Lechea torreyi*	
Virginia pepperweed	*Lepidium virginicum*	
White leadtree*	*Leucaena leucocephala*	
Slender gayfeather	*Liatris gracilis*	
Shortleaf gayfeather	*Liatris tenuifolia* var. *quadriflora*	
Japanese privet*	*Ligustrum japonicum*	
Carolina sealavender	*Limonium carolinianum*	
Canadian toadflax	*Linaria canadensis*	
Apalachicola toadflax	*Linaria floridana*	
Malaysian false pimpernel*	*Lindernia crustacea*	
Moistbank pimpernel	*Lindernia dubia*	
Yellowseed false pimpernel	*Lindernia dubia* var. *anagallidea*	
Sweetgum	*Liquidambar styraciflua*	
Cardinal flower	*Lobelia cardinalis*	HH
Lanceleaf primrosewillow	*Ludwigia lanceolata*	
Seaside primrosewillow	*Ludwigia maritima*	
Smallfruit primrosewillow	*Ludwigia microcarpa*	
Mexican primrosewillow	*Ludwigia octovalvis*	
Marsh seedbox	*Ludwigia palustris*	
Peruvian primrosewillow*	*Ludwigia peruviana*	
Creeping primrosewillow	*Ludwigia repens*	
Carolina desert-thorn	*Lycium carolinianum*	
Staggerbush	*Lyonia ferruginea*	
Coastalplain staggerbush	*Lyonia fruticosa*	
Fetterbush	*Lyonia lucida*	

* Non-Native Species

Common Name	*Scientific Name*	Primary Habitat Codes (for imperiled species)
Wand loosetrife	*Lythrum lineare*	
Wild bushbean*	*Macroptilium lathyroides*	
Southern magnolia	*Magnolia grandiflora*	
Sweetbay	*Magnolia virginiana*	
Axilflower	*Mecardonia acuminata* subsp. *peninsularis*	
Black medick*	*Medicago lupulina*	
Burr medick*	*Medicago polymorpha*	
Snow squarestem	*Melanthera nivea*	
Chinaberry*	*Melia azedarach*	
White sweetclover*	*Melilotus albus*	
Annual yellow sweetclover*	*Melilotus indicus*	
Creeping cucumber	*Melothria pendula*	
Noyau vine*	*Merremia dissecta*	
Shade mudflower	*Micranthemum umbrosum*	
Florida Keys hempvine	*Mikania cordifolia*	
Climbing hempvine	*Mikania scandens*	
Partridgeberry	*Mitchella repens*	
Lax hornpod	*Mitreola petiolata*	
Swamp hornpod	*Mitreola sessilifolia*	
Carolina bristlemallow	*Modiola caroliniana*	
Spotted beebalm	*Monarda punctata*	
Indianpipe	*Monotropa uniflora*	
Pigmypipes	*Monotropsis odorata*	UHF
White mulberry*	*Morus alba*	
Red mulberry	*Morus rubra*	
Wax myrtle	*Myrica cerifera*	
Parrot feather watermilfoil*	*Myriophyllum aquaticum*	
Colicwood	*Myrsine cubana* (syn. *Rapanea punctata*)	
Florida watercress	*Nasturtium floridanum*	
European watercress*	*Nasturtium officinale*	
Swamp tupelo	*Nyssa sylvatica* var. *biflora*	
Whitetop aster	*Oclemena reticulata*	
Seabeach eveningprimrose	*Oenothera humifusa*	
Cutleaf eveningprimrose	*Oenothera laciniata*	
Flattop mille graines*	*Oldenlandia corymbosa*	
Clustered mille graines	*Oldenlandia uniflora*	
Pricklypear	*Opuntia humifusa*	
Shell-mound pricklypear	*Opuntia stricta*	SC,SHM ALC
Wild olive	*Osmanthus americanus*	
Common yellow woodsorrel	*Oxalis corniculata*	
Pink woodsorrel*	*Oxalis debilis*	
Butterweed	*Packera glabella*	
Florida pellitory	*Parietaria floridana*	

* Non-Native Species

Common Name	*Scientific Name*	Primary Habitat Codes (for imperiled species)
Clustered pellitory	*Parietaria praetermissa*	
Virginia creeper	*Parthenocissus quinquefolia*	
Purple passionflower	*Passiflora incarnata*	
Corkystem passionflower	*Passiflora suberosa*	
Gingerbush	*Pavonia spinifex*	
Spreading cinchweed	*Pectis prostrata*	
Hale's pentodon	*Pentodon pentandrus*	
Red bay	*Persea borbonia*	
Swamp bay	*Persea palustris*	
Thicket bean	*Phaseolus polystachios*	
Oak mistletoe	*Phoradendron leucarpum*	
Turkey tangle fogfruit	*Phyla nodiflora*	
Drummond's leafflower	*Phyllanthus abnormis*	
Mascarene Island leafflower*	*Phyllanthus tenellus*	
Chamber bitter*	*Phyllanthus urinaria*	
Cutleaf groundcherry	*Physalis angulata*	
Husk tomato	*Physalis pubescens*	
Walter's groundcherry	*Physalis walteri*	
Slenderleaf false dragonhead	*Physostegia leptophylla*	
Pokeweed	*Phytolacca americana*	
Artillery plant	*Pilea microphylla*	
Canadian clearweed	*Pilea pumila*	
Small butterwort	*Pinguicula pumila*	
Narrowleaf silkgrass	*Pityopsis graminifolia*	
Common plantain*	*Plantago major*	
Virginia plantain	*Plantago virginica*	
Rosy camphorweed	*Pluchea baccharis*	
Stinking camphorweed	*Pluchea foetida*	
Longleaf camphorweed	*Pluchea longifolia*	
Sweetscent	*Pluchea odorata*	
Painted-leaf	*Poinsettia cyathophora*	
Procession flower	*Polygala incarnata*	
Orange milkwort	*Polygala lutea*	
Candyroot	*Polygala nana*	
Racemed milkwort	*Polygala polygama*	
Yellow milkwort	*Polygala rugelii*	
Showy milkwort	*Polygala violacea*	
Tall jointweed	*Polygonella gracilis*	
Mild waterpepper	*Polygonum hydropiperoides*	
Pale smartweed	*Polygonum lapathifolium*	
Dotted smartweed	*Polygonum punctatum*	
Bog smartweed	*Polygonum setaceum*	
Rustweed	*Polypremum procumbens*	

* Non-Native Species

Common Name	*Scientific Name*	Primary Habitat Codes (for imperiled species)
Paraguayan purslane*	*Portulaca amilis*	
Little hogweed*	*Portulaca oleracea*	
Pink purslane	*Portulaca pilosa*	
Pouzolz's bush*	*Pouzolzia zeylanica*	
Carolina laurelcherry	*Prunus caroliniana*	
Black cherry	*Prunus serotina*	
Flatwoods plum	*Prunus umbellata*	
Wild coffee	*Psychotria nervosa*	
Common hoptree	*Ptelea trifoliata*	
Blackroot	*Pterocaulon pycnostachyum*	
Mock Bishop weed	*Ptilimnium capillaceum*	
Flamevine*	*Pyrostegia venusta*	
Carolina desertchicory	*Pyrrhopappus carolinianus*	
Bastard white oak	*Quercus austrina*	
Chapman's oak	*Quercus chapmanii*	
Sand live oak	*Quercus geminata*	
Laurel oak	*Quercus laurifolia*	
Myrtle oak	*Quercus myrtifolia*	
Water oak	*Quercus nigra*	
Live oak	*Quercus virginiana*	
Mellichamp's oak	*Quercus* x *melichampii*	
Fringed meadowbeauty	*Rhexia petiolata*	
Winged sumac	*Rhus copallinum*	
Doubleform snoutbean	*Rhynchosia difformis*	
Least snoutbean	*Rhynchosia minima*	
Tropical Mexican clover*	*Richardia brasiliensis*	
Rougeplant	*Rivina humilis*	
Southern marsh yellowcress	*Rorippa teres*	
Toothcup	*Rotala ramosior*	
Sawtooth blackberry	*Rubus pensilvanicus*	
Southern dewberry	*Rubus trivialis*	
Blackeyed susan	*Rudbeckia hirta*	
Carolina wild petunia	*Ruellia caroliniensis*	
Mexican petunia*	*Ruellia simplex*	
Heartwing dock	*Rumex hastatulus*	
Swamp dock	*Rumex verticillatus*	
Coastal rosegentian	*Sabatia calycina*	
Largeflower rosegentian	*Sabatia grandiflora*	
Smallflower mock buckthorn	*Sageretia minutiflora*	
Annual glasswort	*Salicornia bigelovii*	
Coastalplain willow	*Salix caroliniana*	
Tropical sage	*Salvia coccinea*	
Lyreleaf sage	*Salvia lyrata*	

* Non-Native Species

Common Name	*Scientific Name*	Primary Habitat Codes (for imperiled species)
Elderberry	*Sambucus nigra* subsp. *canadensis*	
Pineland pimpernel	*Samolus valerandi* var. *parviflorus*	
Canadian blacksnakeroot	*Sanicula canadensis*	
Soapberry	*Sapindus saponaria*	
Chinese tallow*	*Sapium sebiferum*	
Perennial glasswort	*Sarcocornia ambigua*	
Lizard's tail	*Saururus cernuus*	
Brazilian pepper*	*Schinus terebinthifolia*	
Sweetbroom	*Scoparia dulcis*	
Helmet skullcap	*Scutellaria integrifolia*	
Coffeeweed*	*Senna obtusifolia*	
Danglepod	*Sesbania herbacea*	
Rattlebox*	*Sesbania punicea*	
Bagpod	*Sesbania vesicaria*	
Sea purslane	*Sesuvium portulacastrum*	
Cuban jute	*Sida rhombifolia*	
Common wireweed	*Sida ulmifolia*	
Tough bully	*Sideroxylon tenax*	
Sleepy catchfly	*Silene antirrhina*	
Hairy leafcup	*Smallanthus uvedalia*	
American black nightshade	*Solanum americanum*	
Carolina horsenettle	*Solanum carolinense*	
Black nightshade	*Solanum chenopodioides*	
Twoleaf nightshade*	*Solanum diphyllum*	
Sticky nightshade*	*Solanum sisymbriifolium*	
Tropical soda apple*	*Solanum viarum*	
Pinebarren goldenrod	*Solidago fistulosa*	
Chapman's goldenrod	*Solidago odora* var. *chapmanii*	
Seaside goldenrod	*Solidago sempervirens*	
Wand goldenrod	*Solidago stricta*	
Spiny sowthistle*	*Sonchus asper*	
Common sowthistle*	*Sonchus oleraceus*	
Woodland false buttonweed	*Spermacoce remota*	
Shrubby false buttonweed*	*Spermacoce verticillata*	
Roughfruit scaleseed	*Spermolepis divaricata*	
Creeping oxeye*	*Sphagneticola triloba*	
Levy pinkroot	*Spigelia loganioides*	UHF
Blue porterweed	*Stachytarpheta jamaicensis*	
Common chickweed*	*Stellaria media*	
Pineland scalypink	*Stipulicida setaceae* var. *lacerata*	
Sea blite	*Suaeda linearis*	
Bahaman aster	*Symphyotrichum bahamense*	
Climbing aster	*Symphyotrichum carolinianum*	

* Non-Native Species

Common Name	*Scientific Name*	Primary Habitat Codes (for imperiled species)
Rice button aster	*Symphyotrichum dumosum*	
Elliott's aster	*Symphyotrichum elliottii*	
Simmond's aster	*Symphyotrichum simmondsii*	
Wood sage	*Teucrium canadense*	
Carolina basswood	*Tilia americana* var. *caroliniana*	
Poison ivy	*Toxicodendron radicans*	
Wavyleaf noseburn	*Tragia urens*	
Forked bluecurls	*Trichostema dichotomum*	
White clover*	*Trifolium repens*	
Clasping Venus' looking-glass	*Triodanis perfoliata*	
Ramgoat dashalong*	*Turnera ulmifolia*	
American elm	*Ulmus americana*	
Caesarweed*	*Urena lobata*	
Zigzag bladderwort	*Utricularia subulata*	
Sparkleberry	*Vaccinium arboreum*	
Highbush blueberry	*Vaccinium corymbosum*	
Shiny blueberry	*Vaccinium myrsinites*	
Deerberry	*Vaccinium stamenium*	
Brazilian vervain*	*Verbena litoralis* var. *brevibracteata*	
Texas vervain	*Verbena officinalis* subsp. *halei*	
Sandpaper vervain	*Verbena scabra*	
Frostweed	*Verbesina virginica*	
Giant ironweed	*Vernonia gigantea*	
Water speedwell	*Veronica anagallis-aquatica*	
Neckweed	*Veronica peregrina*	
Walter's viburnum	*Viburnum obovatum*	
Fourleaf vetch	*Vicia acutifolia*	
Florida vetch	*Vicia floridana*	
Hairypod cowpea	*Vigna luteola*	
Bog white violet	*Viola lanceolata*	
Early blue violet	*Viola palmata*	
Primroseleaf violet	*Viola primulifolia*	
Common blue violet	*Viola sororia*	
Summer grape	*Vitis aestivalis*	
Florida grape	*Vitis cinerea* var. *floridana*	
Muscadine	*Vitis rotundifolia*	
Southern rockbell*	*Wahlenbergia marginata*	
Hog plum	*Ximenia americana*	
Oriental false hawksbeard*	*Youngia japonica*	
Hercules' club	*Zanthoxylum clava-herculis*	

* Non-Native Species

Common Name	*Scientific Name*	Primary Habitat (for all species)

INVERTEBRATES

Molluscs

Gastropods

Rosy wolfsnail	*Euglandina rosea*	MTC
Marsh periwinkle	*Littoraria irrorata*	SM
Coffee bean snail	*Melampus coffea*	SM, MS
Florida crown conch	*Melongena corona*	SM, MS
Moon snail	*Polinices duplicatus*	SM
Florida applesnail	*Pomacea paludosa*	FS, BST

Bivalves

Hooked mussel	*Brachidontes recurvus*	SM
Eastern oyster	*Crassostrea virginica*	SM
Hard clam	*Mercenaria mercenaria*	SM
Common rangia	*Rangia cuneata*	SM

ARTHROPODS

Spiders and Scorpions

Horseshoe crabs

Atlantic horseshoe crab	*Limulus polyphemus*	SM

Scorpions

Hentz striped scorpion	*Centruroides hentzi*	MF, MEH, UHF

Spiders

Spiny orb weaver	*Gasteracantha cancriformis*	MEH, UHF
Brown widow	*Latrodectus geometricus*	DV
Southern black widow	*Latrodectus mactans*	SC, SCF, DV
Wolf spider	*Lycosa carolinensis*	MTC
Golden silk spider	*Nephila clavipes*	MEH, UHF

Mites and Ticks

Lone star tick	*Amblyomma americanum*	MTC
Deer tick	*Ixodes scapularis*	MTC

Crustaceans

Blue crab	*Callinectes sapidus*	SM
Parasitic isopod	*Cymothoa sp*	SM
Sand fiddler	*Uca pugilator*	SM
Mud fiddler	*Uca pugnax*	SM

* Non-Native Species

Common Name	*Scientific Name*	Primary Habitat (for all species)

Insects

Butterflies

Gulf Fritillary	*Agraulis vanillae*	MTC
White Peacock	*Anartia jatrophae*	MTC
Monk Skipper	*Asbolis capucinus*	MTC
Great Southern White	*Ascia monuste*	MTC
Eastern Pygmy-Blue	*Brephidium isophthalma*	MTC
Juniper Hairstreak	*Callophrys gryneus*	MTC
Red-banded Hairstreak	*Calycopis cecrops*	MTC
Queen	*Danaus gilippus*	MTC
Monarch	*Danaus plexippus*	MTC
Horace's Duskywing	*Erynnis horatius*	MTC
Zarucco Duskywing	*Erynnis zarucco*	MTC
Dun Skipper	*Euphyes vestries*	MTC
Little Yellow	*Eurema lisa*	MTC
Sleepy Orange	*Eurema nicippe*	MTC
Zebra Heliconian	*Heliconius charithonia*	MTC
Ceraunus Blue	*Hemiargus ceraunus*	MTC
Carolina Satyr	*Hermeuptychia sosybius*	MTC
Fiery Skipper	*Hylephila phyleus*	MTC
Common Buckeye	*Junonia coenia*	MTC
Cassius Blue	*Leptotes cassius*	MTC
Clouded Skipper	*Lerema accius*	MTC
Yucca Giant-Skipper	*Megathymus yuccae*	MTC
Little Wood-Satyr	*Megisto cymela*	MTC
Swarthy Skipper	*Nastra lherminier*	MTC
Twin-spot Skipper	*Oligoria maculate*	MTC
Ocola Skipper	*Panoquina ocola*	MTC
Salt Marsh Skipper	*Panoquina panoquin*	MTC
Giant Swallowtail	*Papilio cresphontes*	MTC
Eastern Tiger Swallowtail	*Papilio glaucus*	MTC
Palamedes Swallowtail	*Papilio palamedes*	MTC
Black Swallowtail	*Papilio polyxenes*	MTC
Spicebush Swallowtail	*Papilio troilu*	MTC
Cloudless Sulphur	*Phoebis sennae*	MTC
Phaon Crescent	*Phyciodes phaon*	MTC
Pearl Crescent	*Phyciodes tharos*	MTC
Whirlabout	*Polites vibex*	MTC
Question Mark	*Polygonia interrogationis*	MTC
Gray Hairstreak	*Strymon melinus*	MTC
Northern Cloudywing	*Thorybes pylades*	MTC

* Non-Native Species

Common Name	*Scientific Name*	Primary Habitat (for all species)
Dorantes Longtail	*Urbanus dorantes*	MTC
Long-tailed Skipper	*Urbanus proteus*	MTC
Red Admiral	*Vanessa atalanta*	MTC
Southern Broken-Dash	*Wallengrenia otho*	MTC

VERTEBRATES-FISH

Lined sole	*Achirus lineatus*	SM
Bonefish	*Albula vulpes*	SM
White catfish	*Ameiurus catus*	SM
Yellow bullhead	*Ameiurus natalis*	BST
Bowfin	*Amia calva*	BST
Bay anchovy	*Anchoa mitchilli*	SM
Striped Anchovy	*Anchoa hepsetus*	SM
Cuban anchovy	*Anchoa cubana*	SM
American eel	*Anguilla rostrata*	SM
Sheepshead	*Archosargus probatocephalus*	SM
Hardhead catfish	*Arius felis*	SM
Gafftopsail catfish	*Barge marinus*	SM
Silver perch	*Bairdiella chrysoura*	SM
Atlantic menhaden	*Brevoorita tyrannus*	SM
Yellowfin menhaden	*Brevoorita smithii*	SM
Crevalle jack	*Caranx hipppos*	SM
Common snook	*Centropomus undecimalis*	SM
Rock sea bass	*Centropristis philadelphica*	SM
Black seabass	*Centropristis striata*	SM
Atlantic spadefish	*Chaetodipterus faber*	SM
Florida blenny	*Chasmodes saburrae*	SM
Striped burfish	*Chilomycterus schoepfi*	SM
Atlantic bumper	*Chloroscombrus chrysurus*	SM
Bay whiff	*Citharichthys spilopterus*	SM
Spotted seatrout	*Cynoscion nebulosus*	SM
Weakfish	*Cynoscion regalis*	SM
Sheapshead minnow	*Cyprinodon variegatus*	SM
Atlantic stingray	*Dasyatis sabina*	SM
Bluntnose stingray	*Dasyatis say*	SM
Irish pompana	*Diapterus auratus*	SM
Striped mojarra	*Diapterus plumieri*	SM
Fat slepper	*Dormitator maculatus*	SM
Ladyfish	*Elops saurus*	SM
Bluespotted sunfish	*Enneacanthus gloriosus*	BST
Swamp darter	*Etheostoma fusiforme*	BST

* Non-Native Species

Common Name	*Scientific Name*	Primary Habitat (for all species)
Fringed flounder	*Etropus crossotus*	SM
Tidewater mojarra	*Eucinostomus harengulus*	SM
Silver jenny	*Eucinostomus gula*	SM
Lyre goby	*Evorthodus lyricus*	SM
Marsh killifish	*Fundulus confluentus*	SM
Gulf killifish	*Fundulus grandis*	SM
Longnose killifish	*Fundulus majalis*	SM
Mosquitofish	*Gambusia holbrooki*	SM
Yellowfin mojarra	*Gerres cinereus*	SM
Skilletfish	*Gobiesox strumosus*	SM
Darter goby	*Gobionellus boleosoma*	SM
Highfin goby	*Gobionellus oceanicus*	SM
Freshwater goby	*Gobionellus shufeldti*	BST
Emerald goby	*Gobionellus smaragdus*	SM
Naked goby	*Gobiosoma bosc*	SM
Code goby	*Gobiosoma robusstum*	SM
Smooth butterfly ray	*Gymnura micrura*	SM
Scaled sardine	*Harengula jaguana*	SM
Lined seahorse	*Hippocampus erectus*	SM
Brook silverside	*Labidesthes sicculus*	SM
Pinfish	*Lagodon rhomboides*	SM
Banded drum	*Larimus fasciatus*	SM
Spot	*Leiostomus xanthurus*	SM
Longnose gar	*Lepisosteus osseus*	BST
Florida gar	*Lepisosteus platyrhincus*	BST
Redbreast sunfish	*Lepomis auritus*	BST
Warmouth	*Lepomis gulosu*	BST
Bluegill	*Lepomis macrochirus*	BST
Longear sunfish	*Lepomis megalotis*	BST
Redear sunfish	*Lepomis microlophus*	BST
Rainwater killifish	*Lucania parva*	BST
Gray snapper	*Lutjanus griseus*	SM
Lane snapper	*Lutjanus synagris*	SM
Tarpon	*Megalops atlanticus*	SM
Rough silverside	*Membras martinica*	SM
Inland silverside	*Menidia beryllina*	SM
Tidewater silverside	*Menidia peninsulae*	SM
Southern kingfish	*Menticirrhus americanus*	SM
Clown goby	*Microgobius gulosus*	SM
Green goby	*Microgobius thalassinus*	SM
Atlantic croaker	*Micropogonias undulatus*	SM
Largemouth bass	*Micropterus salmoides*	BST

* Non-Native Species

Common Name	*Scientific Name*	Primary Habitat (for all species)
Planehead filefish	*Monacanthus hispidus*	SM
Striped mullet	*Mugil cephalus*	SM
White mullet	*Mugil curema*	SM
Speckled worm eel	*Myrophis punctatus*	SM
Polka-dot batfish	*Ogcocephalus radiates*	SM
Leatherjacket	*Oligoplites saurus*	SM
Atlantic thread herring	*Opisthonema oglinum*	SM
Oyster toadfish	*Opsanus tau*	SM
Blue tilapia*	*Oreochromis aureus*	SM
Pigfish	*Orthopristis chrysoptera*	SM
Gulf flounder	*Paralichthys lethostigma*	SM
Southern flounder	*Paralichthys lethostigma*	SM
Sailfin molly	*Poecilia latipinna*	SM
Black drum	*Pogonias cromis*	SM
Bluefish	*Pomatomus saltatrix*	SM
Leopard searobin	*Prionotus scitulus*	SM
Bighead searobin	*Prionotus tribulus*	SM
Red drum	*Sciaenops ocellatus*	SM
Atlantic Spanish mackerel	*Scomberomorus maculatus*	SM
Lookdown	*Selene vomer*	SM
Southern puffer	*Sphoeroides nephelus*	SM
Great barracuda	*Sphyraena barracuda*	SM
Star drum	*Stellifer lanceolatus*	SM
Atlantic needlefish	*Strongylura marina*	SM
Redfin needlefish	*Strongylura notata*	SM
Timucu	*Strongylura timucu*	SM
Blackcheek tonguefish	*Symphurus plagiusa*	SM
Chain pipefish	*Syngnathus louisianae*	SM
Gulf Pipefish	*Syngnathus scovelli*	SM
Inshore lizardfish	*Synodus foetens*	SM
Permit	*Trachinotus falcatus*	SM
Atlantic cutlass fish	*Trichiurus lepteru*	SM
Hogchoker	*Trinectes maculates*	SM
Southern hake	*Urophics floridana*	SM

AMPHIBIANS

Southern cricket frog	*Acris gryllus gryllus*	DM
Southeastern slimy salamander	*Plethodon grobmani*	UHF
Eastern spadefoot	*Scaphiopus holbrooki holbrooki*	UHF

* Non-Native Species

Common Name	*Scientific Name*	Primary Habitat (for all species)
Oak toad	*Bufo quercicus*	UHF
Southern toad	*Bufo terrestris*	UHF
Greenhouse frog*	*Eleutherodactylus planirostris*	MTC
Eastern narrowmouth toad	*Gastrophryne carolinensis*	UHF
Green treefrog	*Hyla cinerea*	UHF
Squirrel treefrog	*Hyla squirella*	UHF
Cuban tree frog*	*Osteopilus septentrionalis*	MF,DV
Little grass frog	*Pseudacris ocularis*	UHF
Southern Leopard frog	*Rana utricularia*	HH,SWLK
Florida leopard frog	*Rana utricularia sphenocephala*	HH
Bronze frog	*Rana clamitans clamitans*	HH
Eastern spadefoot toad	*Scaphiopus holbrookii holbrookii*	UHF

REPTILES

Eastern cottonmouth	*Agkistrodon piscivorus piscivorus*	HH
American alligator	*Alligator mississippiensis*	DPMF
Green anole	*Anolis carolinensis*	UHF,XH
Brown anole*	*Anolis sagrei*	UHF,XH,MF,DV
Florida softshell	*Apalone ferox*	BST
Florida snapping turtle	*Chelydra serpentina osceola*	BST
Six-lined racerunner	*Cnemidophorus sexlineatus sexlineatus*	SC
Southern black racer	*Coluber constrictor priapus*	UHF,XH,HH
Eastern diamondback rattlesnake	*Crotalus adamanteus*	MF,XH
Southern ringneck snake	*Diadophis punctatus punctatus*	XH
Eastern indigo snake	*Drymarshon corais couperi*	XH,HH
Corn snake	*Elaphe guttata guttata*	UHF,XH,HH
Yellow rat snake	*Elaphe obsoleta quadrivittata*	MF,UHF,XH,HH
Southeastern five-lined skink	*Eumeces inexpectatus*	UHF,XH
Five-lined skink	*Eumeces fasciatus*	UHF
Broadhead skink	*Eumeces laticeps*	UHF,XH
Gopher tortoise	*Gopherus polyphemus*	SC,SCF
Eastern hognose snake	*Heterodon platyrhinos*	UHF
Meditteranean gecko*	*Hemidactylus turcicus*	DV
Florida mud turtle	*Kinosternon subrubrum steindachneri*	HH
Eastern kingsnake	*Lampropeltis getulus getulus*	UHF,XH
Scarlet kingsnake	*Lampropeltis triangulum elapsoides*	HH
Florida east coast terrapin	*Malaclemys terrapin tequesta*	DPMF
Eastern coral snake	*Micrurus fulvius fulvius*	UHF,XH
Atlantic salt marsh snake	*Nerodia clarkii taeniata*	SM
Florida water snake	*Nerodia fasciata pictiventris*	DPMF
Brown water snake	*Nerodia taxispilota*	BST

* Non-Native Species

Common Name	*Scientific Name*	Primary Habitat (for all species)
Rough green snake	*Opheodrys aestivus aestivus*	MEH,UHF
Eastern glass lizard	*Ophisaurus ventralis*	UHF,XH
Peninsula cooter	*Pseudemys floridana peninsularis*	SM
Pine woods snake	*Rhadinaea flavilata*	BST
Florida worm lizard	*Rhineura floridana*	UHF
Ground skink	*Scincella lateralis*	UHF
Dusky Pigmy Rattlesnake	*Sistrurus miliarius barbouri*	MF,UHF,XH
Central Florida crowned snake	*Tantilla relicta neilli*	UHF
Florida box turtle	*Terrapene carolina bauri*	MF,UHF
Eastern garter snake	*Thamnophis sirtalis sirtalis*	UHF

BIRDS

Ducks and Geese

Wood Duck	*Aix sponsa*	BST,SM
American Wigeon	*Anas Americana*	BST,DPMF
Northern Pintail	*Anas acuta*	BST
Ring-necked Duck	*Aythya collaris*	BST,DPMF
Mottled Duck	*Anas fulvigula*	SM
Green-winged Teal	*Anas crecca*	SM
Blue-winged Teal	*Anas discors*	SM
Lesser Scaup	*Aythya affinis*	DPMF
Hooded Merganser	*Lophodytes cucullatus*	SM,BST,DPMF
White-winged Scoter	*Melanitta fusca*	DPMF
Black Scoter	*Melanitta nigra*	DPMF
Surf Scoter	*Melanitta perspicillata*	DPMF
Bufflehead	*Bucephala albeola*	DPMF
Common Goldeneye	*Bucephala clangula*	BST,DPMF
Red-breasted Merganser	*Mergus serrator*	BST,DPMF

Turkeys

Northern Bobwhite	*Colinus virginianus*	MF
Wild Turkey	*Meleagris gallopavo*	UHF

Loons

Common Loon	*Gavia immer*	BST,DPMF

Grebes

Horned Grebe	*Podiceps auritus*	DPMF
Pied-billed Grebe	*Podilymbus podiceps*	BST,DPMF
Eared Grebe	*Podiceps nigricollis*	DPMF

* Non-Native Species

Common Name	*Scientific Name*	Primary Habitat (for all species)
Petrels and Shearwaters		
Band-rumpled Storm-Petrel	*Oceanodroma castro*	DPMF
Gannets		
Northern Gannet	*Morus bassanus*	OF
Pelicans		
American white pelican	*Pelicanus erythrorhynchos*	DPCB,DP7,DPMF
Brown Pelican	*Pelecanus occidentalis*	BST,DPMF,SM
Cormorants		
Double-crested Cormorant	*Phalacrocorax auritus*	BST,DPMF
Frigatebirds		
Magnificent Frigatebird	*Fregata magnificens*	OF
Darters		
Anhinga	*Anhinga anhinga*	BST,DPMF
Herons and Bitterns		
Great Egret	*Ardea alba*	BST,SM,DPMF
Great Blue Heron	*Ardea herodias*	BST,SM,DPMF
American Bittern	*Botaurus lentiginosus*	SM
Cattle Egret	*Bubulcus ibis*	SM
Green Heron	*Butorides virescens*	BST,SM,DPMF
Little Blue Heron	*Egretta caerulea*	BST,SM,DPMF
Reddish Egret	*Egretta rufescens*	DPMF,SM
Snowy Egret	*Egretta thula*	BST,SM,DPMF
Tricolored Heron	*Egretta tricolor*	BST,SM,DPMF
Least Bittern	*Ixobrychus exilis*	SM
Yellow-crowned Night-Heron	*Nyctanassa violacea*	BST,SM,DPMF
Black-crowned Night-Heron	*Nycticorax nycticorax*	BST,SM,DPMF
Ibises and Spoonbills		
White Ibis	*Eudocimus albus*	BST,SM,DPMF
Roseate Spoonbill	*Platalea ajaja*	SM
Glossy Ibis	*Plegadis falcinellus*	SM,DPMF
Storks		
Wood Stork	*Mycteria americana*	SM,DPMF

* Non-Native Species

Common Name	*Scientific Name*	Primary Habitat (for all species)
Vultures		
Turkey Vulture	*Cathartes aura*	MTC
Black Vulture	*Coragyps atratus*	MTC
Hawks, Eagles and Kites		
Cooper's Hawk	*Accipiter cooperii*	UHF,XH
Sharp-shinned Hawk	*Accipiter striatus*	UHF,XH
Red-tailed Hawk	*Buteo jamaicensis*	UHF,SM
Red-shouldered Hawk	*Buteo lineatus*	2DP,HH
Northern Harrier	*Circus cyaneus*	SM
Bald Eagle	*Haliaeetus leucocephalus*	MTC
Osprey	*Pandion haliaetus*	BST,SM,DPMF
Swallow-tailed Kite	*Elanoides forficatus*	OF
Falcons		
Merlin	*Falco columbarius*	OF
Peregrine Falcon	*Falco peregrinus*	SM
American Kestrel	*Falco sparverius*	UHF
Cranes		
Greater sandhill crane	*Grus canadensis pratensis*	OF
Rails, Gallinules and Coots		
Yellow Rail	*Coturnicops noveboracensis*	SM
American Coot	*Fulica americana*	BST,SM,DPMF
Common Moorhen	*Gallinula chloropus*	BST,SM
Sora	*Porzana carolina*	SM
Virginia Rail	*Rallus limicola*	SM
Clapper Rail	*Rallus longirostris*	SM
Plovers		
Piping Plover	*Charadrius melodus*	DPMF
Semipalmated Plover	*Charadrius semipalmatus*	DPMF
Killdeer	*Charadrius vociferus*	SM
Black-bellied Plover	*Pluvialis squatarola*	SM,DPMF
Oystercatchers		
American Oystercatcher	*Haematopus palliatus*	DPMF,DPCB
Snipes and Sandpipers		
Spotted Sandpiper	*Actitis macularius*	SM,BST
Ruddy Turnstone	*Arenaria interpres*	DPMF

* Non-Native Species

Common Name	*Scientific Name*	Primary Habitat (for all species)
Sanderling	*Calidris alba*	DPMF
Dunlin	*Calidris alpina*	DPMF,SM
Red Knot	*Calidris canutus*	DPMF
Western Sandpiper	*Calidris mauri*	DPMF
Least Sandpiper	*Calidris minutilla*	SM,DPMF
Semipalmated Sandpiper	*Calidris pusilla*	SM,DPMF
Willet	*Catoptrophorus semipalmatus*	SM,DPMF
Common Snipe	*Gallinago gallinago*	SM
Short-billed Dowitcher	*Limnodromus griseus*	SM,DPMF
Long-billed Dowitcher	*Limnodromus scolopaceus*	DPMF
Marbled Godwit	*Limosa fedoa*	DPMF
Lesser Yellowlegs	*Tringa flavipes*	SM,DPMF
Greater Yellowlegs	*Tringa melanoleuca*	SM,DPMF
Solitary Sandpiper	*Tringa solitaria*	SM,DPMF
Gulls, Terns and Skimmers		
Black Tern	*Chlidonias niger*	OF,SM
Herring Gull	*Larus argentatus*	DPMF
Lesser Black-backed Gull	*Larus fuscus*	DPMF
Laughing Gull	*Larus atricilla*	BST,DPMF,SM
Ring-billed Gull	*Larus delawarensis*	BST,SM,DPMF
Great Black-backed Gull	*Larus marinus*	DPMF
Bonaparte's Gull	*Larus philadelphia*	SM
Black Skimmer	*Rynchops niger*	DPMF,SM
Least Tern	*Sterna antillarum*	SM,DPMF,OF
Caspian Tern	*Sterna caspia*	SM,DPMF,OF
Forster's Tern	*Sterna forsteri*	SM,DPMF
Common Tern	*Sterna hirundo*	OF
Royal Tern	*Sterna maxima*	SM,DPMF,OF
Gull-billed Tern	*Sterna nilotica*	DPMF
Sandwich Tern	*Sterna sandvicensis*	SM,DPMF
Doves		
Rock Dove	*Columba livia*	DV,OF
White-winged Dove	*Zenaida asiatica*	UHF,XH
Common Ground-Dove	*Columbina passerina*	UHF,XH
Mourning Dove	*Zenaida macroura*	UHF,XH
Cuckoos		
Yellow-billed Cuckoo	*Coccyzus americanus*	UHF
Barn Owls		

* Non-Native Species

Common Name	*Scientific Name*	Primary Habitat (for all species)
Barn Owl	*Tyto alba*	UHF,XH
Owls		
Great Horned Owl	*Bubo virginianus*	UHF,XH
Eastern Screech-Owl	*Megascops asio*	UHF,XH
Barred Owl	*Strix varia*	UHF,XH
Goatsuckers		
Chuck-will's-widow	*Caprimulgus carolinensis*	UHF,XH
Common Nighthawk	*Chordeiles minor*	OF,UHF,MF
Whip-poor-will	*Caprimulgus vocieferus*	UHF,XH
Swifts		
Chimney Swift	*Chaetura pelagica*	OF,DV
Hummingbirds		
Ruby-throated Hummingbird	*Archilochus colubris*	UHF,XH
Kingfishers		
Belted Kingfisher	*Ceryle alcyon*	BST,SM
Woodpeckers		
Northern Flicker	*Colaptes auratus*	UHF,XH
Pileated Woodpecker	*Dryocopus pileatus*	UHF,XH
Red-bellied Woodpecker	*Melanerpes carolinus*	UHF,XH
Red-headed Woodpecker	*Melanerpes erythrocephalus*	OF
Downy Woodpecker	*Picoides pubescens*	UHF,XH
Hairy Woodpecker	*Picoides villosus*	UHF,XH
Yellow-bellied Sapsucker	*Sphyrapicus varius*	UHF,XH
Flycatchers		
Eastern Wood-Pewee	*Contopus virens*	UHF,XH
Least Flycatcher	*Empidonax minimus*	UHF,XH
Great Crested Flycatcher	*Myiarchus crinitus*	UHF,XH
Eastern Phoebe	*Sayornis phoebe*	UHF,SM
Eastern Kingbird	*Tyrannus tyrannus*	UHF,SM
Gray Kingbird	*Tyrannus dominicensis*	SM
Shrikes		
Loggerhead Shrike	*Lanius ludovicianus*	UHF,XH

* Non-Native Species

Common Name	*Scientific Name*	Primary Habitat (for all species)
Vireos		
Yellow-throated Vireo	*Vireo flavifrons*	UHF,XH
White-eyed Vireo	*Vireo griseus*	UHF,XH
Bell's Vireo	*Vireo bellii*	MF4
Red-eyed Vireo	*Vireo olivaceus*	UHF,XH,HH
Blue-headed Vireo	*Vireo solitarius*	UHF,XH
Jays and Crows		
American Crow	*Corvus brachyrhynchos*	OF
Fish Crow	*Corvus ossifragus*	SM,OF
Blue Jay	*Cyanocitta cristata*	UHF,XH,HH
Martins and Swallows		
Barn Swallow	*Hirundo rustica*	OF,SM
Purple Martin	*Progne subis*	OF
Northern Rough -winged Swallow	*Stelgidopteryx serripennis*	SM,OF
Bank Swallow	*Riparia riparia*	OF
Tree Swallow	*Tachycineta bicolor*	SM,OF
Cliff Swallow	*Petrochelidon pyrrhonota*	OF
Titmice		
Tufted Titmouse	*Baeolophus bicolor*	UHF,XH
Carolina Chickadee	*Poecile carolinensis*	UHF
Wrens		
Marsh Wren	*Cistothorus palustris*	SM
Sedge Wren	*Cistothorus platensis*	SM
Carolina Wren	*Thryothorus ludovicianus*	UHF,XH
House Wren	*Troglodytes aedon*	UHF,XH
Kinglets		
Ruby-crowned Kinglet	*Regulus calendula*	UHF,XH
Golden-crowned Kinglet	*Regulus satrapa*	UHF,XH
Gnatcatchers		
Blue-gray Gnatcatcher	*Polioptila caerulea*	UHF,XH
Thrushes		
Veery	*Catharus fuscescens*	UHF,XH
Hermit Thrush	*Catharus guttatus*	UHF,XH
Gray-cheeked Thrush	*Catharus minimus*	UHF,XH
Swainson's Thrush	*Catharus ustulatus*	UHF,XH

* Non-Native Species

Common Name	*Scientific Name*	Primary Habitat (for all species)
Wood Thrush	*Hylocichla mustelina*	UHF,XH
American Robin	*Turdus migratorius*	UHF,XH,HH
Mimids		
Gray Catbird	*Dumetella carolinensis*	UHF,XH
Northern Mockingbird	*Mimus polyglottos*	UHF
Brown Thrasher	*Toxostoma rufum*	UHF,XH
Starlings		
European Starling*	*Sturnus vulgaris*	UHF,,SM,DV
Waxwings		
Cedar Waxwing	*Bombycilla cedrorum*	UHF
Warblers		
Tennessee Warbler	*Vermivora peregrine*	XH
Blue-winged Warbler	*Vermivora pinus*	XH
Black-throated Blue Warbler	*Dendroica caerulescens*	UHF,XH
Black-throated Green Warbler	*Dendroica virens*	UHF,XH
Yellow-rumped Warbler	*Dendroica coronata*	MTC
Prairie Warbler	*Dendroica discolor*	UHF,HH,SM
Yellow-throated Warbler	*Dendroica dominica*	UHF,XH,HH
Palm Warbler	*Dendroica palmarum*	UHF,XH,HH
Bay-breasted Warbler	*Dendroica castanea*	UHF,XH,HH
Yellow Warbler	*Dendroica petechia*	SM
Chestnut-sided Warbler	*Dendroica pensylvanica*	XH
Magnolia Warbler	*Dendroica magnolia*	UHF,XH
Pine Warbler	*Dendroica pinus*	UHF,XH,MF
Blackpoll Warbler	*Dendroica striata*	UHF,XH,HH
Cape May Warbler	*Dendroica tigrina*	UHF,XH
Common Yellowthroat	*Geothlypis trichas*	HH,SM
Worm-eating Warbler	*Helmitheros vermivorum*	UHF,XH,HH
Black-and-white Warbler	*Mniotilta varia*	UHF,XH,HH
American Redstart	*Setophaga ruticilla*	UHF,XH,HH
Swainson's Warbler	*Limnothlypis swainsonii*	HH
Connecticut Warbler	*Oporonis agilis*	UHF,XH
Kentucky Warbler	*Oporonis formosus*	UHF,XH
Hooded Warbler	*Wilsonia citriina*	UHF,XH
Northern Parula	*Parula americana*	UHF,XH,HH
Prothonotary Warbler	*Protonotaria citrea*	UHF,XH
Ovenbird	*Seiurus aurocapilla*	UHF,XH,HH
Northern Waterthrush	*Seiurus noveboracensis*	UHF,HH,SM

* Non-Native Species

Common Name	*Scientific Name*	Primary Habitat (for all species)
Orange-crowned Warbler	*Vermivora celata*	UHF,XH,HH
Tanagers		
Summer Tanager	*Piranga rubra*	UHF,XH,HH
Sparrows,Towhees,and Juncos		
Swamp Sparrow	*Melospiza georgiana*	SM
Savannah Sparrow	*Passerculus sandwichensis*	SM
Eastern Towhee	*Pipilo erythrophthalmus*	UHF,XH
Chipping Sparrow	*Spizella passerina*	MF
Cardinals,Grosbeaks,and Buntings		
Northern Cardinal	*Cardinalis cardinalis*	UHF,XH
Painted Bunting	*Passerina ciris*	UHF,XH
Indigo Bunting	*Passerina cyanea*	UHF,XH
Meadowlarks,Blackbirds,and Orioles		
Red-winged Blackbird	*Agelaius phoeniceus*	SM
Bobolink	*Dolichonyx oryzivorus*	SM
Brown-headed Cowbird*	*Molothrus ater*	UHF,XH
Boat-tailed Grackle	*Quiscalus major*	SM,UHF,XH
Common Grackle	*Quiscalus quiscula*	UHF,XH
Eastern Meadowlark	*Sturnella magna*	MF
Baltimore Oriole	*Icterus galbula*	UHF,XH
Finches		
American Goldfinch	*Carduelis tristis*	UHF,XH

MAMMALS

Didelphids		
Opossum	*Didelphis virginiana*	MTC
Moles		
Eastern mole	*Scalopus aquaticus*	MF, XH
Bats		
Eastern pipestrelle	*Pipistrellus subflavus*	XH
Edentates		
Nine-banded armadillo*	*Dasypus novemcinctus*	MTC

* Non-Native Species

Tomoka Basin State Parks Animals

Common Name	*Scientific Name*	Primary Habitat (for all species)
Lagomorphs		
Eastern cottontail	*Sylvilagus floridanus*	MF
Marsh rabbit	*Sylvilagus palustris*	SM
Rodents		
Southern flying squirrel	*Glaucomys volans*	UHF, XH
Round-tailed muskrat	*Neofiber alleni*	SM
Eastern woodrat	*Neotoma floridana*	XH
Golden mouse	*Ochrotomys nuttalli*	MF
Rice rat	*Oryzomys palustris*	SM
House mouse*	*Mus musculus*	DV
Cotton mouse	*Peromyscus gossypinus*	MF, XH
Brown rat*	*Rattus norvegicus*	MF,DV
Gray squirrel	*Sciurus carolinensis*	MTC
Fox squirrel	*Sciurus niger*	1CB, UHF
Hispid cotton rat	*Sigmodon hispidus*	MF, XH, SM
Carnivores		
Coyote*	*Canis latrans*	MTC
Feral cat*	*Felis catus*	MTC
River otter	*Lutra canadensis*	SM
Bobcat	*Lynx rufus*	MTC
Striped skunk	*Mephitis mephitis*	UHF, XH
Long-tailed weasel	*Mustela frenata*	MF,UHF
Raccoon	*Procyon lotor*	MTC
Florida panther	*Puma concolor*	MF, UHF
Gray fox	*Urocyon cinereoargenteus*	MF, XH
Florida black bear	*Ursus americanus floridanus*	MTC
Artiodactyls		
White-tailed deer	*Odocoileus virginianus*	MF, UHF, XH
Feral pig*	*Sus scrofa*	MTC
Cetaceans		
Bottle-nosed dolphin	*Tursiops truncatus*	SM
Sirenia		
Florida manatee	*Trichechus manatus latirostris*	SM

* Non-Native Species

TERRESTRIAL

Beach Dune ..... BD
Coastal Berm ..... CB
Coastal Grassland ..... CG
Coastal Strand ..... CS
Dry Prairie ..... DP
Keys Cactus Barren ..... KCB
Limestone Outcrop ..... LO
Maritime Hammock ..... MAH
Mesic Flatwoods ..... MF
Mesic Hammock ..... MEH
Pine Rockland ..... PR
Rockland Hammock ..... RH
Sandhill ..... SH
Scrub ..... SC
Scrubby Flatwoods ..... SCF
Shell Mound ..... SHM
Sinkhole ..... SK
Slope Forest ..... SPF
Upland Glade ..... UG
Upland Hardwood Forest ..... UHF
Upland Mixed Woodland ..... UMW
Upland Pine ..... UP
Wet Flatwoods ..... WF
Xeric Hammock ..... XH

PALUSTRINE

Alluvial Forest ..... AF
Basin Marsh ..... BM
Basin Swamp ..... BS
Baygall ..... BG
Bottomland Forest ..... BF
Coastal Interdunal Swale ..... CIS
Depression Marsh ..... DM
Dome Swamp ..... DS
Floodplain Marsh ..... FM
Floodplain Swamp ..... FS
Glades Marsh ..... GM
Hydric Hammock ..... HH
Keys Tidal Rock Barren ..... KTRB
Mangrove Swamp ..... MS
Marl Prairie ..... MP
Salt Marsh ..... SAM
Seepage Slope ..... SSL
Shrub Bog ..... SHB

Slough ..... SLO
Slough Marsh ..... SLM
Strand Swamp ..... STS
Wet Prairie ..... WP

LACUSTRINE
Clastic Upland Lake ..... CULK
Coastal Dune Lake ..... CDLK
Coastal Rockland Lake ..... CRLK
Flatwoods/Prairie ..... FPLK
Marsh Lake ..... MLK
River Floodplain Lake ..... RFLK
Sandhill Upland Lake ..... SULK
Sinkhole Lake ..... SKLK
Swamp Lake ..... SWLK

RIVERINE
Alluvial Stream ..... AST
Blackwater Stream ..... BST
Seepage Stream ..... SST
Spring-run Stream ..... SRST

SUBTERRANEAN
Aquatic Cave ..... ACV
Terrestrial Cave ..... TCV

ESTUARINE
Algal Bed ..... EAB
Composite Substrate ..... ECPS
Consolidated Substrate ..... ECNS
Coral Reef ..... ECR
Mollusk Reef ..... EMR
Octocoral Bed ..... EOB
Seagrass Bed ..... ESGB
Sponge Bed ..... ESPB
Unconsolidated Substrate ..... EUS
Worm Reef ..... EWR

MARINE

Algal Bed ..... MAB
Composite Substrate ..... MCPS
Consolidated Substrate ..... MCNS
Coral Reef ..... MCR
Mollusk Reef ..... MMR
Octocoral Bed ..... MOB
Seagrass Bed ..... MSGB
Sponge Bed ..... MSPB
Unconsolidated Substrate ..... MUS
Worm Reef ..... MWR

ALTERED LANDCOVER TYPES

Abandoned field ..... ABF
Abandoned pasture ..... ABP
Agriculture ..... AG
Canal/ditch ..... CD
Clearcut pine plantation ..... CPP
Clearing CL
Developed ..... DV
Impoundment/artificial pond ..... IAP
Invasive exotic monoculture ..... IEM
Pasture - improved ..... PI
Pasture - semi-improved ..... PSI
Pine plantation ..... PP
Road ..... RD
Spoil area ..... SA
Successional hardwood forest ..... SHF
Utility corridor ..... UC

MISCELLANEOUS

Many Types of Communities ..... MTC
Overflying ..... OF

Addendum 6—Imperiled Species Ranking Definitions

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 fabricated 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 or 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 individuals) or because of vulnerability to extinction due to some natural or man-made factor.
S3 .....Either very rare or 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)
N .....Not currently listed, nor currently being considered for listing, by state or federal agencies.

LEGAL STATUS

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 that 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.LTListed as Threatened Species. Defined as any species that is likely to become an endangered species within the near 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 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 therefore is destined or very likely to become an endangered species within the near 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 that, in the near 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.

Addendum 7—Cultural Information

These procedures apply to state agencies, local governments and non-profits that manage state-owned properties.

A. General Discussion

Historic resources are both archaeological sites and historic structures. Per Chapter 267, Florida Statutes, "Historic property" or "historic resource" means any prehistoric district, site, building, object, or other real or personal property of historical, architectural or archaeological value, and folklife resources. These properties or resources may include, but are not limited to, monuments, memorials, Indian habitations, ceremonial sites, abandoned settlements, sunken or abandoned ships, engineering works, treasure trove, artifacts, or other objects with intrinsic historical or archaeological value, or any part thereof, relating to the history, government, and culture of the state."

B. Agency Responsibilities

Per State Policy relative to historic properties, state agencies of the executive branch must allow the Division of Historical Resources (Division) the opportunity to comment on any undertakings, whether these undertakings directly involve the state agency, i.e., land management responsibilities, or the state agency has indirect jurisdiction, i.e. permitting authority, grants, etc. No state funds should be expended on the undertaking until the Division has the opportunity to review and comment on the project, permit, grant, etc.

State agencies shall preserve the historic resources that are owned or controlled by the agency.

Regarding proposed demolition or substantial alterations of historic properties, consultation with the Division must occur, and alternatives to demolition must be considered.

State agencies must consult with Division to establish a program to location, inventory and evaluate all historic properties under ownership or controlled by the agency.

C. Statutory Authority

Statutory Authority and more in depth information can be found in the following:

Chapter 253, F.S. – State Lands

Chapter 267, F.S. – Historical Resources

Chapter 872, F.S. – Offenses Concerning Dead Bodies and Graves

Other helpful citations and references:

Chapter 1A-32, F.A.C. – Archaeological Research

Other helpful citations and references:

Chapter 1A-44, F.A.C. – Procedures for Reporting and Determining Jurisdiction Over Unmarked Human Burials

Chapter 1A-46, F.A C. – Archaeological and Historical Report Standards and Guidelines

The Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings

D. Management Implementation

Even though the Division sits on the Acquisition and Restoration Council and approves land management plans, these plans are conceptual. Specific information regarding individual projects must be submitted to the Division for review and recommendations.

Managers of state lands must coordinate any land clearing or ground disturbing activities with the Division to allow for review and comment on the proposed project. Recommendations may include, but are not limited to: approval of the project as submitted, pre-testing of the project site by a certified archaeological monitor, cultural resource assessment survey by a qualified professional archaeologist, modifications to the proposed project to avoid or mitigate potential adverse effects.

Projects such as additions, exterior alteration or related new construction regarding historic structures must also be submitted to the Division of Historical Resources for review and comment by the Division's architects. Projects involving structures fifty years of age or older, must be submitted to this agency for a significance determination**.** In rare cases, structures under fifty years of age may be deemed historically significant. These must be evaluated on a case-by-case basis.

Adverse impacts to significant sites, either archaeological sites or historic buildings, must be avoided. Furthermore, managers of state property should prepare for locating and evaluating historic resources, both archaeological sites and historic structures.

E. Minimum Review Documentation Requirements

In order to have a proposed project reviewed by the Division, the following information, at a minimum, must be submitted for comments and recommendations.

Project Description – A detailed description of the proposed project including all related activities. For land clearing or ground disturbing activities, the depth and extent of the disturbance, use of heavy equipment, location of lay down yard, etc. For historic structures, specific details regarding rehabilitation, demolition, etc.

Project Location – The exact location of the project indicated on a USGS Quadrangle map, is preferable. A management base map may be acceptable. Aerial photos indicating the exact project area as supplemental information are helpful.

Photographs – Photographs of the project area are always useful. Photographs of structures are required.

Description of Project Area – Note the acreage of the project; describe the present condition of project area, and any past land uses or disturbances.

Description of Structures – Describe the condition and setting of each building within project area if approximately fifty years of age or older.

Recorded Archaeological Sites or Historic Structures – Provide Florida Master Site File numbers for all recorded historic resources within or adjacent to the project area. This information should be in the current management plan; however, it can be obtained by contacting the Florida Master Site File at (850) 245-6440 or Suncom 205-6440.

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

Susan M. Harp
Historic Preservation Planner
Division of Historical Resources
Bureau of Historic Preservation
Compliance and Review Section
R. A. Gray Building
500 South Bronough Street
Tallahassee, FL 32399-0250

Phone: (850) 245-6333
Fax: (850) 245-6438

The criteria to be used for evaluating eligibility for listing in the National Register of Historic Places are as follows:

1) Districts, sites, buildings, structures, and objects may be considered to have significance in American history, architecture, archaeology, engineering, and/or culture if they possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

- **a)** are associated with events that have made a significant contribution to the broad patterns of our history; and/or
- **b)** are associated with the lives of persons significant in our past; and/or
- **c)** embody the distinctive characteristics of type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; and/or
- **d)** have yielded, or may be likely to yield, information important in prehistory or history.

2) Ordinarily cemeteries, birthplaces, or graves of historical figures; properties owned by religious institutions or used for religious purposes; structures that have been moved from their original locations; reconstructed historic buildings; properties primarily commemorative in nature; and properties that have achieved significance within the past 50 years shall not be considered eligible for the *National Register*. However, such properties will qualify if they are integral parts of districts that do meet the criteria or if they fall within the following categories:

- **a)** a religious property deriving its primary significance from architectural or artistic distinction or historical importance; or
- **b)** a building or structure removed from its original location but which is significant primarily for architectural value, or which is the surviving structure most importantly associated with a historic person or event; or
- **c)** a birthplace or grave of an historical figure of outstanding importance if there is no appropriate site or building directly associated with his productive life; or
- **d)** a cemetery which derives its primary significance from graves of persons of transcendent importance, from age, distinctive design features, or association with historic events; or

e) a reconstructed building, when it is accurately executed in a suitable environment and presented in a dignified manner as part of a restoration master plan, and no other building or structure with the same association has survived; or a property primarily commemorative in intent, if design, age, tradition, or symbolic value has invested it with its own exceptional significance; or

f) a property achieving significance within the past 50 years, if it is of exceptional importance.

Restoration is defined as the act or process of accurately depicting the form, features, and character of a property as it appeared at a particular period of time by means of the removal of features from other periods in its history and reconstruction of missing features from the restoration period. The limited and sensitive upgrading of mechanical, electrical and plumbing systems and other code-required work to make properties functional is appropriate within a restoration project.

Rehabilitation is defined as the act or process of making possible a compatible use for a property through repair, alterations and additions while preserving those portions or features that convey its historical, cultural or architectural values.

Stabilization is defined as the act or process of applying measures designed to reestablish a weather resistant enclosure and the structural stability of an unsafe or deteriorated property while maintaining the essential form as it exists at present.

Preservation is defined as the act or process of applying measures necessary to sustain the existing form, integrity and materials of an historic property. Work, including preliminary measures to protect and stabilize the property, generally focuses upon the ongoing maintenance and repair of historic materials and features rather than extensive replacement and new construction. New exterior additions are not within the scope of this treatment; however, the limited and sensitive upgrading of mechanical, electrical and plumbing systems and other code-required work to make properties functional is appropriate within a preservation project.

Addendum 8—Timber Management Analysis

Bulow Creek State Park – Mission Pines Flatwoods (Zone BC18)

The staff biologist for Tomoka Basin State Parks assisted John Marshall, Senior Forester OSL Region 5, Florida Forest Service ("FFS forester") with a timber assessment of the Mission Pines Addition on 7 May 2008. Mission Pines contains 105 acres of pine timber in mesic flatwoods and wet flatwoods, designated as zone BC18 for prescribed burning. The overstory pines in BC18 are slash pine, *Pinus elliottii*, and the understory is dominantly sawpalmetto and cabbage palms with patches of crookedwood, oaks and other hardwood trees and shrubs.

The FFS forester utilized standard silvicultural methods to determine basal area, quantitative estimates and qualitative assements of merchantable timber at several sample points. Sample point #1 in subunit 18C (BC18 is subdivided into five blocks, 18A-18E) had a basal area of 190 ft2/acre with trunk diameters ranging from 6-17 inches DBH. One of the larger pines in SP#1 was 16.5 inches DBH and 95 ft total height. The potential timber yield at SP#1 was 28,000-board ft/ac, with six chords/acre of Chip-n-Saw timber and six chords/acre of pulpwood.

Sample Point #2 in subunit 18E had a basal area of 230 ft2/acre. Quantitative estimates of yield by size class were not determined; it was evident, with 80% of the pines >12 inches DBH, that SP#2 had a significant amount of merchantable timber. The largest pine in SP#2 measured 19.8 inches DBH and 90 ft total height.

Sample Point #3 was taken along Spur Road at the southeast edge of the flatwoods in BC18. The basal area was 80 ft2/acre. The overstory was open with scattered pines over a tall, dense understory with sawpalmettos, crookedwood, and oaks covered with Smilax vines. The high fuel loading in this heavy rough indicated that the area had not burned in recent years. The FFS forester extracted a core from one of the larger pines in SP#3; the tree measured 12.3 inches DBH and 70 ft. total height. A tree ring count indicated 50 years of growth. The core showed a "release" event occurred about 20 years ago, with a notable increase in annual growth increment. Although fire scars were not observed, the growth increase may have been a response to a fire in the flatwoods, probably the last burn in this area. With a basal area of 80 ft2, a thinning harvest is not recommended in this open flatwoods.

Sample points #1-#3 were located in flatwoods east of Hammock Pond Road, an interior woods road that traverses the Mission Pines Addition from the gate on Old Dixie Highway to the park boundary at Plantation Oaks Subdivision. John Marshall worked as a commercial forester prior to employment with FFS and supervised a harvest in the flatwoods west of Hammock Pond Road prior to state acquisition. In the early 1990s, the pine stand in subunits 18D and 18E were partially logged as a "shelterwood" harvest where lower grade timber was cut for pulpwood, leaving high quality pines to partially shelter the undergrowth and provide seed trees for

regeneration. This resulted in an uneven-age stand, 15 years later that can be seen from Old Dixie Highway between the Main Gate and West Gate at the northwest corner of BC18.

Summary and Recommendations for Mission Pines Flatwoods by OSL Forester: BC18 has significant quantities of merchantable pine timber. There is within-stand variation in basal area and tree sizes, reflecting site quality and harvest history. High quality, unharvested sites have an average basal area of about 200 ft2/acre. FFS recommends two light thinnings (each < 50% removal) or one heavy thinning (> 50% removal) of pulpwood and Chip-n-Saw timber to reduce basal area to 70-80 ft2/acre. Tall, healthy pines would be selected as seed trees for future regeneration. Sites with basal area less than 100 ft2/acre would not be harvested. Prescribed burning in BC18 must be carefully implemented to maintain or improve the value of merchantable timber. Fire can damage timber resources as occurred in the pine flatwoods on the north side of Old Dixie Highway in zone BC12. A prescribed burn in December 2002 scorched the crowns of overstory pines and left a patch of dead trees, although most of the pines in BC12 were not damaged by fire. FFS recommends thinning the remaining stand in BC12 when BC18 is harvested. In January 2011, another meeting between Park Staff, District Staff and the OSL forester was held at the area. It was determined at that date that the current market would not support a fair price for the resource, and that it would be best to wait until market that is more favorable conditions to begin the harvesting operation.

Cultural Resources at Mission Pines: There is a cultural site dating to the plantation period in a hammock adjacent to flatwoods at the northeast corner of BC18, opposite the Dummett Mill Site on the other side of Old Dixie Highway. The hammock site is identified in the Florida Master Site File as VO2587 and is restricted for burning or timber harvest. There is another known (recently discovered) archaeological site/historic feature in the pine flatwoods in BC18; the entire 105-acre tract is known to be part of the Bunch-Dummett Plantation grant (1,168, acres) from the early 1800s. On 24 January 2011, the Environmental Specialist I for the Park investigated a ditch/road feature. The feature was determined to be an elevated roadway created by excavating soil to form a ditch, and piling all of the spoil to one side, forming an elevated roadway. The feature originates just west of the known site VO 2588 Lee Landing, and then continues southwesterly for ca. 375 meters and eventually due south for ca. another 475 meters. It has two "spurs"; one goes directly to the Dummett Mill VO 241 and the other directly to the aforementioned VO 2587 site. Park staff is in the process of reporting this newly discovered site to the Florida Master Site File. In this regard, the potential impact of a timber harvest would comprise a major disturbance and require Compliance Review by the state Division of Historical Resources (DHR) prior to logging operations.

Bulow Creek State Park–Pumphouse Road Pine Plantations (Zones BC10b, BC16a & BC16b)
The timber resources of the planted pine stands along Pumphose Road were evaluated

In 2002 by park biologist Charles DuToit and reviewed and approved by FFS for the 2003 Multi-Park UMP. In the following analysis, the pine plantations are described as individual tracts that correspond to zones BC10b, BC16a and BC16b on the management zone map for Bulow Creek State Park.

There are three tracts of planted pines within these zones along Pumphouse Road that is aligned approximately on the historic boundary between the Ormond Plantation Grant (north of the road) and McHardy Plantation Grant (south of the road). Although the boundary area may have been used for agriculture during Ormond-McHardy settlement (Territorial Period), these coastal flatlands were described as "pine islands" on an 1888 plat map of the Harwood "subdivision" (never developed) which incorporated both the Ormond and McHardy grants. There is no indication of agricultural -silvicultural use until the mid 20th century when the property was acquired by the large landholder E.B. Smoak. Aerial photos from the 1940s and 1950s show that Smoak was grazing cattle on flatwoods terraces--the "pine islands" of the Harwood map -- that were later planted for timber along Pumphouse Road (tracts BC10, BC16a, and BC16b) and Estuary Road (tracts BC6 & BC7). The Mound Grove stand (tracts BC3 & BC4) appears to have originally been xeric hammock, which was described as "high hammock" on the 1888 Harwood map.

According to retired FFS forester (J. Marquis, pers. comm.) slash pine was row planted in grazed flatwoods tracts and open hammock land in 1958, following the transfer of property from E.B. Smoak to the Lehigh Corporation. At this time, Pumphouse Road was constructed by the East Volusia Mosquito Control District which also excavated a network of perimeter ditches around the pine stands to improve the surface drainage of low-lying "pine islands" in a coastal basin.

Timber Analysis. There are approximately 140 acres of planted slash pines in the Pumphouse Road stand, comprising separate three tracts of 62 acres (BC10b), 37 acres (BC16b) and 39 acres (BC16a) respectively. The tracts are even-aged stands with 42 years of pine growth. Sample plots in tract BC10b and tract BC 16a showed a similar stand density of about 300 trees per acre. Trunk diameters typically range from seven-12 inches dbh; the average diameter is 9.2 inches dbh. The pines are 70-80 feet tall. The Pumphouse Road stand could be harvested for multiple forest products including pulp, plywood, fiberboard and lumber. The understory of all three tracts is dominated by cabbage palms whose crowns form a midstory canopy, about 20 feet high, above the ground layer which is predominantly pine straw and palm litter, with patches of grasses and forbs. There are scattered hardwoods in the pine stands including live oak, red cedar, sweetgum and red maple.

Bulow Creek State Park–Mound Grove Road Pine Plantations (Zones BC3& BC4)

The timber resources of the planted pine stands along Mound Grove Road were evaluated in 2002 by park biologist Charles DuToit, reviewed, and approved by FFS for the 2003 Multi-Park UMP.

There are 91 acres in the Mound Grove stand, comprised of two tracts of 50 acres (BC3) and 41 acres (BC4) respectively. Like the Pumphouse Road stand, the Mound Grove tracts were grazed by cattle prior to the planting of pines in 1958. The Mound Grove stand, however, was planted on more xeric uplands, Orsino and Daytona soils, that did not require ditching for water control. A quantitative sample plot in tract BC4 had a stand density was 183 pines per acre. The average trunk diameter of 11.2 inches dbh. average tree height was about 70 feet. The understory the Mound Grove tracts, characteristic of all the Bulow Creek plantations, is dominated by cabbage palms with occasional live oak (to 12 inches dbh), red cedar, laurel oak, and sweetgum. The ground layer is mostly bare needle-litter with a few species of grasses and forbs. No pine seedlings were observed in sample plot BC4. A walk-through survey in tract BC3 showed more understory diversity than BC4. There were some openings in palm understory of BC3 with pine reproduction, saw palmetto and shrub growth including wax myrtle, rusty lyonia and shiny blueberry.

Bulow Creek State Park– Estuary Road Pine Plantations (Zones BC6& BC7)
The timber resources of the planted pine stands along Mound Grove Road were evaluated in 2002 by park biologist Charles DuToit, reviewed, and approved by FFS for the 2003 Multi-Park UMP.

The Estuary Road Stand is west of Mound Grove, across Cedar Creek, on a flatwoods terrace with Myakka soils. There are three tracts of planted slash pines: BC 6 has 39 acres, BC7 has 45 acres and BC8 has 37 acres. These tracts were also grazed prior to planting around 1958; there is a cattle pond, watering trough and other remnant features from the old cattle operation. The plantations are even-aged stands with over 40 years of pine growth. A sample plot in BC 7 had 232 trees per acre with an average trunk diameter of 9.7 inches dbh and average height of 70 feet.
The Mound Grove stands could provide multiple forest products including pulpwood, plywood and lumber. Tract BC6 and BC7 are accessible from Estuary road; the unimproved grade will require stabilization at wetland crossings in order to support harvest equipment. There is no access to BC8 and this tract, therefore, has been omitted from the timber harvest plan.

Timber Management & Natural Community Restoration at Bulow Creek State Park. The following analysis was prepared in 2002 by park biologist Charles DuToit for the 2003 Multi-Park UMP.

In late June 1998, wildfires burned through two of the three tracts in the Pumphouse stands. Tract BC10b, on the north side of Pumphouse Road, had high mortality with about 75 % of the pines dead a year after the fire. Tract BC 16b, on the south side of the road, also burned in the 1998 wildfires, but experienced low mortality with only about 5% of the pines dying after the fire. The reason for this differential mortality is not clear, but it appears that the burnout of organic surface layers (duff-humus) in BC10b caused high mortality. Pine tract BC16a did not burn in the 1998 fires probably protected by perimeter ditches.

A vegetation survey after the Pumphouse Road fires, as well as post-burn evaluations following prescribed burns in the other pine tracts at Bulow Creek, suggest that fires may change the density of planted pines, but does not affect the understory dominance by cabbage palms. Regardless of fire intensity, all size classes of cabbage palm show high survival rates (with the exception of seedling growth consumed in ground burns) and rapidly refoliate, maintaining a dense midstory crown-cover. Exposure of mineral soils after severe burns appears to promote seedling regeneration of pines, red cedar and some other native and exotic species (Brazilian pepper noted in BC10b) but only in small gaps in the closing palm canopy. Based on these observations, it seems apparent that fire management will not break the dominance of cabbage palms and the associated stand characteristics of low species diversity and lack of habitat complexity for wildfire.

Other land managers relate similar observations, and suggest that cattle grazing and / or hydrological alteration prior to pine management may be responsible for palm dominance and loss in species diversity and habitat value. In this regard, there is a small stand of “natural” flatwoods near Pumphouse Road, between tracts BC16b and BC16a, that was neither planted and nor heavily grazed by earlier owners. This relatively undisturbed tract has the same soil type-Myakka sand with a hardpan layer, as the soils in adjacent planted tracts, as determined by Florida Cooperative Extension Service (D. Griffiths 6-27-00). The slash pines in the FCES stand are expectedly larger than the planted pines; most have trunks greater than 12 inches dbh. The most notable difference, however, is the understory diversity in the IFAS tract, which in addition to cabbage palms has saw palmetto, gallberry, rusty lyonia, yaupon, redbay, southern magnolia, live oak and persimmon. The major understory components of this tract, also common in the flatwoods in VOLT addition, have been displaced in the grazed and planted “pine islands” along Pumphouse Road and Estuary Road (tracts BC10a,BC16b, BC16a, BC6, BC7) and need to be replanted for community restoration. In terms of timber management, some of the cabbage palm thickets should be removed when the pines are harvested, and replaced by mixed-species patches of saw palmetto, gallberry, rusty lyonina, and other fire-adapted flatwoods species associated with Myakka soils.

The network of ditches around the Pumphouse Road tracts has altered the hydrology of the pinelands. The restoration of natural flatwoods, in addition to pine harvest and

understory plantings, will require an assessment of drainage impacts and structural measures for restoring original hydrological conditions.

Addendum 9—Land Management Reviews

Name of Site: Tomoka Basin State Parks
(Including: Addison Blockhouse Historic State Park, Bulow Creek State Park, Bulow Plantation Ruins Historic State Park and Tomoka State Park)

County: Volusia and Flagler Counties

Managed by: Department of Environmental Protection, Division of Recreation and Parks (DRP)

Acres: 12, 113.43 Acres

Review Date: 6/19/2007

Review Team Determination

1. Managed in accordance with acquisition purpose? **Yes**

2. Management practices, including public access, in compliance with the management plan? **Yes**

Consensus Commendations to the Managing Agency

The following commendations resulted from discussion and vote of the review team members.

1. The team commends the manager and staff on the ongoing, effective invasive exotic plant monitoring and treatment program at the parks that has resulted in maintenance condition over much of the property.
2. The team commends the DRP for the long-term tidal marsh restoration efforts at the parks, which are the result of successful interagency cooperation with the SJRWMD and Volusia County. The team supports continued active restoration of these communities.
3. The team commends the DRP for the acquisition, protection and interpretation of archaeological and historic resources at the parks.
4. The team commends the DRP for a very detailed, comprehensive and well written unit management plan.
5. The team commends the DRP for their efforts to minimize sedimentation from Karona Canal, resulting in improved flow in Bulow Creek.

Consensus Recommendations to the Managing Agency

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

1. The team recommends the DRP increase the frequency of prescribed fire in the pyrogenic natural communities in the parks.

Managing Agency Response: Agree. DRP will work on acquiring the necessary staff and equipment needed to increase the fire return interval for fire type natural communities when funding is allocated and received.

2. The team recommends that DRP identify concentrations of rare plants in the park and designate these areas as protected zones.

Managing Agency Response: Agree. The DRP is currently working on expanding the rare plant surveys to include areas not previously or recently surveyed.

3. The team recommends that DRP increase the use of mechanical means to restore areas that otherwise could not be restored with fire alone, and to reduce fire hazard in urban interface areas.

Managing Agency Response: Agree. Park staff has utilized mechanical methods of restoration in critical areas of the park. We will continue to pursue partnerships and funding to expand our efforts.

4. The team recommends that state-of-the-art, alternative waste disposal systems be used with any major retrofitting or new developments in order to protect water quality in the parks. The DEP should be at the forefront of protecting the environment in and around the park.

Managing Agency Response: Funding for projects such as these are determined annually by the Florida Legislature. DRP is making efforts to upgrade waste disposal systems at all state parks.

5. The team recommends the DRP reconsider the use of spoil areas for cabins and instead work toward ecological restoration of the spoil islands in the park.

Managing Agency Response: DRP will consider the merits of this recommendation during the unit planning process. Recreational opportunities at this location must also be considered in order to make a prudent determination.

Management Actions Exceeded Expectations

1. Management of the maritime hammocks, scrub, scrubby flatwoods, shell mound, upland mixed forest, xeric hammock, basin marsh and swamp, baygall, depression marsh, dome swamp, hydric hammock, slough, marsh and swamp lake, and estuarine tidal marsh, swamp and unconsolidated substrate communities.
2. Management and protection of the listed plants and animals, including bald eagle and manatee.
3. Cultural resources survey, and protection and preservation of the cultural resources.
4. Quality of the prescribed burns.

5. Tidal marsh and tidal creek restoration.
6. Control of invasive exotic animals and plants.
7. Maintenance of roads, culverts and ditches.
8. Management of hydroperiods and water levels.
9. Monitoring of ground water and surface water quality and quantity.
10. Gates and fencing, boundary surveys, signage, and law enforcement presence.
11. Managing impacts from adjacent expanding development and adjacent water issues.
12. Monitoring inholdings and additions for acquisition potential.
13. Public access including roads, parking, boat ramps, recreational facilities and interpretive signs.
14. Management of visitor impacts.
15. Environmental education and outreach programs.
16. Management of buildings.

Findings

1. Discussion in the management plan go address the management issues related to the dome swamp community.

Managing Agency Response: This will be addressed in the next UMP revision.

Memorandum

Florida Department of
Environmental Protection

July 9, 2012

TO: Marianne Gengenbach, Program Administrator
Division of State Lands

FROM: Parks Small, Chief, Bureau of Natural and Cultural Resources
Division of Recreation and Parks

Albert Gregory, Chief, Office of Park Planning
Division of Recreation and Parks

SUBJECT: Response to Draft Land Management Review (LMR)
Bulow Creek State Park

The Land Management Review draft report provided to DRP determined that management of Bulow Creek State Park by the Division of Recreation and Parks met the two tests prescribed by law. Namely, the review team concluded that the land is being managed for the purposes for which it was acquired and in accordance with the land management plan.

Below are Additional Recommendations and Checklist Findings (items the LMR determined should be further addressed in the management plan update) of the draft LMR report, with our manager's response to each. The responses were prepared via a coordinated effort of the park, district office, and our offices.

The team recommends that park staff continue their focus on increasing the fire frequency in all burn zones at these parks. (VOTE: 7+, 0-)
Managing Agency Response: *Agree; DRP will continue to keep existing burn zones in rotation while adding new zones to the plan to meet the goal of burning all zones within their recommended fire return interval. The park will continue to secure the funding needed to reduce fuel loads via mechanical treatment and harvests while putting in new fire lines in order to add backlogged zones to the burn plan.*

PLAN REVIEW
No recommended actions

FIELD REVIEW
Natural communities, regarding depression marsh, with documentation in the management plan.
Managing Agency Response: *Agree; The Unit Management Plan (UMP) for the park has been recently updated and will be approved in the next few months. When drafting the new UMP, the natural communities map was completely revised to include the newest FNAI classifications except for the altered land types. The map and the new plan now contain an expanded depression marsh description that is explained in the plan with management goals and objectives along with future desired conditions for this community.*

Increased resource management activities related to prescribed fire, specifically the frequency, with documentation in the management plan.
Managing Agency Response: *Agree; Staff will strive to increase the frequency of prescribed burning to meet the targeted acres. The newly revised management plan assigns fire return intervals and an annual acreage target for each community within the park.*

Thank you for your attention.

/gk

CC: Larry Fooks, Chief, Bureau of Parks District 3
Robert Yero, Assistant Chief, Bureau of Parks District 3
Phil Rand, Park Manager, Bulow Creek State Park
Jason Depue, Environmental Specialist, Bureau of Parks District 3

Memorandum

Florida Department of
Environmental Protection

July 9, 2012

TO: Marianne Gengenbach, Program Administrator
Division of State Lands

FROM: Parks Small, Chief, Bureau of Natural and Cultural Resources
Division of Recreation and Parks

Albert Gregory, Chief, Office of Park Planning
Division of Recreation and Parks

SUBJECT: Response to Draft Land Management Review (LMR)
Tomoka State Park

The Land Management Review draft report provided to DRP determined that management of Tomoka State Park by the Division of Recreation and Parks met the two tests prescribed by law. Namely, the review team concluded that the land is being managed for the purposes for which it was acquired and in accordance with the land management plan.

Below are Additional Recommendations and Checklist Findings (items the LMR determined should be further addressed in the management plan update) of the draft LMR report, with our manager's response to each. The responses were prepared via a coordinated effort of the park, district office, and our offices.

The team recommends that park staff continue their focus on increasing the fire frequency in all burn zones at these parks. (VOTE: 7+, 0-)
Managing Agency Response*: Agree; DRP will continue keep existing burn zones in rotation while adding new zones to the plan to meet the goal of burning all zones within their recommended fire return interval. The park will continue to secure the funding needed to reduce fuel loads via mechanical treatment and the construction of fire lines in order to add backlogged zones to the burn plan.*

The team recommends that immediate erosion control measures be taken at Tomoka Point. These actions may include limiting visitor access, pursuing necessary permits, hydrological studies to determine causes and possible solutions, etc. (VOTE: 7+, 0-)
Managing Agency Response: *Agree; DRP has been exploring feasible control measures for the erosion at Tomoka point for the past two years. The SJRWMD has also inspected the area with us and we are looking at ways to establish a living shoreline that will be able to withstand the swift currents that this point is subjected to.*

The team recommends that staff move forward with a more complete historical interpretation of Tomoka Point, including the removal of the Chief Tomokie statue and preservation of portions of the statue in a more suitable location, as practicable. (VOTE: 7+, 0-)
Managing Agency Response: *Agree; DRP has contracted with the University of South Florida to scan, document, and archive the structure before its removal. Now that this task has been completed, DRP is currently compiling the pertinent information needed to setup kiosks and*

interpretive displays. Following the DHR recommendations, part of the statue is scheduled to be removed and stored in a secure location at the park.

PLAN REVIEW
No recommended actions

FIELD REVIEW
Natural communities, regarding scrub and wet flatwoods, with documentation in the management plan.
Managing Agency Response: *Agree; The Unit Management Plan (UMP) for the park has been recently updated and will be approved in the next few months. When drafting the new UMP, the natural communities map was completely revised to include the newest FNAI classifications. The map and the new plan now contain an expanded scrub and wet flatwoods cover type that is explained in the plan with management goals and objectives along with desired future conditions for each community type.*

Resource management prescribed fire, regarding frequency, with documentation in the management plan.
Managing Agency Response: *Agree; Park staff will continue to increase the frequency of prescribed burns to meet targeted fire return intervals. The new revised UMP does assign fire return intervals and an annual acreage target for each community within the park.*

Thank you for your attention.

/gk

CC: Larry Fooks, Chief, Bureau of Parks District 3
Robert Yero, Assistant Chief, Bureau of Parks District 3
Phil Rand, Park Manager, Tomoka State Park
Jason Depue, Environmental Specialist, Bureau of Parks District 3