FLORIDA DEPARTMENT OF
Environmental Protection

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

Rick Scott
Governor

Carlos Lopez-Cantera
Lt. Governor

Noah Valenstein
Secretary

December 14, 2018

Mr. Steven Cutshaw
Division of Recreation and Parks
Department of Environmental Protection
3900 Commonwealth Boulevard, MS 525
Tallahassee, Florida 32399-3000

RE: Big Lagoon State Park – Lease No. 2977
Tarkiln Bayou State Park – Lease No. 4192
Perdido Key State Park – Lease No. 3193

Dear Mr. Cutshaw:

On **December 14, 2018**, the Acquisition and Restoration Council (ARC) recommended approval of the **Big Lagoon, Tarkiln Bayou, and Perdido Key State Parks** management plan. Therefore, 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 **Big Lagoon, Tarkiln Bayou, and Perdido Key State Parks** management plan. The next management plan update is due December 14, 2028.

Pursuant to s. 253.034(5)(a), F.S., each management plan is required to "describe both short-term and long-term management goals, and include measurable objectives to achieve those goals. Short-term goals shall be achievable within a 2-year planning period, and long-term goals shall be achievable within a 10-year planning period." Upon completion of short-term goals, please submit a signed letter identifying categories, goals, and results with attached methodology to the Division of State Lands, Office of Environmental Services.

Pursuant to s. 259.032(8)(g), F.S., by July 1 of each year, each governmental agency and each private entity designated to manage lands shall report to the Secretary of Environmental Protection, via the Division of State Lands, on the progress of funding, staffing, and resource management of every project for which the agency or entity is responsible.

Pursuant to s. 259.036(2), F.S., management areas that exceed 1,000 acres in size, shall be scheduled for a land management review at least every 5 years.

Pursuant to s. 259.032, F.S., and Chapter 18-2.021, F.A.C., management plans for areas less than 160 acres may be handled in accordance with the negative response process.

This process requires small management plans and management plan amendments be submitted to the Division of State Lands for review, and the Acquisition and Restoration Council (ARC) for public notification. The Division of State Lands will approve these plans or plan amendments submitted for review through delegated authority unless three or more ARC members request the division place the item on a future council meeting agenda for review. To create better efficiency, improve customer service, and assist members of the ARC, the Division of State Lands will notice negative response items on Thursdays except for weeks that have State or Federal holidays that fall on Thursday or Friday. The Division of State Lands will contact you on the appropriate Friday to inform you if the item is approved via delegated authority or if it will be placed on a future ARC agenda by request of the ARC members.

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,

Raymond V. Spaulding
Chief, Office of Environmental Services
Division of State Lands
Department of Environmental Protection

Big Lagoon State Park
Tarkiln Bayou Preserve State Park
Perdido Key State Park

Approved
Multi-Unit Management Plan

State of Florida
Department of Environmental Protection
Division of Recreation and Parks
December 2018

TABLE OF CONTENTS

RESOURCE MANAGEMENT COMPONENT

LAND USE COMPONENT

IMPLEMENTATION COMPONENT

TABLES

MAPS

LIST OF ADDENDA

INTRODUCTION

Big Lagoon State Park, Tarkiln Bayou Preserve State Park, and Perdido Key State Park (also referred to as Big Lagoon, Tarkiln Bayou, Perdido Key) are located in southwestern Escambia County near the border of Florida and Alabama (see Vicinity Map). Access to the parks is from Gulf Beach Highway (State Road 292), Perdido Key Drive, and Bauer Road (see Reference Map). The Vicinity Map also reflects significant land and water resources existing near the parks.

Big Lagoon State Park, Tarkiln Bayou Preserve State Park, and Perdido Key State Park are designated single-use to provide resource-based outdoor recreation and other public park-related uses. There are no legislative or executive directives that constrain the use of the properties (see Addendum 1).

Purpose and Significance of the Parks

Given the parks' close proximity to one another, it could be assumed that the parks closely resemble each other. However, each park has a distinctly unique character and each was acquired to provide visitors with different experiences. Big Lagoon, Tarkiln Bayou, and Perdido Key are vastly diverse environments, but with this diversity, the parks provide a representative sample of the Florida Park Service as a whole.

Big Lagoon is a recreational paradise and emphasizes high-quality visitor experiences. The park's main amenities are the 75-unit family campground and boat ramp that provides access to the Intracoastal Waterway. Trails, picnic pavilions, fishing platforms, and beach areas are utilized by day use and overnight visitors alike. The starting point for the Florida Circumnavigation Saltwater Paddling Trail is located at the Grand Lagoon, and an observation tower in this area allows visitors to ascend two stories to catch a glimpse of the scenic Intracoastal Waterway and Gulf Islands National Seashore.

Tarkiln Bayou includes close to 700 acres of globally-rare wet prairie wetland habitat that provides significant refuge for 5 of Florida's known pitcherplant species. Four of the 5 pitcherplant species are in decline due to loss of wetland habitat and are considered to be either threatened or endangered. The main purpose for the acquisition of Tarkiln Bayou was to preserve these imperiled wetland habitats and plant species. In addition to the wet prairie and other wetland habitat, Tarkiln Bayou also preserves nearly 20 acres of seepage stream habitat, another significant habitat type for pitcherplants.

Perdido Key is the typical beach park that attracts visitors to the Sunshine State every year. The park offers the white sand beaches and emerald green waters that are unlike anywhere else in the world, enticing tourists and residents alike to the Gulf Coast. The park conserves over 1.5 miles of beach, giving visitors plenty of room to set up an umbrella and spread out their beach towels. In addition to typical beach activities, the beach dunes are irreplaceable habitat for numerous imperiled

animal species that include nesting shorebirds, sea turtles, and the endemic and endangered Perdido Key beach mouse.

Acquisition Histories

Big Lagoon State Park was initially acquired January 27, 1977 with funds from the Land and Water Conservation Fund (LWCF). Currently, the park comprises 704.93 acres. The Board of Trustees of the Internal Improvement Trust Fund (Trustees) hold fee simple title to the park and on June 24, 1977, the Trustees leased (Lease Number 2977) the property to DRP under a 50-year lease. The current lease will expire on August 16, 2033.

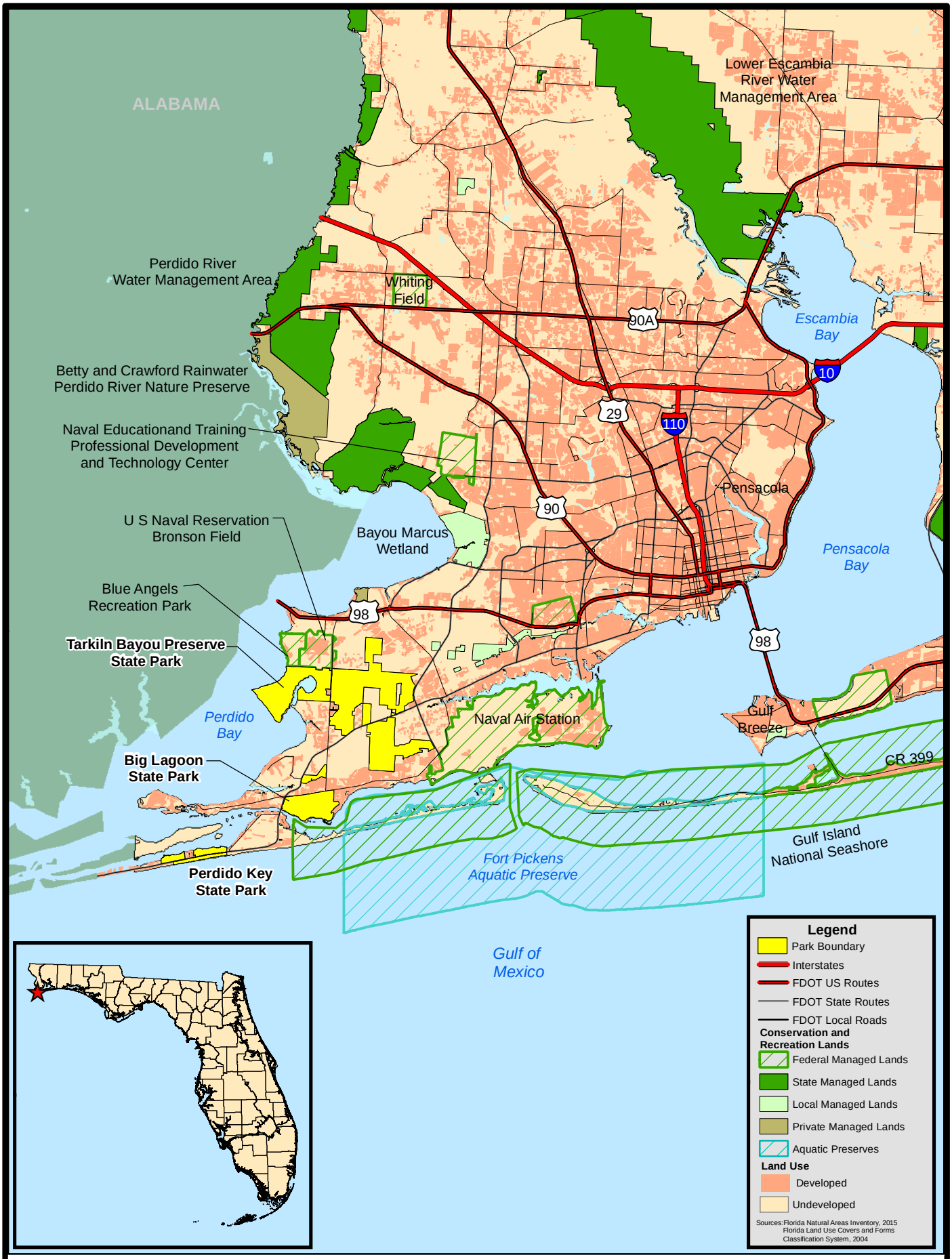
Tarkiln Bayou Preserve State Park was initially acquired on April 13, 1998 with funds from the Preservation 2000 (P2000)/Conservation and Recreation Lands (CARL) program. Currently, the park comprises 4,470.16 acres. The Trustees hold fee simple title to the park and on April 30, 1998, the Trustees leased (Lease Number 4192) the property to DRP under a 50-year lease. The current lease will expire on April 29, 2048.

Perdido Key State Park was initially acquired on May 19, 1978 using Environmentally Endangered Lands (EEL) funds. Currently, the park comprises 290.32 acres. The Trustees hold fee simple title to the park and on June 2, 1978, the Trustees leased (Lease Number 3193) the property to DRP under a 45-year lease. The current lease will expire on October 03, 2023.

Unit Classifications

Big Lagoon State Park and Perdido Key State Park are classified as State Recreation Areas in the DRP's unit classification system. In the management of a State Recreation Area, major emphasis is placed on maximizing the recreational potential of the unit. However, preservation of the park's natural and cultural resources remains important. Depletion of a resource by any recreational activity is not permitted. In order to realize the park's recreational potential, the development of appropriate park facilities is undertaken with the goal to provide facilities that are accessible, convenient and safe, to support public recreational use or appreciation of the park's natural, aesthetic and educational attributes.

Tarkiln Bayou Preserve State Park is classified as a State Preserve in the DRP's unit classification system. In the management of a State Preserve, preservation and enhancement of natural conditions is all important. Resource considerations are given priority over user considerations and development is restricted to the minimum necessary for ensuring its protection and maintenance, limited access, user safety and convenience, and appropriate interpretation. Permitted uses are primarily of a passive nature, related to the aesthetic, educational and recreational enjoyment of the preserve, although other compatible uses are permitted in limited amounts. Program emphasis is placed on interpretation of the natural and cultural attributes of the preserve.



BIG LAGOON TARKILN BAYOU PRESERVE PERDIDO KEY STATE PARKS

N

0 1.25 2.5 5 Miles

Florida Department of Environmental Protection
Division of Recreation and Parks
Office of Park Planning

VICINITY MAP

BIG LAGOON
TARKILN BAYOU PRESERVE
PERDIDO KEY
STATE PARKS

N

0 1 2 4 Miles

Florida Department of Environmental Protection
Division of Recreation and Parks
Date of aerial; 2011

REFERENCE MAP

Purpose and Scope of the Plan

This plan serves as the basic statement of policy and direction for the management of Big Lagoon State, Tarkiln Bayou Preserve, and Perdido Key State Parks as units 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 2006 approved plans.

The 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 parks. Resource management needs and issues are identified, and measurable management objectives are established for each of the parks' 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 parks. Based on considerations such as access, population, adjacent land uses, the natural and cultural resources of the parks, and current public uses and existing development, measurable objectives are set to achieve the desired allocation of the physical space of the parks. These objectives identify use areas and propose the types of facilities and programs as well as the volume of public use to be provided.

The Implementation Component consolidates the measurable objectives and actions for each of the parks' 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 accordance with 253.034(5) F.S., the potential of the parks to accommodate secondary management purposes was analyzed. These secondary purposes were considered within the context of DRP's statutory responsibilities and the resource

needs and values of the parks. This analysis considered the parks' natural and cultural resources, management needs, aesthetic values, visitation and visitor experiences. For Perdido Key State Park, it was determined that no secondary purposes could be accommodated. For Big Lagoon State Park, it was determined that renewable energy (solar) production could be accommodated in a manner that would be compatible and not interfere with the primary purpose of resource-based outdoor recreation and conservation. For Tarkiln Bayou Preserve State Park, it was determined that timber management could be accommodated. These compatible secondary management purposes are addressed in the Resource Management Component of the plan. DRP has determined that 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) would not be consistent with this plan or the management purposes of the parks.

In accordance with 253.034(5) F.S. the potential for generating revenue to enhance management was also analyzed. Visitor fees and charges are the principal source of revenue generated by the parks. It was determined that timber management as part of Tarkiln Bayou Preserve State Park's natural community management and restoration activities could be appropriate at this park as an additional source of revenue for land management since it is compatible with the park's primary purpose of resource-based outdoor recreation and conservation. Generating revenue from consumptive uses that are not a byproduct of resource management activities is not contemplated in this management plan.

DRP may provide the services and facilities outlined in this plan either with its own funds and staff or through an outsourcing contract. Private contractors may provide assistance with natural resource management and restoration activities or a concessionaire may provide services to park visitors in order to enhance the visitor experience. For example, a concessionaire could be authorized to sell merchandise and food and to rent recreational equipment for use in the parks. A concessionaire may also be authorized to provide specialized services, such as interpretive tours, or overnight accommodations when the required capital investment exceeds that which DRP can elect to incur. Decisions regarding outsourcing, contracting with the private sector, the use of concessionaires, etc. are made on a case-by-case basis in accordance with the policies set forth in DRP's Operations Manual (OM).

Management Program Overview

Management Authority and Responsibility

In accordance with Chapter 258, Florida Statutes and Chapter 62D-2, Florida Administrative Code, the Division of Recreation and Parks (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 Board of Trustees of the Internal Improvement Trust Fund (Trustees) has 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 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 DRP's long-term intent in managing the state parks:

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

Management Coordination

The parks are managed in accordance with all applicable laws and administrative rules. Agencies having a major or direct role in the management of the parks 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 (FWC) assists staff in the enforcement of state laws pertaining to wildlife, freshwater fish and other aquatic life existing within the parks. In addition, the FWC aids DRP with wildlife management programs, including imperiled species management. 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), Florida Coastal Office (FCO) aids staff in aquatic preserves management programs. The DEP, Bureau of Beaches and Coastal Systems aids staff in planning and construction activities seaward of the Coastal Construction Control Line (CCCL). In addition, the Bureau of Beaches and Coastal Systems aid the staff in the development of erosion control projects. The United States Fish and Wildlife Service (FWS) assists DRP with enforcement and interpretation of Federal laws pertaining to wildlife and aids DRP with wildlife programs that include federally imperiled species.

Public Participation

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 June 19, 2018 and June 20, 2018, respectively. Meeting notices were published in the Florida Administrative Register (Vol. 44/113), included on the Department Internet Calendar, posted in clear view at the parks, 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.

Other Designations

The parks are not within an Area of Critical State Concern as defined in Section 380.05, Florida Statutes, and it is not presently under study for such designation. The parks are a component of the Florida Greenways and Trails System, administered by the Department's Office of Greenways and Trails.

All waters within the parks have been designated as Outstanding Florida Waters, pursuant to Chapter 62-302, Florida Administrative Code. Surface waters in the parks are also classified as Class III waters by the Department. Big Lagoon is adjacent to Fort Pickens Aquatic Preserve as designated under the Florida Aquatic Preserve Act of 1975 (Section 258.35, Florida Statutes).

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 parks and identifies the methods that will be used to manage them. Management measures expressed in this plan are consistent with the DRP's overall mission in natural systems management. Cited references are contained in Addendum 3.

The 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 the park values.

The 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.

Measurable objectives and actions have been identified for each of the DRP's management goals for Big Lagoon, Tarkiln Bayou, and Perdido Key. 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 the parks.

While the 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 parks. 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 the 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, the 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 Sections 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 parks. The ten-year management plan is based on conditions that exist at the time the plan is developed. The annual work plans provide the flexibility needed to adapt to future conditions as they change during the ten-year management planning cycle. As the parks' 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.

Each park is divided into management zones that delineate areas on the ground that are used to reference management activities (see Management Zones Map, Addendum 1). 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. Addendum 1 contains the management zones table with the acres of each zone and a corresponding management zones map for each park.

Natural Resources

Topography

The parks lie within the Coastal Lowlands physiographic region of the United States. The Coastal Lowlands form the entire Florida coastline including, the Florida Keys, and can reach inland as much as sixty miles. In recent geologic times, these lowlands were marine terraces (sea floors) during three or more successive inundations by higher sea levels. The coastline of Florida has shifted significantly both seaward and landward in the past five million years. This is an overall flat region except where old dune ridges occur, or where the surface has been modified by human development, erosion and/or underground solution.

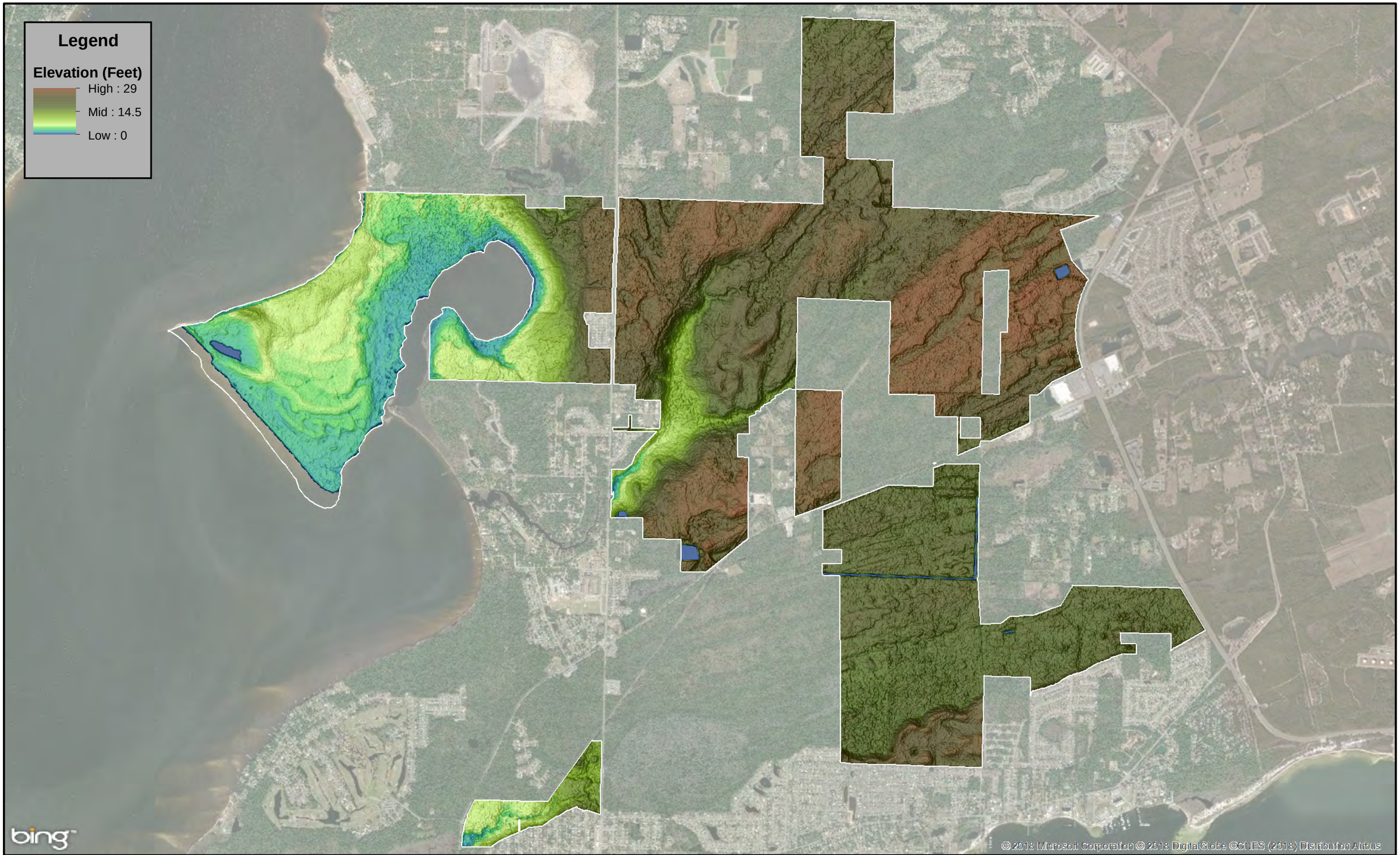
BIG LAGOON STATE PARK

N

0 250 500 1,000 Feet

Florida Department of Environmental Protection
Division of Recreation and Parks
Date of aerial: 2011

TOPOGRAPHIC MAP



TARKILN BAYOU PRESERVE STATE PARK

N

0 0.25 0.5 1 Miles

Florida Department of Environmental Protection
Division of Recreation and Parks
Date of aerial; 2011

TOPOGRAPHIC MAP

PERDIDO KEY STATE PARK

N

0 500 1,000 2,000 Feet

Florida Department of Environmental Protection
Division of Recreation and Parks
Date of aerial; 2011

TOPOGRAPHIC MAP

Big Lagoon

Elevation extremes in Big Lagoon Key State Park range from sea level to a height of 25 feet above sea level, with the highest points corresponding to dune ridges. Roads, parking lots, recreational facilities, a borrow pit, drainage canals, and service facilities have modified the topography of the area moderately. In addition to these anthropogenic changes, dredging and spoil deposition from the Intracoastal Waterway (ICW) altered elevations along the park's shoreline. On top of this, the shoreline at Big Lagoon State Park changes due to daily and periodic wave action and storm force winds. While gradual accretion and erosion are considered part of this natural process, the park's shoreline had net erosion associated with sloughing of the shoreline into the deeper trench of the ICW.

Tarkiln Bayou

Tarkiln Peninsula is nearly flat. Relief is 5 to 25 feet in the central portion of the peninsula and along Bauer Road, and slopes gradually toward the bay and Tarkiln Bayou (see Topographic Map). The large portions of the preserve located east of Bauer Road are low flatwoods and wet prairies with subtle topographic relief. Slight changes in elevation have created downslope drainage along the various titi-dominated seepage streams.

Perdido Key

Elevation extremes on Perdido Key State Park range from sea level to a height of 20 feet above sea level with the highest points corresponding to dune ridges. Roads, parking lots, recreational facilities, and service facilities have modified the topography of the area slightly. Storm surge and strong winds associated with multiple hurricanes have altered elevations along the park's sand dunes in recent decades. In particular, the 2004 and 2005 hurricane seasons saw major land-falling storms with significant impacts to the park's shoreline and dune profile. The shoreline at Perdido Key State Park is constantly changing due to daily wave action, winds and longshore currents from the Gulf of Mexico. While gradual accretion and erosion are considered part of this natural process, the park's shoreline had experienced net erosion associated with recent hurricanes, specifically Hurricane Opal in 1995, Hurricane Ivan in 2004 and Hurricane Dennis in 2005.

Geology

The parks lie in the East Gulf Coastal Plain physiographic province, which extends eastward to the Apalachicola River boundary, where it joins with the Atlantic Coastal Plain. The Southern Coastal Strip lies in the Southern Pine Hills District of the province and extends eastward to Choctawhatchee Bay in Walton County. This strip includes Perdido Key, Santa Rosa Island, Santa Rosa Sound, and portions of the north shoreline of the Sound (Brooks 1982). According to the Florida Geological Survey, the surficial sediments of the coastal lowlands of Escambia County are relict dunes of Pleistocene sediments composed almost entirely of quartz (FGS 1993). The terrain of the lowlands is a series of marine terraces resulting from the

erosion and deposition during this epoch over multiple glacial events. These ridges and swales are still apparent in the terrain. Swampy areas to the north of the dunes are drained by small sluggish creeks. On the island of Perdido Key, the modern beach and shoreline sands are likely to have been derived from the transgressive reworking of older delta and shallow marine sands deposited in the Late Pleistocene Epoch (Olsen Associates 2006). For the most part, coastal islands and narrow peninsulas along the coast represent this landform. The geologic setting of Perdido Key is more similar to the coastal areas of neighboring Alabama and Mississippi to the west rather than the majority of the Florida carbonate platform to the east.

Soils

The parks are located in the extreme southwest part of Escambia County. Big Lagoon State Park occupies approximately 704 acres, Tarkiln Bayou Preserve State Park occupies 4,470 acres, and Perdido Key State Park occupies 290 acres. Thirteen distinct soil types occur within the boundaries of the state parks (USDA 1997). These soil types are Duckston sand, Corolla-Duckston sands, Croatan and Pickney soils, Direго muck, Lakeland-Hurricane sand, Kureb sand, Newhan-Corolla sands, Leon sand, Beaches, Allanton-Pottsburg soils, Resota sand, Foxworth sand, and Doravan muck and fluvaquents. A description and map of the soil types found in the state parks is included in Addendum 4.

Tarkiln Bayou

Overall, soil conservation is not an issue at Tarkiln Bayou. Along the Bayou itself, a low wave energy environment has allowed shorelines to remain stable for many years. Increased boating activity could potentially alter this shoreline in the future, but extremely shallow water surrounding the entire peninsula limits this issue.

Limited soil erosion has occurred at Tarkiln Bayou from unimproved roads and off-road vehicle (ORV) impacts before the land was acquired by the State. These areas have since been closed to vehicular access, and are now recovering naturally as soils decompress and native vegetation begins to grow in. The development of future trails and the maintenance of existing park firelines will implement best management practices as outlined by the Florida Forest Service 2008 Silviculture Best Management Practices. This includes maintaining native vegetation within 50 feet of any waterbody, avoiding the use of heavy machinery during wet conditions, and the placement of trails and firelines that will not impede sheet flow or cause any dome or basin swamps to become artificially drained.

Due to a multitude of wetlands throughout Tarkiln Bayou, low water crossings should be installed along trails and firelines in commonly flooded areas. It is vital that these low water crossings use the correct rock size at an appropriate depth to ensure the smallest amount of disturbance possible to the watershed.

Perdido Key

Land management practices that continue to protect and conserve natural groundcover vegetation will be utilized. Limiting soil erosion is vital to the stability of coastal areas, particularly during major tropical weather events. The main issue facing soil preservation at Perdido Key comes with the creation and use of social trails by park visitors. The unauthorized trails deteriorate stabilizing vegetation and allow a passageway for storm surge to enter the back dunes. This topic will be further described in the natural community management section.

Minerals

There are no known minerals of commercial value within the parks.

Hydrology

Regional Hydrology

The parks are located in the southwest corner of the Florida panhandle and straddles the Perdido Watershed on the west side, and the Pensacola Bay System Watershed on the east side. Specific geologic formations do not always correspond to recognized hydrologic units, and an aquifer or a confining unit will include several distinct geologic formations that are considered to function as a single hydrologic unit. These geologic units contain the surficial aquifer and, in Escambia county, the sand and gravel aquifer. The sand and gravel aquifer consist primarily of quartz sand along with very coarse pea-sized gravel and a small amount of clay (Barraclough and Marsh 1962). This surficial aquifer is directly recharged by local rainfall. Water in the sand and gravel aquifer is not only abundant but also extraordinarily soft (low in calcium and magnesium carbonates) and relatively unmineralized. Additionally, chloride content of water from the sand and gravel aquifer is generally low, indicating very little lateral encroachment of saltwater (Barraclough and Marsh 1962). The surface waters of the region are a valuable resource and generally support an abundance of wildlife and aquatic life.

The region's most common water quality problems stem from biochemical oxygen demand (BOD), nutrients, and coliform bacteria. These problems result from point source (contamination from a specific source) and non-point source (general runoff from fields, parking lots, etc.) pollution. Pensacola is the major area of urban development within the region, and consequently the major contributor to the problem of water quality. Major potential sources of non-point source pollution include urban stormwater runoff, construction run-off and return flow, silviculture activities, mining, hydrologic modification and saltwater intrusion into freshwater aquifers. While the pollution contributions of both point and non-point sources result in problems for all types of water bodies, the situation is generally most critical in the region's shallow nutrient-active lakes and bays where non-point source pollution loads alone often exceed "permissible" limits for nutrients (NFWMD 2012). Water bodies of greatest concern for water quality degradation include

Eleven-Mile Creek and Bayou Texar in Escambia County, along with the Escambia River and Pensacola Bay.

Park Hydrology

Big Lagoon

Big Lagoon State Park operates on the Emerald Coast Utility Association and there is one known groundwater well on the property at Miss Ivey's former outparcel. Park water is drawn from the sand and gravel aquifer, a major source of groundwater in the extreme western panhandle of Florida.

Permanent surface waters include Grand Lagoon in the east and south, Grand Lagoon Lake in the interior to the southeast, Long Pond (a borrow area) and basin swamp to the northwest. Interdunal swales are prevalent throughout the property creating a matrix within the scrub and mesic flatwoods patches. As salinities fluctuate from different storm events, vegetative communities shift.

Long Pond is a quarter mile borrow pit constructed just south of the campground. This ruderal pond is about 150 feet wide along its entire length. The pit was constructed to harvest sand for the construction of the Theo Baars bridge along State Road 292. The basin swamp pond at the park is unnamed, approximately 2-3 acres in size and occurs in the northwest corner. This smaller water body appears to be a natural wetland that has been altered at some point by spoil removal and by long-term impoundment by North American beaver (*Castor canadensis*). Florida Natural Areas Inventory (hereafter FNAI) recorded the occurrence of white-top (*Sarracenia leucophylla*) and Gulf Coast redflower pitcherplants (*Sarracenia rubra gulfensis*) within this area in the early 1980s. A statewide assessment in 1999-2000 was unable to find any pitcherplants at this site (Johnson 2001). Prolonged flooding by beavers and previous hydrologic alteration is probably responsible for the loss of the pitcherplants. The western end of the basin swamp has a drainage connection via a large box culvert that runs underneath SR292, and drains into the park. The outflow is a straightened US Army Corps constructed canal into Big Lagoon. Habitat restoration or improvement where feasible is needed to restore the natural hydrological conditions of these wetlands.

Grand Lagoon Lake, a 44-acre estuarine lake exists on the park's east side. A shallow inlet connects the lake to the estuarine waters of Big Lagoon. Lower reaches of the lakeshore are dominated by tidal marsh.

Several large ditches occur in the park within origins and outflows extending beyond park boundaries. The large east-west ditch along the southern end of management zone BG-D appears to follow a former poorly defined stream. Based on 1950s aerials in the Escambia County Soil Survey (USDA 1997), this small stream once flowed east into Big Lagoon. Presumably, the ditch was created to increase drainage of the baygall and wet flatwoods communities in the northern portion of the park. Today this ditch flows into a man-made canal that parallels the park's east boundary. This canal appears to follow a segment of the small stream

delineated on the 1950s aerial, before turning southwest to connect into Grand Lagoon Lake via a narrow stretch of tidal marsh. Recent improvements to a box culvert within the adjacent subdivision have seemed to result in less water impoundment and less flooding of the park's drive.

Based on the 1950s aerial and anecdotal reports from longtime inhabitants of the area, surface hydrology in the western portion of the park followed naturally occurring intermittent streams, ultimately draining into the far western end of Grand Lagoon Lake. The basin swamp had an intermittent stream connection running south from the unnamed pond, then east to Grand Lagoon Lake, particularly during and after heavy rains. Another segment of the large east-west ditch runs through the middle of the northwester basin swamp/baygall. Presumably, this ditch, with numerous side ditches, was constructed to improve drainage of this large wetland area.

Tarkiln Bayou

Within Tarkiln Bayou Preserve, there are only 3 appreciable tracts of high, well-drained land. The largest of these areas is found on the Tarkiln Peninsula in management zone TB-E. This area is best described as sandhill, with maritime hammock located along the western edge of the peninsula. Another large, dry section of sandhill is found in management zones TB-N and TB-O, nestled between two seepage streams that drain down to a blackwater stream, and then to Perdido Bay. The last area is located at the southern end of the Garcon Swamp Tract in management zone TB-GG, which is only accessed via Leeward Lane off Gulf Beach Highway. The remaining majority of the property, particularly more recent acquisitions east of Bauer Road, consist of poorly drained wet flatwoods, mesic flatwoods, wet prairies, basin swamp, or baygall communities, where standing water is present for much of the year. Up to 2 feet of water has been measured in areas delineated as wet prairie and wet flatwoods. These areas will almost always hold some level of standing water following a significant rainfall, making them a haven for pitcherplants and other wetland species.

Most soil types at the preserve stay saturated during all but the driest of times, creating a vast mosaic of wetland and semi-wetland environments. For the majority of the park, surface and near surface flow is directed into small streamlets that tend to drain to the southwest. Much of the property east of Bauer Road is drained by 2 seepage streams. These streams collect surface and near surface water in management zones TB-L and TB-O. The streams converge in management zone TB-P, where the resulting unified blackwater stream has a well-defined channel that continues to the southwest, underneath Bauer Road, before changing course to the northwest and draining into Perdido Bay. Surface and near surface drainage west of Bauer Road tends to form small, irregular streamlets that generally flow southwest into Tarkiln Bayou.

Due to past land uses, Tarkiln Bayou has multiple structures that impair the local hydrology. For example, there is a drainage ditch impacting surface flow that runs along the northern park boundary on the Bronson Field, U.S. Naval Installation.

This ditch runs from the beaver pond, just north of management zone TB-B, west into Perdido Bay. Additionally, decades of recreational off-road vehicle use prior to state acquisition has left major rutting along traditional jeep trails. Some of these holes are 50-100 feet long and hold up to 3-4 feet of water. Some of the larger holes hold water year-round, regardless of rainfall. Many of the damaged jeep trails are essential for resource management activities such as prescribed burning, as they are ideal mineral firelines (as long as no engines become stuck). Park and District staff should continue to work with the DEP northwest regulatory office and other appropriate agencies to develop a plan that identifies appropriate measures to begin restoration of these roads, or the creation of low water crossings.

Another substantial ditch is located along the preserve's northern boundary, on the eastern side of Bauer Road in management zone TB-HH. This ditch was installed in the early 1980s to help drain the property to the immediate north for silviculture. Water flow within this 2,030-foot ditch is directed to the east where it eventually drains, via artificial channelization, into wet prairies at the headwaters of a seepage stream. The portion of the preserve immediately south of the ditch is a vast area of wet prairie that is rapidly succeeding towards wet flatwoods. Based on 60-year-old aerial photos, this area of the preserve was a wet grassland/prairie with virtually no pines. The high level of recent pine recruitment in this area appears to be a result of both lack of frequent fire, and alteration of the hydroperiod due to the manmade ditch.

A third area of ditching occurs on the Garcon Swamp tract of the preserve which is located south of Sorrento Road (County Road 292) in management zone TB-DD. Again, the ditching appears to be connected with silviculture practices in the area, and aerial photography pinpoints the ditching to have occurred in the past 35 years. A 4,440-foot east/west-running ditch cuts through the entire width of this tract. This ditch flows into a north/south-running ditch situated along the tract's eastern boundary. From this intersection, the north/south-running ditch then continues for 2,550 feet along the eastern property line. Water flow in the east/west ditch is directed east into the north/south ditch. Water flow in the north/south ditch is directed north into a seepage stream that eventually drains into the far western end of Bayou Grande. A few smaller ditches flow into the north/south ditch, and were intended to expedite drainage of the flatwoods for pine tree plantations.

A few other, less substantial ditches occur throughout the property, and are identified on the natural community map. These canals/ditches were created to drain standing water throughout this property. Drainage was desired for either silviculture or nearby residential developments. Some of the ditches hold water year-round, and have impacted the immediate hydrology within the park. Each of these ditches should be assessed in the future for potential restoration.

Three artificial ponds occur on the preserve, and are associated with past road construction. The largest pond is located in the southern portion of the preserve, just north of Sorrento Road in management zone TB-U. A second, slightly smaller, pond is located in the far eastern portion of the preserve near Blue Angel Parkway

in management zone TB-AA. A third, much smaller pond is located just east of Bauer Road in management zone TB-P. These square-shaped ponds have steep shorelines, and although they are not natural, provide habitat for a variety of animals. Filling these artificial ponds would cause local flooding to roads and nearby properties, including multiple private residences and a Walmart store.

The most notable water body at the preserve is Tarkiln Bayou. This is a shallow sand and mud bottom, estuarine area rimmed by needle rush-dominated marsh and flatwoods. Water depth generally ranges from 3 to 6 feet, with water levels at the narrow neck and mouth of the bayou shallow enough to walk across during low tide. The bayou receives freshwater via sheet flow and small, irregular streamlets through the adjacent baygall and flatwoods natural communities. Typical inhabitants of the bayou are mullet, red fish, speckled sea trout, blue crab, oysters, and a variety of wading birds and migratory waterfowl.

Currently, Tarkiln Bayou is considered to be impaired by the EPA due to high levels of mercury in fish tissue samples (EPA 2014). Causes for high mercury in fish tissue can be attributed to nonpoint sources, but the primary source is atmospheric deposition. While the bayou's narrow mouth, which does not allow water to flush regularly especially in low rainfall years, may be contributing to high mercury levels, it is estimated that about 70 percent of deposited mercury comes from anthropogenic sources (NWFWMD 2017, FDEP 2013). The waters directly west of the Tarkiln Peninsula are a part of Perdido Bay and are considered to be in good health as of 2012.

Consideration should be given to initiating a Regional Offsite Mitigation Area (ROMA) through the DEP district office. A ROMA consists of an environmental creation, enhancement, and/or preservation that can provide a net environmental benefit. The ROMA must be approved by the FDEP and the memorandum of agreement (MOA) must meet the criteria of section 373.4135, Florida Statutes. A ROMA could provide mitigation banking for restoration needs within this unit. The Floridan Aquifer underlies Escambia County, but the main source of drinking water for this region is the sand-and-gravel aquifer.

There are currently no water sources flowing into the park. During prescribed burns, park staff tap nearby fire hydrants, or collect water from city water lines at Big Lagoon State Park. If development occurs at Tarkiln in the future, it is advised to connect to city water, so the limited groundwater is not drawn down. Drawing from a local freshwater lens could cause saltwater intrusion at the park, further impacting the natural hydrology.

Perdido Key

Perdido Key State Park operates on the Emerald Coast Utilities Authority and there are no known groundwater wells on the property.

Permanent surface waters adjacent to Perdido Key include the Gulf of Mexico to the south and Old River to the north. Interdunal swales are prevalent throughout the

property creating a matrix within the coastal scrub and mesic flatwoods patches. Recent hurricanes have created deep swash cuts within the coastal scrub zone where standing freshwater is deep enough to sustain Eastern mosquito fish (*Gambusia holbrooki*) populations along with cattail (*Typha latifolia*), and sawgrass (*Cladium jamaicense*) stands. Other swales that are more frequently inundated sustain a host of halophytic grasses and shrub species. Along the north shore adjacent to Old River, salt marsh natural communities skirt the shoreline and punch into low lying areas scoured out from past hurricanes. As salinities fluctuate from different storm events, vegetative communities shift.

Perdido Key deep sandy soils largely preclude surface water sheetflow during rain events. The exception is paved/impervious parking areas and roadways that now drain into the surrounding sandy soils. It appears that most of the stormwater runoff from paved areas is directed into former swales. The installation of a firehouse directly north of the Perdido Key Chamber of Commerce has caused increased freshwater runoff into a swale directly north and northeast of the structure. Also, runoff from the main road (SR 292) and the parking lots causes water to build up over both beach access parking areas. After a large rainfall event, park staff describes standing water as much as a foot deep within the east access area, and two inches over half of the parking spots on the west access area. More research is needed to determine the negative impacts associated with these impervious structures within the beach dune and coastal scrub community. Overall, the hydrologic function is generally intact within the park's remaining natural areas.

Hydrological Management Goals, Objectives, Action Items

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

The natural hydrology of most state parks has been impaired prior to 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.

Objective A: Conduct/obtain assessments of the parks' hydrological restoration needs.

Action 1	Conduct hydrological assessments to address the parks potential restoration needs.
Action 2	Assess removal of debris at Big Lagoon generated from tropical systems restricting ditches from functioning as designed.
Action 3	Develop removal plan for Big Lagoon.

Action 4 Implement plan at Big Lagoon.
Action 5 Determine how stormwater from SR 292 is impacting Perdido Key beach dune and scrub habitat.
Action 6 Assess impact of outparcel development on interdunal swale communities within Perdido Key.

Big Lagoon

Unfortunately, most of the surficial hydrological features located within Big Lagoon have been altered in some way. The alterations are due to spoil removal, impounding by beavers, past ditching to improve drainage of wetland type natural communities (e.g., wet flatwoods and basin swamp). Due to the extent of hydrological alteration at the park, a comprehensive assessment is needed, particularly in relation to regular flooding of the park roads.

In addition to past hydrological alteration, debris from prior tropical storm systems has led to poor function of existing ditches. As part of the hydrologic assessment, a plan should be created to target problem areas impacting draining and ditch functionality.

Tarkiln Bayou

Due to the number of wetland natural communities and the prior use history of Tarkiln Bayou, there may still be a number of hydrological restoration needs beyond what has been identified in this plan (e.g., ditching).

Perdido Key

Historical aerial photography reveals visible changes in the size, shape, and hydroperiod of the interdunal swales located at Perdido Key State Park. An assessment is needed to document the immediate impacts that the impervious substrates have on adjacent park property. SR 292 also sheds water into the scrub and coastal grassland communities adjacent to the roadway. Impacts to the natural communities should be documented. The county has discussed in the past expanding SR 292 into a four-lane road, which would increase the need for proper stormwater retention. Before the road is widened, the impacts that the existing road already have on the park should be determined.

Objective B: Restore natural hydrological conditions and functions to approximately 1.5 acres of basin swamp natural community at Big Lagoon.

Action 1 Install one culvert at southwest ingress/egress to replace culvert lost during Hurricane Ivan.
Action 2 Assess stream flow of ACOE dredged channel.
Action 3 Develop channel restoration plan to restore stream bankfull stage.
Action 4 Implement plan.

The culvert located along the park ingress/egress in the southwest corner of the park, located in management zones BG-M and BG-I, was lost during Hurricane Ivan. The loss of this culvert has exacerbated stormwater issues at the park. The loss of the culvert has resulted in increased erosion and blockage of the natural water flow, periodically leading to flooding of the park road.

Assess the current steam flow through BG-F, BG-E and BG-D and associated stream margin height (i.e. bankfull stage) and develop a restoration plan to return the bankful stage to its original margins.

Objective C: Improve natural hydrological conditions and functions to approximately 155 acres of shrub bog, wet flatwoods, and wet prairie natural communities at Tarkiln Bayou.

Action 1	Remove and correctly install 3,900 linear feet of geotextile fabric and schedule A gray lime rock to create a function extended low-water crossing.
Action 2	Install 2 miles of low-water crossings (i.e., subgrade stabilization of firelines).
Action 3	Assess and develop restoration plans for 3 ditches occurring at the park in management zones TB-B, TB-HH, and TB-DD.

Decades of recreational off-road vehicle use prior to state acquisition has left major rutting along traditional jeep trails. Due to the hydrological disruption, various low-water crossings (i.e., subgrade road/fireline stabilization) are needed at the park for access and management (i.e., firelines and access for prescribed fire). One of the low-water crossings was actually completed previously. However, the low-water crossing does not function as desired and should be removed and corrected. Approximately 3900 feet of geotextile fabric is needed in management zone TB-KK, along with schedule A gray lime rock to construct a functional extended low-water crossing at the park. Additional low-water crossings are needed throughout the park, for a total of approximately 2 miles in length.

Due to past land uses, Tarkiln has multiple structures that impair local hydrology, in particular there are three drainage ditches impacting surface flow at various locations within the park. Ditches occur just north of management zone TB-B, east of management zone TB-HH and throughout management zone TB-DD. Due to the extensive footprint of these ditches it is not likely that restoration will be completed during this cycle. However, park staff should work with district biologists, the water management district and contractors to develop a restoration plan to begin the process.

Objective D: Restore natural hydrological conditions and functions to approximately 3.1 acres of coastal interdunal swale natural community at Perdido Key.

Action 1	Assess how stormwater from developments in outparcel property are impacting interdunal swales.

Action 2 Determine corrective measures, potentially adding appropriate water holding structures.

As mentioned previously, historical aerial photographs show much smaller, less defined interdunal swales within the state park boundary. Impacts to the permeability of the landscape adjacent to the park have altered the natural hydrology found within Perdido Key State Park's natural communities. To monitor these impacts, staff need to annually map the interdunal swales adjacent to the land outparcel between management zones PK-1 and PK-3. If these swales continue to expand with added development, action is needed to rectify the situation. As of 2015, the outparcel development needs to renovate the stormwater management system to improve treatment of runoff from approximately 11.5 acres of impervious surfaces adjacent to the park's boundary. As development continues at this outparcel and on the eastern boundary of the park, more issues surrounding stormwater will occur.

Natural Communities

This section of the management plan describes and assesses each of the natural communities found in the state parks. It also describes of the desired future condition (DFC) of each natural community and identifies the actions that will be required to bring the community to its desired future condition. Specific management objectives and actions for natural community management, exotic species management, imperiled species management (and population 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 dependent 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 that link natural communities across the landscape.

The parks contain 19 distinct natural communities as well as 5 altered landcover types (see Table 1). A list of known plants and animals occurring in the parks is contained in Addendum 5. The natural community maps for each park can be seen below.

Natural Communities
Basin Swamp – **BS**
Baygall – **BG**
Blackwater Stream – **BST**
Beach Dune – **BD**
Coastal Grassland – **CG**
Coastal Interdunal Swale – **CIS**
Depression Marsh – **DM**
Estuarine Unconsolidated Substrate – **EUS**
Marine Unconsolidated Substrate – **MUS**
Maritime Hammock – **MAH**
Mesic Flatwoods – **MF**
Salt Marsh – **SAM**
Sandhill – **SH**
Scrubby Flatwoods – **SCF**
Scrub – **SC**
Seepage Stream – **SST**
Wet Flatwoods – **WF**
Wet Prairie – **WP**
Xeric Hammock – **XH**

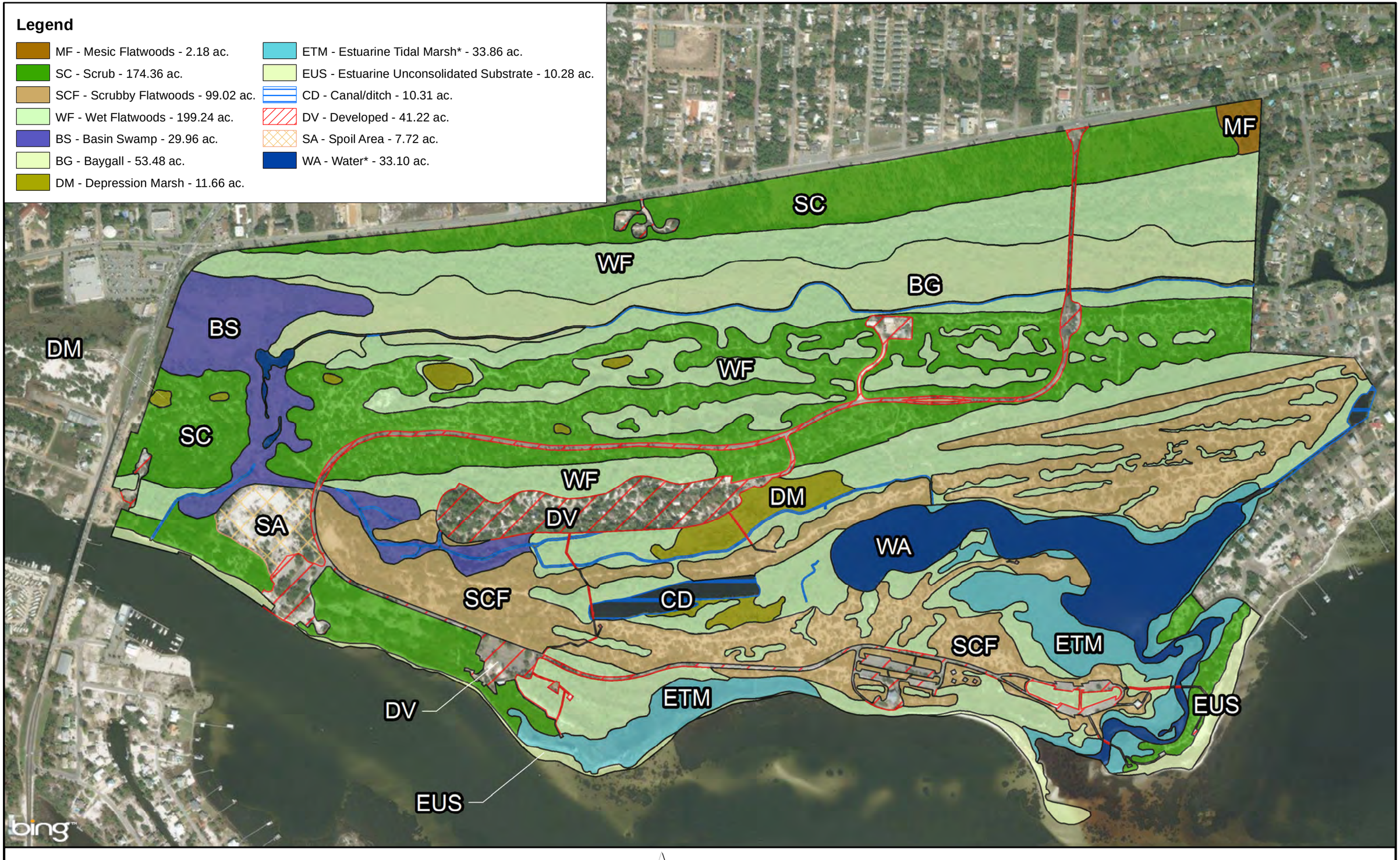
Altered Landcover Types
Artificial Pond – **AP**
Canal/Ditch – **CD**
Developed – **DV**
Spoil Area – **SA**
Utility Corridor – **UC**

Table 1: Natural Communities and Altered Landcover Types

Big Lagoon	**Tarkiln Bayou**	**Perdido Key**
NATURAL COMMUNITIES		
MF – 2.18 acres	MAH – 24.98 acres	MF – 28.08 acres
SC – 174.36 acres	MF – 1,202.69 acres	SC – 119.19 acres
SCF – 99.02 acres	SH – 334.02 acres	CG – 26.94 acres
WF – 199.24 acres	WF – 1,014.03 acres	SAM – 17.17 acres
BS – 29.96 acres	XH – 26.01 acres	BD – 58.09 acres
BG – 53.48 acres	BS – 309.58 acres	CIS – 23.36 acres
DM – 11.6 acres	BG – 653.6 acres	MUS – 27.13 acres
SAM – 33.86 acres	DM – 0.95 acres	
EUS – 10.28 acres	SAM – 106.82 acres	
	WP – 652.45 acres	
	BST – 3.37 acres	
	SST – 19.38 acres	
	EUS – 57.07 acres	
ALTERED LANDCOVER TYPES		
CD – 10.31 acres	AP – 16.64 acres	DV – 2.94 acres
DV – 41.22 acres	CD – 19.73 acres	
SA – 7.72 acres	DV – 2.42 acres	
	UC – 26.86 acres	
TOTAL ACREAGE		
704.93 acres	4,470.16 acres	290.32 acres

Legend

- MF - Mesic Flatwoods - 2.18 ac.
- SC - Scrub - 174.36 ac.
- SCF - Scrubby Flatwoods - 99.02 ac.
- WF - Wet Flatwoods - 199.24 ac.
- BS - Basin Swamp - 29.96 ac.
- BG - Baygall - 53.48 ac.
- DM - Depression Marsh - 11.66 ac.
- ETM - Estuarine Tidal Marsh* - 33.86 ac.
- EUS - Estuarine Unconsolidated Substrate - 10.28 ac.
- CD - Canal/ditch - 10.31 ac.
- DV - Developed - 41.22 ac.
- SA - Spoil Area - 7.72 ac.
- WA - Water* - 33.10 ac.



BIG LAGOON STATE PARK

N

0 250 500 1,000 Feet

Florida Department of Environmental Protection
Division of Recreation and Parks
Date of aerial; 2011

NATURAL COMMUNITIES MAP

Legend

- MAH - Maritime Hammock - 24.98 ac.
- MF - Mesic Flatwoods - 1,202.69 ac.
- SH - Sandhill - 334.02 ac.
- WF - Wet Flatwoods - 1,014.03 ac.
- XH - Xeric Hammock - 26.01 ac.
- BS - Basin Swamp - 309.58 ac.
- BG - Baygall - 653.60 ac.
- DM - Depression Marsh - 0.95 ac.
- SAM - Salt Marsh - 106.82 ac.
- WP - Wet Prairie - 652.45 ac.
- BST - Blackwater Stream - 3.37 ac.
- SST - Seepage Stream - 19.38 ac.
- EUS - Estuarine Unconsolidated Substrate - 57.07 ac.
- AP - Artificial Pond - 16.64 ac.
- CD - Canal/Ditch - 19.73 ac.
- DV - Developed - 2.42 ac.
- UC - Utility Corridor - 26.86 ac.

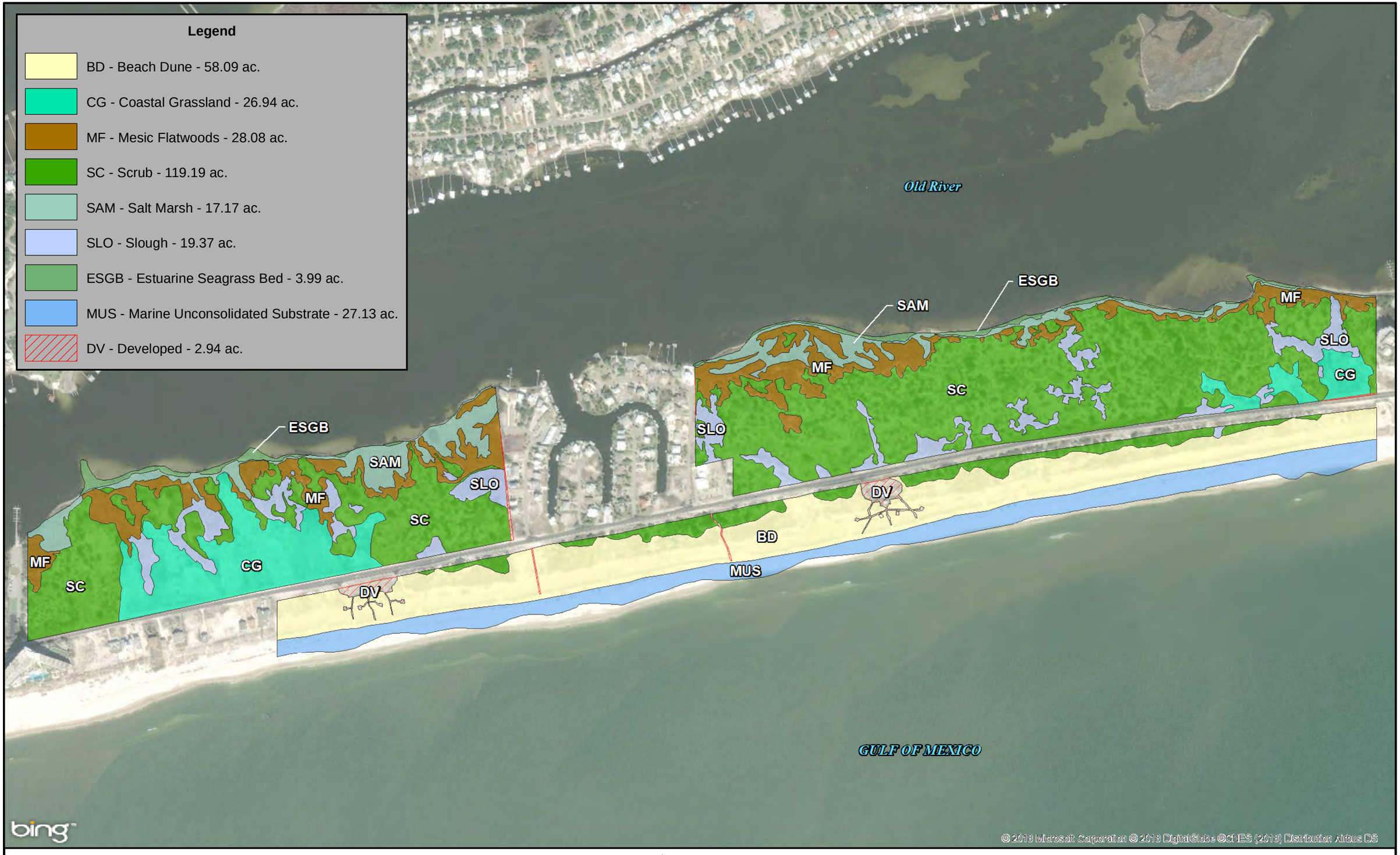
TARKILN BAYOU PRESERVE STATE PARK

N

0 0.25 0.5 1 Mile

Florida Department of Environmental Protection
Division of Recreation and Parks
Date of aerial; 2011

NATURAL COMMUNITIES MAP



PERDIDO KEY STATE PARK

N

0 500 1,000 2,000 Feet

Florida Department of Environmental Protection
Division of Recreation and Parks
Date of aerial; 2015

NATURAL COMMUNITIES MAP

Basin Swamp

Desired Future Condition: Basin swamp occurs within the boundary of Big Lagoon and Tarkiln Bayou. The desired future condition of basin swamp at the park is a forested basin wetland that is highly variable in shape and species composition and has an extended hydroperiod typically of 200-300 days. The dominant trees include slash pine, sweetbay (*Magnolia virginiana*) and swamp red bay (*Persea palustris*). Depending upon fire history and hydroperiod, the understory shrub component can be throughout or concentrated around the perimeter. Shrubs can include a variety of species, including Virginia willow (*Itea virginica*), wax myrtle (*Myrica cerifera*) and titi (*Cyrilla racemiflora*). The herbaceous component is also variable and may include a wide variety of species such as ferns, arrowheads (*Sagittaria* spp.), lizard's tail (*Saururus cernuus*) and sphagnum moss (Sphagnum spp.). Basin swamp provides important foraging and/or nesting grounds for avian species such as the swallow-tailed kites (*Elanoides forficatus*) or various amphibian species. Soils are acidic and nutrient poor peats that overlay an organic lens. Hydrology should not be disrupted. Exotics species should not be present.

Big Lagoon

The condition of the community at Big Lagoon is considered poor as the U.S. Army Corps of Engineers (USACE) ditch changed the original hydrological outflow from the east to almost due south. Increased surface water is now being shunted through the ditch from adjacent parking lots and commercial and residential housing areas under SR 292.

Following the tropical systems of 2004 and 2005, saltwater inundation was documented to depths of 10 feet or more in the basin swamp. Due to these extreme water levels and headwall failure, a culvert was lost at the park's secondary ingresss/egress west of the boat ramp (BG-M). The loss of the culvert has changed the stream flow level, resulting in below normal bankfull stage. This means that the flow stage of the ditch no longer meets the bank margins along the edge of the tree line. As a result, the stream channel is now head cutting and severely eroded. Head cutting often leaves streambanks in an unstable condition often resulting in downstream incision and bank failure causing increased erosion and channel widening over time.

Tarkiln Bayou

Large portions of the Garcon Swamp occur within the Tarkiln Bayou park boundary in management zones TB-EE, TB-FF, TB-FF2, and are delineated as basin swamp. Garcon Swamp encompasses approximately 1,500 acres of freshwater swamp soil type, situated in a wide band of low-lying poorly drained land. This area was most likely a former shallow lagoon or large swale in a past geologic era characterized by higher sea level. Garcon Swamp still retains a well-defined drainage connection into Bayou Garcon and Perdido Bay to the west. The oldest available maps and land surveys have always delineated this area as a swamp. Large portions of Garcon Swamp can have standing water year-round, ranging from 6 inches to 3 feet in

depth. Vegetation along the periphery is dominated by titi trees, and grades into wet flatwoods, most of which are overgrown. The overgrowth of various age titi and other wetland shrubs make access further into the swamp very difficult. However, once past the tangled overgrowth, interior portions of the swamp are characterized by either much larger canopy forming titi and bay, or nearly inaccessible islands of blackgum and cypress. The Garcon Swamp found within the southern portion of Tarkiln is in good condition, and will easily be brought into excellent conditions when the neighboring pyric communities receive regular fire.

Basin swamp can be found in smaller sections within management zones TB-HH and TB-Z. These smaller swamps are in a matrix of wet prairie and wet flatwoods. The northernmost swamp appears to be altered by a drainage canal from previous land uses. Prior to the canal, this swamp would have covered more of the wet prairie area that surrounds it. This swamp and canal will not be restored, as the wet prairie that has taken over the wet basin contains a multitude of imperiled plant species.

General Management Measures: Improve and maintain the hydrology of this natural community as much as possible. Prevent future hydrological alteration. Care must be taken to prevent any further disruption to hydrology. Careful consideration should be given to the type, location, creation and maintenance of firelines. When burning zones adjacent to basin swamps, the burn boss should take soil moisture into account to prevent duff smoldering fires in these wetlands. It is standard to use herbicides to control any observed exotic plant species. Care should be used when applying herbicides as ferns and amphibians found in this community may be sensitive to pollutants.

Baygall

Desired Future Condition: Baygall occurs within the boundary of Big Lagoon and Tarkiln Bayou. The desired future conditions of baygall should consist of wet densely-forested, peat-filled depressions near the edges and along the slopes of seepage streams. Seepage from adjacent uplands should maintain the saturated conditions. Medium to tall trees should consist of sweetbay and swamp bay (*Persea palustris*). Slash pine may also occur within the canopy of the baygall community. The understory should consist of gallberry, fetterbush (*Lyonia lucida*), dahoon (Ilex cassine), titi, climbing vines such as greenbriar (*Smilax* spp.) and muscadine grape (*Vitis* spp.) should also be abundant. The dominant baygall species are fire intolerant indicating an infrequent Optimal Fire Return Interval of 25-100 years. Fires from adjacent communities should be allowed to enter the baygall ecotone however, taking into account the problems associated with peat fires. No exotic plants or animals should be present.

Big Lagoon

The condition of the community at Big Lagoon is considered fair, although as hurricane debris entered the community, the south lying ditch and the mature canopy was grossly impacted by tropical systems a decade ago. The hardwood

overstory was almost completely destroyed and few mature tulip poplar and bay trees remain. Saltwater inundation to depths of 4 feet occurred in most areas.

The baygall community at Big Lagoon is heavily influenced by tropical storm activity. In locations where the shrub bog/baygall occurs near the bayou, it is exposed to saltwater intrusion during tropical storm events. This community, based on historic 1950s aerial photography was likely basin swamp or marsh historically. However, based on the changed hydrology associated with the ACOE stormwater ditching, it has taken on a baygall characteristic overtime.

Tarkiln Bayou

A large area in management zones TB-C and TB-D surrounding the shoreline of Tarkiln Bayou is mapped as baygall. It is dominated by black titi and gallberry on the exterior and by slash pine, loblolly pine, bald cypress, sweetbay, and redbay in the interior canopy. The interior shrub layer includes a variety of ferns, smilax vines, fetterbush, odorless bayberry (*Myrica inodora*), and Virginia willow. More interior portions of this large baygall have areas where dense, even-aged canopies of old titi trees exist. Ecotonal edges between baygall and wet flatwoods resemble shrub bog, but this community will fluctuate in size and location over time with the continuation of the prescribed fire program. As fire is more regular in surrounding communities, remapping of the baygall will be needed to determine exactly where the ecotone lies. The area potentially included various communities at one time such as seepage slope and wet prairie at the periphery, whereas true baygall likely only occurred in the fire-resistant interior. Currently, the baygall surrounding the bayou is in excellent condition. The lack of service roads, and inaccessibility into this community has protected it from detrimental impacts.

Tarkiln Bayou has been introducing fire into these communities for 10 years, but progress is slow by using fire alone. Prolonged historic fire exclusion has blurred the distinctions between natural communities in many areas of the preserve due to the proliferation of woody species. Overgrown titi is very resistant to prescribed fire under permitted conditions. Even if fire is able to penetrate the stand of titi, it leaves an excessive and unnatural amount of standing and downed dead fuel with subsequent vigorous re-sprouting from roots. Exacerbating the situation are the soil nutrients in these degraded sites where many decades of biomass are stored. Nutrients stored in the woody biomass of overgrown shrubs becomes available for woody re-growth both through slow decomposition and when fire transfers nutrients and minerals from standing live shrubs, dead, standing and downed tree-form shrubs and redistributes them to the soil in the form of ash. Roots of woody shrubs take up this pulse of nutrients and minerals resulting in a surge of growth by shrubs reinforcing their dominance in these communities. Remnant carnivorous plant species (e.g., pitcherplants) still occur within this community at the park.

General Management Measures: In some locations, fire return intervals in the baygall may naturally be long due to the surrounding natural communities. It appears that that the heavily-wooded baygall has conditions that resist the spread

of naturally occurring fires and would only burn under extreme drought conditions that would probably result in a catastrophic, stand replacement burn.

The community is not considered pyric, and generally only burns in drought years, causing catastrophic fires that have smoldering peat afterwards. Prescribed fires in adjacent communities should be allowed to extinguish naturally in baygall, but ignition should not be within the community itself. Duff moisture and water levels within baygall should be assessed prior to burning neighboring pyric communities.

Management measures for some portions of this natural community will be closely aligned with the restoration of former wet prairie, via careful removal of encroaching and overgrown titi. Based on historic aerial photos, it is possible that other communities co-occurred in the area, such as seepage slope or more extensive wet prairie. Following future restoration or after continued burning efforts, some of these areas may be reclassified as seepage slope.

The parks should continue to maintain the original hydrology and prevent future hydrological alteration. Careful consideration should be given to the type, location, creation, and maintenance of firelines. Exotic plant species such as Chinese tallow (*Triadica sebifera*) and Japanese climbing fern (*Lygodium japonicum*) can be hard to eradicate once established in baygall. The parks should monitor the baygall community for exotic species. The community is vulnerable to infestation due to water flow from neighboring developments. Regular surveys should be conducted to ensure exotic vines and trees do not take over this area.

Blackwater Stream

Desired Future Condition: Blackwater stream only occurs within the boundary of Tarkiln Bayou. Blackwater stream can be characterized as perennial or intermittent watercourses originating in lowlands where extensive wetlands with organic soils collect rainfall and runoff, discharging it slowly to the stream. The stained waters will be laden with tannins, particulates, and dissolved organic matter derived from drainage through adjacent swamps resulting in sandy bottoms overlain by organic matter. Emergent and floating vegetation [including golden club (*Orontium aquaticum*), smartweeds (*Polygonum* spp.), grasses, and sedges] may occur but are often limited by steep banks and dramatic seasonal fluctuations in water levels. Desired conditions include minimizing disturbance and alterations and preserving adjacent natural communities.

Tarkiln Bayou

The characteristics of the stream, beginning downstream of the seepage stream convergence (described under Hydrology) are more indicative of a blackwater stream. This is a permanent stream with a well-defined streambed. The flowing water is very dark with tannic acid, and nearly fully canopied by titi, blackgum (*Nyssa biflora*), and bay. This stream is navigable by canoe from Bauer Road to Tarkiln Bay. Currently, this community is in excellent condition.

General Management Measures: The blackwater stream at Tarkiln needs little direct management. Correct prescribed burning in nearby communities will ensure proper nutrient loads into this stream type. Herbicides should be limited surrounding blackwater stream as to protect amphibians and plant species that are sensitive to chemicals.

Beach Dune

Desired future condition: Beach dune only occurs within the boundary of Perdido Key. This is a coastal community that includes mounds or ridges of unconsolidated sediment along shorelines with high-energy waves. Vegetation on dunes are patchy with bare sand exposed, and include a diversity of herbaceous dune forming plants such as sea oats (*Uniola paniculata*), golden asters (*Chrysopsis* spp.) and bitter panicgrass (*Panicum amarum*). Occasionally shrubs may be scattered within the herbaceous vegetation, such as Florida rosemary (*Ceratiola ericoides*), woody goldenrod (*Chrysoma pauciflosculosa*), seashore elder (*Iva frutescens*) and sand live oak (*Quercus geminata*). Other typical species found in this community include sea rocket (*Cakile lanceolata*), railroad vine (*Ipomea pes-caprae*), and beach morning glory (*Ipomea imperati*).

A self-sustaining population of Perdido Key beach mice (*Peromyscus polionotus trysillepsis*), a federally-listed endangered species, should occupy all available beach dune habitats. Nesting shorebirds including least terns (*Sternula antillarum*) and snowy plovers (*Charadrius nivosus*) should successfully nest along the dune fronts and in dune blowout areas. Shorebirds should have connectivity between the beach dune communities and various foraging habitats (such as the shoreline). In particular, corridors should be free from human disturbance and vehicle rutting during the breeding season to allow shorebirds (and their flightless young) to make the journey from the nest to available foraging habitats. Sea turtles should nest along a dark beach, and hatchlings should be able to crawl to the water on a beach that is free of vehicle ruts and artificial light. No exotic plants or animals should be present.

Wind and water shape this community. The beach dune community is a dynamic system that is constantly changing depending on the stage of recovery after a large storm. Although this community potentially can burn, the fire return interval is unknown, and there is a very low likelihood that fire would be introduced from an adjacent natural community.

Perdido Key

The beach dune community at Perdido Key State Park is found in management zone PK-2, and extends from the gentle undulating foredunes near the gulf waters to the higher, mobile dunes extending landward of the beach. These larger dunes may reach heights up to 20 feet during extended periods between major hurricanes. Currently, the tallest beach dunes are only approximately twelve feet above mean sea level due to tropical storm events occurring in the last decade, specifically hurricane Ivan in 2004. Storm surge from Ivan was recorded to be 14 feet over

Perdido Key State Park, washing away beach dunes and flattening the landscape (FEMA 2005). Tropical storms and human alterations are the biggest threats to the beach dune community at the park. Storm surge from hurricanes erode the primary dunes and inundate sea turtle nests. Salt spray from storms impact dune vegetation by top-killing foliage and creating a moisture deficit that can desiccate plants. Recovery from these intense storms can be slow, with at least two years needed before vegetation is capable of producing seeds and additional years for some woody species to recover.

This community is currently in good condition and appears to have little human disturbance. In the past, unauthorized social trails damaged native dune vegetation and caused sand blowouts to occur in the back dunes. Little disturbance is now visible ever since new fencing and signage was installed along SR 292 in 2009, discouraging visitors to park on the road and walk over the dunes to access the beach. Now, these dunes provide habitat for sea oats, seacoast marshelder (*Iva imbricata*), bitter panicgrass, and sea rocket, all of which help stabilize these Gulf facing dunes by trapping sand with their roots and dispersing wind and wave energy with their stems and leaves.

Subtle microhabitats occur within the beach dune at Perdido Key State Park. In a few remaining areas, wet swales creating very small ephemeral ponds provide fresh water after significant rain events. Higher dunes not heavily impacted by past hurricanes succeed to coastal scrub with a variety of oak species (*Quercus* spp.) and Florida rosemary (*Ceratiola ericoides*). This matrix of beach dune, interdunal swale, and scrub remains in constant flux at Perdido Key, changing slightly with every high energy storm event.

Many imperiled species rely on the beach dune natural community, including breeding shorebirds and seabirds, nesting sea turtles, and the Perdido Key beach mouse. Being one of the only non-developed beaches on Perdido Key, this park is vital to the existence and preservation of these imperiled animals, especially the endemic beach mouse. This community is the primary habitat of the Perdido Key beach mouse, which burrows in the dunes and forages at night for dune plants and insects. Maintaining the park's dune community in good condition is critical for sustaining this species.

Federally-listed loggerhead (*Carretta caretta*), Kemp's ridley (*Lepidochelys kempii*) and green sea turtles (*Chelonia mydas*) nest on the open sandy beaches and in the beach dunes at the park. Annual sea turtle nesting ranges from one to four total nests within the 1.6 miles of beach. State-listed snowy plovers and least terns also nest in the beach dune community within the park. Annual nesting for snowy plovers ranges from one to five nests, and for least terns, nesting ranges from 0-75 nests depending on the season.

Exotic and nuisance predators including coyotes (*Canis latrans*), red foxes (*Vulpes vulpes*), and cats (*Felis catus*) have been present at the park and can affect the rare faunal populations in the beach dune community. Park staff work closely with USDA personnel to trap exotic and nuisance animals within the park prior to the

shorebird and sea turtle nesting season, as well as throughout the season. Shorebird nesting at this park is severely limited due to the impacts from predators, as well as human interactions. The endemic beach mouse populations are also constantly threatened by these same predators, and would benefit from their removal.

“Sky glow” can be seen from the park, and artificial lighting impacts to the beach dune community are moderate to severe. Sea turtle disorientations from artificial lighting are a continuous threat to both nesting females and emerging hatchlings. The lights also impact the beach mice populations as well as nesting and resting shorebirds, by allowing predators more light to locate prey on the beaches. Beach mice have been reported using areas impacted by artificial lights less than the darker interior section of the park (Bird et al. 2004). Recently, FWC has allotted money to retrofit all lights surrounding the park to be “wildlife friendly,” which should hopefully limit the impacts from artificial lights on all imperiled species utilizing the park.

General Management Measures: Park visitor access into and through beach dune areas should be controlled as much as possible to prevent degradation of the beach dune community at the park. Dune walkover areas should be designated and protected with boardwalks in the visitor use areas. Unauthorized trails in dunes should be actively discouraged with interpretive signs, ranger interpretation, post and rope, dune plantings and other natural barriers.

Driving on or near established dunes should be prohibited except through designated beach access areas. Beach driving by law enforcement, contractors, county officials, wildlife officials and assessment crews has increased since 2010 due to reconnaissance for oil from the Mississippi Canyon block 252 (also known as Deepwater Horizon) oil well blowout. Vehicular rutting associated with beach driving impacts shorebird and sea turtle hatchling nest success and recruitment. Beach drivers should follow the guidelines in the FWC Best Management Practices for Operating Vehicles on the Beach (FWC BMPs) and try to keep from disturbing the wrack line. Symbolic fencing (i.e., posts, signs and rope) should be used to protect the beach dune habitat from potential detrimental impacts associated with beach driving. Moreover, efforts to protect the beach habitat should focus on protecting shorebird nesting habitat and dune restoration areas while creating a corridor for driving access as close to the wet sand as possible.

After tropical storms, impacts to dunes should be assessed. Plantings and other dune restoration techniques should be considered when and where necessary to prevent further dune erosion. A plan should be developed prior to any planting to address dune restoration while maintaining low vegetated dune blowouts for nesting shorebirds.

Exotic and nuisance predators should be controlled to prevent negative impacts to rare faunal populations, such as the Perdido Key beach mice, loggerhead sea turtles, and snowy plovers. A tracking assessment of exotic predators should be conducted prior to the start of the shorebird nesting season and during beach mice

and shorebird monitoring to establish predator control needs. Efforts to avoid and/or minimize disturbance, including the impacts associated with the presence of humans and dogs around nesting shorebirds, are critical to nesting success.

Artificial lighting or sky glow should not be present on the beach dune community. Artificial lights disorient sea turtles and can affect their ability to successfully enter the marine environment. Lights can also alter the behaviors of beach mice and nesting shorebirds. A nighttime assessment of lighting should be conducted annually before sea turtle and shorebird monitoring commences to anticipate and prevent sea turtle hatchling disorientations, and increased predator impacts.

Coastal Grassland

Desired Future Condition: Coastal grassland only occurs within the boundary of Perdido Key. Coastal grassland is a predominantly herbaceous community occupying the flatter and drier portions of the transition zone between the primary beach dunes and mesic flatwoods or coastal scrub. With the exception of overwash from severe storms, it is a relatively stable community compared to the dynamic primary dunes. Characteristic plant species include bluestem grasses (*Andropogon* spp. and *Schizachyrium scoparium*), Gulf bluestem (*Schizachyrium maritimum*) camphorweed (*Heterotheca subaxillaris*) and earleaf greenbriar (*Smilax auriculata*). Other common species may include sea oats, bitter panicgrass and saltmeadow cordgrass (*Spartina patens*).

Perdido Key

Coastal grassland can mainly be found on the southern border of management zone PK-1 and PK-3. Historical photography from 1941 and 1958 show this area as open, flat and sparsely vegetated, indicative of coastal grassland. Currently the areas labeled as grassland contain open expanses dominated by sea oats, bitter panicgrass and earleaf greenbriar. This area appears to be a low-lying swash zone that is scoured clean after every major hurricane landfall on Perdido Key. This flat, open zone is dominated by low herbaceous plants and grasses that gradually fade into scrub or mesic flatwoods.

The Coastal grassland at Perdido Key State Park is in fair condition. Because of past hurricanes making landfall on Perdido Key, debris and trash from nearby developments are readily visible on the open grassland. Gravel used for road stabilization, tiles, and pieces of asphalt litter the landscape, visible due to the lack of dense groundcover. Hand removal of hurricane debris could potentially benefit the Perdido Key beach mouse and imperiled plants such as Cruises golden aster (*Chrysopsis gossypina* subsp. *cruiseana*) and Godfrey's goldenaster (*Chrysopsis godfreyi*), all of which utilize this natural community. It is also possible that with continued removal of debris, Wilson's plovers (*Charadrius wilsonia*), might utilize these low, open areas for nesting.

The low-lying zones of coastal grassland are outlets for storm surge, funneling water across Perdido Key to Old River. Any development south of this low

topographical natural community, such as a few covered picnic pavilions associated with the west access point, will be greatly impacted by storm surge from any tropical storm event.

General Management Measures: This natural community is shaped by wind and water associated with tropical storms. The landscape is kept low and flat due to high water storm surges that push water from the Gulf of Mexico to Old river though these natural outlets. Vegetation is too low and sparse to carry fire through this natural community.

Park staff should work with volunteers to remove trash and debris from this community where hand removal is feasible. To avoid rutting and the creation of anthropogenic swales within the coastal grassland, vehicular traffic should be limited or excluded.

Coastal Interdunal Swale

Desired Future Condition: Coastal interdunal swale only occurs within the boundary of Perdido Key. Coastal interdunal swale is a variable community which occurs as marshes, moist grasslands, dense shrublands, or damp flats. This community is created by the accretion of sediment leaving narrow strips of low-lying habitat between beach dune succession, or from the deep scouring of sand as a result of storm surge associated with large hurricanes. Dominant plant species may be quite variable and a function of local hydrology, salt water occurrence, and the age of the swale. Wetter areas may include sawgrass, broadleaf cattail, bulltongue arrowhead (*Sagittaria lancifolia*) or American white waterlily (*Nymphaea odorata*), while shallower areas may have a diverse mixture of herbs, including Elliot's yelloweyed grass (*Xyris elliottii*) candyroot (*Polygala nana*), and saltmeadow cordgrass. Shrubby areas may contain wax myrtle (*Myrica cerifera*) and coastalplain willow (*Salix caroliniana*). Hurricanes and tropical storms can flood the swales with salt water after which are recolonized with salt-tolerant species such as needle rush.

Perdido Key

Swales are located in management zones PK-1, PK-2, and PK-3 within Perdido Key State Park. The swales located here are relatively linear, and exist between higher ridges of scrub and mesic flatwoods. Many of these wetter depressions formed after strong hurricanes scoured this barrier island, leaving deep pockets that maintain moisture. While some of these swales resemble depression marshes, their locations within beach dune and coastal scrub communities and their vegetative structure make them more aptly marked as swales.

Swales adjacent to the outparceled residential land between management zones PK-1 and PK-3 are negatively impacted by the addition of impervious substrates. Historical aerials show swales much smaller than the ones present today, implying that the increased area of development is funneling water to the historical swales, thereby altering their hydroperiods. Multiple roads, driveways, tennis courts and a basketball court are the likely culprits of altered hydrology within the park. With no

stormwater areas created in association with this development, it is likely that water is flowing from the higher ground of where the development is, to the park unimpeded. SR 292 also alters the hydrology of the beach dune and scrub areas adjacent to the roadway, creating artificial swales parallel to the road. These swales act as stormwater retention areas after heavy rainfall events.

General Management Measures: The hydrology of Perdido Key has changed dramatically in the last 70 years. Changes in relative water levels and shifts in climate have created a barrier island that is much wetter than in recent history. These shifts are readily visible when surveying interdunal swales at the park. Swale size has increased exponentially with the addition of impervious substrates on the island. Management needs include a hydrological survey of the park, identifying where roads and developments are funneling fresh water to natural areas. Impacts to swales from unimpeded stormwater include excess nutrients and harmful chemical accumulation in these low-lying communities.

Due to the accumulation of freshwater, swales are an ideal community for exotic plants to become established. It is vital that park staff survey for invasive exotics such as cogongrass and Chinese tallow tree in these wetter, more favorable communities.

Fire is not used as a management tool for interdunal swales on Perdido Key. If these swales were in a matrix of other pyric communities, fire would be allowed to burn through the swales if conditions were favorable. Point source ignition would not be an applicable tool for managing this community. Wind and water associated with high energy storm events are the main disturbance factors for this natural community.

Depression Marsh

Desired Future Condition: Depression marsh occurs within the boundary of Big Lagoon and Tarkiln Bayou. Depression marshes are shallow circular depressions in sand substrate with herbaceous vegetation or small woody shrubs, often in concentric bands. Depression marshes are embedded within upland communities, such as sandhill and flatwoods communities. The concentric zones or bands of vegetation are related to the hydrological regime. Herbaceous vegetation, such as Vasey longleaf threeawn (*Aristida palustris*), beaksedges (*Rhynchospora* spp.), yellow-eyed grass (*Xyris* spp.), St. John's wort (*Hypericum* spp.), and patches of Curtiss' sandgrass (*Calamovilfa curtissii*) occupy the ecotonal zone between depression marsh and the surrounding natural community. In the community proper other scattered herbs, such as fringed yellow-eyed grass (*Xyris fimbriata*), pipeworts (*Eriocaulon* spp), pikerushes (*Eleocharis* spp.), can be found. Maidencane (*Panicum hemitomon*), pickerelweed (Pontederia cordata), white waterlily (*Nymphaea odorata*) and bulltongue arrowhead (*Sagittaria lancifolia*) can be found in the deeper portions of the community. Fire should burn at least partially into these communities to maintain the herbaceous character. Depression marshes should be allowed to burn on the same frequency as the adjacent fire type community, allowing fires to naturally burn across ecotones. The Optimal Fire

Return Interval for this community is 2-4 years, depending on fire frequency of adjacent communities.

Big Lagoon

The depression marshes at Big Lagoon are generally embedded within flatwoods communities and are in good condition. The marshes are maintained through periodic prescribed fire. Fire is not set directly at the marshes. However, prescribed fires do occasionally enter this community from adjacent uplands.

Most of the depression marshes at the park are ringed by grasses signaling a transition to an ephemeral wetland. Vegetation in the wetter areas includes pipeworts and St. John's wort. The marshes hold water for some of the year but because they are shallow, they usually dry up during periods with little rain. The depression marshes do not have hydrological disruptions at this time. These marshes are important breeding grounds for amphibians, snakes, marsh birds and wading birds.

Tarkiln Bayou

There is one small depression marsh delineated at Tarkiln Bayou in management zone TB-GG. It is nestled within an upland, sandhill community in the southernmost section of the park. This community is in fair condition, as there are a multitude of ORV tracks surrounding this marsh, and vegetation diversity is low. With the development of housing directly south of this zone, it appears that there is a higher occurrence of visitor use in this community. A service road rings the northern part of the marsh, potentially impacting sheet flow and seepage into this ephemeral wetland.

General Management Measures: The fire regime of this community should mirror that of the natural community where it occurs. Fire is important for keeping this community herbaceous and if applied regularly will allow the marsh to reach the desired future conditions. Areas surrounding the marsh that have been bedded should be restored to return the depression marsh to the historical hydrological regime. The parks should avoid altering the hydrology of depression marshes especially when planning new firelines or development. Herbicide use should be limited in these marshes as the amphibians that depend on them may be sensitive to pollutants.

Estuarine Unconsolidated Substrate

Desired Future Condition: Estuarine unconsolidated substrate occurs within the boundary of Big Lagoon and Takiln Bayou. Estuarine unconsolidated substrates are generally characterized as low energy, relatively open areas of subtidal, intertidal, and supratidal zones which consist of expansive unvegetated areas composed of shell, mud, and/or sand. This natural community extends itself from the low tide line landward across the sparsely vegetated sediment to where it grades into adjacent communities. Sparse vegetation may be colonizing at the edges of this

community depending on the amount of time since the last tropical storm. The vegetation type depends on the adjacent community and the level of salt water overwash. Common plant species include American glasswort (*Salicornia virginica*), sea oats (*Uniola paniculata*), and black rush (*Juncus roemerianus*). At low tide, much of the shoreline should consist of tidal flats of exposed sand and mud. This community should support a large population of infaunal organisms as well as a variety of transient planktonic and pelagic organisms (e.g., tube worms, sand dollars, mollusks, isopods, amphipods, burrowing shrimp, and an assortment of crabs) and should support a variety of foraging wading birds and shorebirds. When tidal flats are exposed during low winter tides, this habitat is often heavily used by many migratory shorebirds. Fiddler crabs (*Uca* spp.) are seasonally common along the wet exposed sand at low tide. Organic marine debris, including seaweed and driftwood, should form a wrack line on the shore. The desired future condition of this community for the park is a dynamic system free of pollutants, manmade debris, vehicular rutting, and dredging. Presence of exotic plants and animals should be minimal and under control.

Big Lagoon

At Big Lagoon, this natural community extends from the low tide line along the lagoon shoreline landward and grades into seagrass beds and estuarine tidal marsh habitat in some locations. At Big Lagoon, some areas of this community are eroding and others are accreting. Other eroding areas are converting into estuarine tidal marsh due to lower elevations and the resulting salt water intrusion from past storms.

The condition of the community is considered good. However, it was somewhat impacted by the Deepwater Horizon oil spill in 2010. Baseline data was collected prior to oiling but limited data post oiling has been gathered. Adjacent nearshore seagrass beds are being restored by USFWS grants following the oil spill and short-term monitoring occurs. The monitoring efforts may guide our knowledge regarding prior impacts.

Erosion of this community is often exacerbated by wake from fast moving vessels. Previously, motor exclusion buoys were in place. However, the buoys from eastern and southern shores were lost during Hurricane Ivan. The buoys should be restored to protect this community.

Tarkiln Bayou

The narrow sandy beaches at Tarkiln Bayou along the western and southern shorelines on Tarkiln Peninsula are examples of estuarine unconsolidated substrate. This narrow beach provides habitat for burrowing crustaceans and worms, as well as resting and foraging habitat for a variety of shorebirds and wading birds.

General Management Measures: Natural beach erosion and accretion occurs constantly within this community. Manmade non-biodegradable debris should be cleaned from this community as much as is feasible after tropical storms or

extreme high tide events. Wrack lines should not be moved or destroyed. A healthy wrack line is important for supporting macroinvertebrates. Birds and other fauna forage in the wrack line as well as on the wet shoreline. As high tides move wrack up to the dry sandy shore, it can then serve to trap sand and support colonizing vegetation. Disturbance to foraging, wading, and nesting birds should be avoided. This community in the southwest corner of Big Lagoon and the adjacent mud flats exposed during low tide events are designated as critical habitat for piping plovers. Driving on the estuarine unconsolidated substrate should be limited, and ideally prevented completely.

Marine Unconsolidated Substrate

Desired Future Condition: Marine unconsolidated substrate only occurs within the boundary of Perdido Key. The desired future condition of this community for the park is a dynamic system with an open, wide, white sandy beach free of toxins, manmade debris and vehicular rutting. The lower or wet portion of the beach should contain a high density of infauna, and intertidal organisms that support a variety of foraging shorebirds. Organic marine flotsam, including seaweed and driftwood, should form a wrack line on the beach. Nesting shorebirds should nest in the upper portion of the beach without disturbance. Foraging shorebird broods (i.e., flightless chicks) and migratory shorebird species should forage on the wet sand without disturbance. Sea turtles should use the gulf-side beach for nesting. Non-native predators should be absent. Sparse vegetation may be colonizing on the upper beach depending on the amount of time since the last tropical storm.

Perdido Key

The marine unconsolidated substrate at Perdido Key is in good condition. Beach raking does not occur on these islands; therefore, the natural beach wrack community is kept intact. This community is extremely important to many designated species such as nesting sea turtles and shorebirds. Shorebirds use these areas for foraging, loafing and resting. Vehicles are used on the beaches for sea turtle, shorebird and beach mice surveys, but driving is limited to those lower beach areas not utilized for nesting.

The main factor affecting this natural community is erosion to the shoreline. This is a dynamic system where the constant movement of sand changes the community day to day. The county is considering nourishing the beaches on Perdido Key in the future by dredging sediment offshore and pumping it onto the existing beach. Park staff have agreed that no nourishment will be directly placed on the park, but will fan in on both the east and west sides of management zone PK-2. More information on beach nourishment can be found in the Special Management Considerations section of this plan.

General Management Measures: Natural beach erosion and accretion occurs constantly within this community. Park staff should monitor changes in the beach community, but limit the amount of human interference in the form of beach nourishment or hard stabilizations if possible.

Manmade non-organic, non-biodegradable debris should be cleaned off the beach as much as is feasible after tropical storms. Wrack lines with natural materials should not be moved or destroyed. A healthy wrack line on the wet beach is important for supporting macroinvertebrates, as well as providing shorebirds valuable foraging areas. As high tides move wrack up to the dry sandy beach, it can then serve to trap sand and support colonizing dune vegetation.

Vehicular driving should be discouraged as it creates rutting, and can affect infaunal populations. Rutting can cause a barrier to sea turtle hatchlings as they crawl their way to the Gulf after hatching. Driving on the beach can also disturb nesting, resting and foraging shorebirds. Shorebird chicks are very vulnerable to predation, especially from ghost crabs or gulls, when trapped in ruts. Also, newly hatched chicks tend to squat in vehicle ruts to hide from an oncoming vehicle and may be run over.

Beach driving by law enforcement, contractors, county officials, wildlife officials and assessment crews has increased since 2010 due to reconnaissance for oil from the Mississippi Canyon block 252 oil well blowout. Vehicular rutting associated with beach driving impacts shorebird and sea turtle nest success and recruitment. Beach drivers should follow the guidelines in the FWC Best Management Practices for Operating Vehicles on the Beach (FWC BMPs) and try to keep from disturbing the wrack line. Symbolic fencing (i.e., posts, signs and rope) should be used to protect the beach dune habitat from potential detrimental impacts associated with beach driving. Moreover, efforts to protect the beach habitat should focus on protecting shorebird nesting habitat and dune restoration areas while creating a corridor for driving access as close to the wet sand as possible.

Exotic and nuisance predators should be controlled to prevent negative impacts to rare faunal populations, such as Perdido Key beach mice and snowy plovers. A tracking assessment of predators should be conducted prior to the start of the shorebird nesting season and during beach mice and shorebird monitoring to establish predator control needs. Efforts to avoid and/or minimize disturbance, including the impacts associated with the presence of humans and dogs, around nesting shorebirds is critical to nesting success.

Artificial lighting or sky glow should not be present on the beach. Artificial lights disorient sea turtles and can affect their ability to successfully enter the marine environment. A nighttime assessment of lighting should be conducted annually before sea turtle monitoring commences to anticipate and prevent sea turtle hatchling disorientations.

Maritime Hammock

Desired Future Condition: Maritime hammock only occurs within the boundary of Tarkiln Bayou. Maritime hammock is a coastal evergreen hardwood forest occurring in narrow bands along the Tarkiln Peninsula. This community grows in areas protected from fire, sea breezes, and severe storms, allowing them to develop complete canopies. Canopy species will consist of live oak, red bay (*Persea*

borbonia), red cedar (*Juniperus virginiana*), and sand hickory (*Carya pallida*). This canopy is densely packed, and often salt-spray pruned wherever leaves are exposed to wind. Understory species consist of yaupon (*Ilex vomitoria*), saw palmetto, and wax myrtle. Herbaceous groundcover is absent, or limited to the occasional *Smilax* spp. vine.

Tarkiln Bayou

A linear stretch of mixed hardwoods and pines on the western shoreline of Tarkiln Peninsula is described as maritime hammock. A partially closed canopy comprised mostly of live oak, laurel oak (*Quercus laurifolia*), sand hickory, red bay, and southern magnolia (*Magnolia grandiflora*) has developed here, and provides a shaded habitat in contrast to the more open pine uplands of the interior peninsula. The understory here is relatively open with a few shade-tolerant species such as American beautyberry (*Callicarpa americana*), forked bluecurls (*Trichostema dichotomum*), and coral bean (*Erythrina herbacea*) growing in the filtered light beneath the canopy.

The maritime hammock found on the peninsula is on a slightly elevated area on the coast, where sand live oak (*Quercus geminata*) and longleaf pines intergrade. In places, the oaks have formed a nearly closed canopy covering a number of acres, providing a shady habitat with ample mast for grey squirrels (*Sciurus carolinensis*), white-tailed deer (*Odocoileus virginianus*), and other foragers. The shady conditions, accumulation of oak leaves, and relatively low soil nutrients tend to limit dense groundcover. The scattered understory plants include saw palmetto, gopher apple (*Licania michauxii*), woody goldenrod (*Chrysoma pauciflosculosa*), and false rosemary (*Conradina canescens*). Large-leaved jointweed (*Polygonella macrophylla*), a state listed species, occurs sparingly along the subtle dune line at the hammock's edge.

The biological significance of this site is far greater than its small size might otherwise indicate. It not only enhances the biological diversity of the park, but is a highly important stopover site for migrating neotropical birds. This is due to the coastal location, protection from the elements, and abundance of food and fresh water. Many of these bird species stop here while crossing the Gulf of Mexico to overwinter in South America; therefore, this hammock area near the Gulf is vital for stocking up on water, nutrients, and fats before the long flight south.

General Management Measures: Management of the maritime hammocks should include protection from disturbance. This community developed due to a lack of fire and storm damage, therefore no prescription fire or mechanical treatment should be conducted. Maintaining a closed canopy with a diverse and sometimes dense understory is important for many migratory bird species. Due to the location of the fireline on the Tarkiln Peninsula, it is easy to avoid the hammock during prescribed burns, because it is protected by a mineral fireline. If this community were to ignite naturally by lightning, it should be allowed to burn when feasible, as a forestry dozer would negatively impact the community more so than a wildfire. It is unlikely that such a wildfire would become uncontrollable due to the proximity of the bayou

and mineral fireline surrounding this community. However, as with any wildfire, conditions will need to be monitored and suppression decisions would need to be made at the time of the fire.

With no real hydrological issues, no major exotic infestations, and protection from recent prescribed burns, this area is considered to be in excellent condition. Continued protection from unauthorized camping, as well as continued survey efforts for exotic plants will ensure this natural community stays in good condition.

Mesic Flatwoods

Desired Future Condition: Mesic flatwoods occur within the boundary of Big Lagoon, Tarkiln Bayou, and Perdido Key. Mesic flatwoods are characterized by an open, uneven aged mixed canopy of slash and longleaf pines (*Pinus palustris*) and with a diversity of low shrubs, grasses, and forbs in the understory. Saw palmetto will generally be present but not overly dominant. Shrub species include saw palmetto, gallberry, fetterbush, blueberry (*Vaccinium* spp.) and huckleberry (*Gaylussacia* spp.). Shrubs should be generally knee-high or less, and there should be few, if any, large trunks of saw palmetto along the ground. This community has minimal topographic relief and the soils contain a hardpan layer within a few feet of the surface which impedes percolation. Due to these factors, water can saturate the sandy surface soils for extended periods during the wet season but lengthy droughts also commonly occur. This fire-dependent community should be burned every 2-5 years. Presence of exotic plants and animals should be minimal and under control.

Big Lagoon

The mesic flatwoods at Big Lagoon are found in an ancient swale, wedged between sand pine scrub and an adjacent development. Within this remnant section of mesic flatwoods, a relic population of mature longleaf pine occurs in the northeast corner. This community was heavily impacted by Hurricane Ivan in 2004, resulting in the loss of roughly 50% of the longleaf population.

Given the volatile fuels of the adjacent scrub community and the urban interface, this community is currently not in rotation for prescribed fire. In fact, it was last burned in the early 1990s. During the previous burns, over 20 years ago, the fire burned catastrophically. Lack of fire in this community had led to an out of balance woody understory and the lack of bare mineral soil has limited pine recruitment.

Based on the presence, relative abundance and distribution of key on-site plant species, the park's mesic flatwoods is in poor condition. Understory live fuel loading is high throughout this community, due to pervious fire exclusion.

Tarkiln Bayou

Mesic flatwoods at Tarkiln Bayou are located throughout the park, with all but 2 management zones containing this natural community. As previously mentioned,

this community is interspersed within a diverse matrix of wet flatwoods, wet prairie, sandhill, basin swamps, shrub bog, and xeric hammock. A small change in topography, wetness, and soil leads to major changes in the vegetative community. Overall, this community is in fair condition due to a lack of prescribed fire in some areas of the park. Mesic flatwoods on the peninsula and near Bauer Road are in excellent condition, with multiple successful prescribed burns in recent history. Towards the eastern and southern section of the park, where firelines are lacking, flatwoods are overgrown and potentially dangerous to adjacent residential communities. More firelines and low water crossings are needed in order to safely burn these areas of mesic flatwoods around developments and private property.

Mesic flatwoods at Tarkiln Bayou are dominated by a mix of slash and longleaf pine, a shrub layer of fetterbush and gallberry, and an herbaceous layer dominated by wiregrass. The areas of mesic flatwoods west of Bauer Road (County Road 293) are beginning to develop a multi-aged overstory comprised of both longleaf and on-site slash pines.

Perdido Key

The mesic flatwoods found at Perdido Key State Park are located in management zones PK-1 and PK-3 adjacent to Old River on the northern boundaries of the park. It is found in small patches interspersed in a matrix of scrub, interdunal swale, and salt marsh. Being so close to the Gulf of Mexico and Old River, the main disturbance to this community is tropical storm events. Fire is not a tool utilized to maintain this community due to its patchy nature interspersed through other non-pyric communities, and the lack of appropriate fuels needed to carry fire.

Minute changes in elevation differentiate the communities from mesic flatwoods, scrub, salt marsh and interdunal swale. The slightly raised, nonporous sediments (Corolla-Duckston) allow for the persistence of slash pines and wiregrass to exist alongside adjacent coastal communities. Mesic flatwoods can commonly be found bordering large interdunal swales as well as the edges of saltmarsh communities.

Evidence of past hurricanes are readily observable in this community from the large amounts of boardwalk and house debris scattered throughout the park. In some areas, entire sections of dune crossovers can be seen laying partially intact within the mesic flatwoods and scrub communities. As storm surge from hurricane Ivan lifted the structures from the beach dune community just to the south, the debris was caught within the mesic flatwoods by the remaining pine trees and mature yaupon hollies (*Ilex vomitoria*). While some of the smaller debris can be removed and disposed of by hand, the larger sections of boardwalk will most likely remain. Bringing in heavy equipment would disrupt all of the communities here, and the benefits to remove the structures would not outweigh the damage to the adjacent areas.

Currently, the mesic flatwoods are in fair condition. Salt inundation from large storms have stunted vegetative growth, and high winds have toppled many of the older slash pines. Storm debris is scattered around this community, shading out the

growth of grasses or shrubs. Also, small patches of cogongrass (*Imperata cylindrica*) can be found in this natural community. AmeriCorps treated every cogongrass patch in 2013, but consistent effort is needed to truly eradicate this invasive from the park.

General Management Measures: Prescribed fire is important to this community and should continue to be implemented on a 2-5-year interval once the understory fuels are in balance. Mechanical treatment and prescribed fire application will likely be needed to restore this community. In addition, depending on the response, underplanting of longleaf pine seedlings should be considered. Restoration is discussed in the Resource Management Program section of this component.

In areas where fire has been suppressed for many years, reintroduction of fire in these communities must be undertaken in a sensitive and strategic manner to prevent tree crown consumption and duff smoldering, which can kill older trees (Varner 2005). An example of management for older trees is raking the duff and accumulated leaf litter from the base of the tree during prescribed fire efforts. Once fire has been reintroduced, it will take many years of careful burning before this community will return to good condition. Burns during the recovery period should take into account the duff moisture prior to burning. If sufficient duff moisture exists then prescribed burns should be conducted with ignition techniques tailored accordingly to reduce the likelihood of old-growth mortality.

In this natural community as well as other pyric communities, it is understood that in most cases growing season burns may be the most advantageous for natural community health. However, there are smoke management and safety considerations due to the wildland urban interface, which limits the number of opportunities that prescribed fire can be introduced during a season. The park should continue to schedule prescribed burns so that variability in the seasonality of burns between zones exists and growing season opportunities are maximized.

The mesic flatwoods at Perdido Key need consistent surveys to locate and treat any new exotic plant species. With cogongrass present, follow up treatments are necessary to prevent the spread of this grass. Also, Chinese tallow trees (*Sapium sebiferum*) are prevalent in the adjacent properties, therefore staff should be looking out for this tree and treating it before a fruiting population becomes established. Prescribed fire is not used as a management technique for this natural community at Perdido Key.

The parks should continue to maintain the original hydrology and prevent future hydrological alteration. Careful consideration should be given to the type, location, creation, and maintenance of firelines, as well as additional trails and campgrounds. If and when new firelines are installed, appropriate low water crossings should be designed and implemented.

Salt Marsh

Desired Future Condition: Salt marsh occurs within the boundary of Big Lagoon, Tarkiln Bayou and Perdido Key. Salt marsh is 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 will have distinct zones of vegetation based on water depth and tidal fluctuations. Saltmarsh cordgrass will dominate the seaward edge; areas most frequently inundated by tides. Needle rush will dominate the higher, less frequently flooded areas. Other characteristic species include annual saltmarsh aster (*Symphyotrichum subulatum*), saltwort (*Batis maritima*), sea oxeye (*Borrichia frutescens*), and shoreline seapurslane (*Sesuvium portulacastrum*). A landward border of salt-tolerant shrubs including groundsel tree (*Baccharis halimifolia*), yaupon holly and marshelder (*Iva frutescens*) may exist. Soil salinity and flooding are the two major environmental factors that influence salt marsh vegetation. Fire may sporadically burn into the salt marsh from surrounding communities, though this would likely be very limited in extent given the patchiness of the fuels and the wetter areas interspersed among the drier zones.

Hydrology should remain unaltered and tidal exchange uninfluenced by development. Snakes such as the gulf salt marsh snake and other herptofauna should be present. The salt marsh should be used by a variety of birds for foraging, resting and nesting, including clapper rails (*Rallus crepitans*), least bitterns (*Ixobrychus exilis*), etc. Invertebrates such as marsh periwinkles (*Littoraria irrorata*) and salt marsh tiger beetles (Habroscelimorpha severa) are an important component of salt marshes and should be present. Fiddler crabs (*Uca* spp.) should be present along the edges of the salt marsh community. Desired conditions include preventing accumulation of pollutants or manmade debris. Presence of exotic plants and animals should be minimal and under control.

Big Lagoon

This community is found on south section of the park along Grand Lagoon and the shore of Grand Lagoon Lake and its outlet. Currently, this community is in good condition given the recovery since tropical storm disruption. Tropical systems a decade or more ago lead to saltwater inundation to depths of 10 feet and a significant amount of debris accumulation within this community. However, debris in the eastern and southern portion has been removed by direct debris removal efforts and through prescribed fires.

Numerous wading birds utilize the salt marsh habitat including snowy egrets (*Egretta thula*), little blue herons (*Egretta caerulea*) and tricolored herons (*Egretta tricolor*). A variety of bird species use the salt marsh habitat for nesting including clapper rail, sora (*Porzana carolina*), least bittern, and marsh wren (*Cistothorus palustris*). Nelson's sparrow (*Ammodramus nelsoni*) are found in this community during the winter months.

Tarkiln Bayou

Large areas of black needle rush line the shoreline of Tarkiln Bayou and the southwest tip of Tarkiln Peninsula, all of which are in good condition. This area would be considered in excellent condition if the surrounding water quality was better in Tarkiln Bayou and Perdido Bay. These areas are influenced by the regular ebb and flow of tidal waters, and provide a nutrient-rich environment for a great many marine animals. Estuarine systems such as these are considered the nurseries of the sea. Marine fish hatch out as fry and spend the early stages of life in tidal marsh areas where food and protection from open water predators are readily provided. The solitary tunicate, a tiny filter feeder, occurs in these waters, often obscured by sand and silt. Marine worms form U-shaped burrows in the muddy bottom and feed on nutrient-rich sediments. Their sandy/silt-like deposits can be seen in the clear shallows at low tide. Other animals inhabiting the marsh include segmented worms, marsh snails, top snails, olive snails, hermit crabs, saltmarsh mud crabs, fiddler crabs, saltmarsh beachhoppers, and barnacles.

Perdido Key

The salt marsh at Perdido Key is in good condition, and is located on the northern boundary of management zones PK-1 and PK-3. These marshes are directly linked to Old River, with saltmarsh cordgrass in the deeper sections and needle rush on the higher, upland areas. On the slightly raised wave-created berms surrounding the marshes, a ring of groundsel tree and yaupon holly can be found. Some of the salt marshes appear to fade into interdunal swales, with vegetative communities shifting from freshwater plants to halophytic plants depending on the time since tropical storm.

General Management Measures: Following storm events, the salt marsh habitat is often littered with garbage. These materials should be collected and removed when possible due to potential for entanglement or ingestion by foraging wading birds and other wildlife.Being a natural community shaped by salinity and hydroperiod, the current hydrology of the salt marshes should be maintained. The addition of any hard shoreline stabilization techniques should be avoided, as it causes increased erosion adjacent to the introduced structure. Also, the removal of native vegetation to install a hard structure eliminates vital nursery area for multiple game fish and invertebrate species vital to the local economy.

Although this community potentially can burn, the fire return interval is unknown. It is common for fire to enter this ecosystem from neighboring pyric communities, and burn plans should account for this. It appears that the main ecological factor driving this community is wind and waves from Grand Lagoon, Tarkiln Bayou, Perdido Bay. The vegetative biomass and diversity in these salt marshes fluctuates from halophytic after extreme high-water events and tropical storms that impact Tarkiln to fresh during periods of low tropical storm activity and heavy rains. Fire should be used with caution in the marsh to avoid adversely affecting bird or other species dependent on the marsh habitat for nesting and foraging. Specifically, fires during

the breeding season should be ignited in a mosaic providing patches of unburned habitat that function as a refuge for marsh-dependent species.

Sandhill

Desired Future Condition: Sandhill only occurs within the boundary of Tarkiln Bayou. The dominant pine of sandhill at Tarkiln Bayou is longleaf pine, with the occasional slash pine interspersed. Herbaceous cover is dense with wiregrass, and low in stature. Most of the plant diversity is contained in the herbaceous layer including other three-awns (*Aristida* spp.), pineywoods dropseed, lopsided Indian grass (*Sorghastrum secundum*), bluestems (*Andropogon* spp.) and little bluestem (*Schizachyrium scoparium*). In addition to groundcover and pines, there will be scattered individual trees, clumps, or ridges of on-site oak species such as turkey oak, sand post oak (*Quercus margaretta*), and bluejack oak. In old-growth conditions, sand post oaks will commonly be 150-200 years old, and some turkey oaks will be more than 100 years old. The Optimal Fire Return Interval for this community is 1-3 years.

Tarkiln Bayou

The sandhill currently identified at Tarkiln Bayou contains longleaf pine, turkey oak, post oak, and bluejack oak, along with a diverse herbaceous component dominated by wiregrass. This community is found on slightly elevated areas with deeper, more permeable sandy soils. Although these areas lack the picturesque rolling hills of classic sandhill communities, the scattered overstory of longleaf pine, prevalence of turkey oak, and slightly xeric conditions identify these communities as sandhill.

Three areas of sandhill are currently identified at Tarkiln Bayou. One of the largest areas occurs on the Tarkiln Peninsula, where some of the park's oldest longleaf pines occur. This sandhill community is in management zone TB-E, is in relatively good condition, and has been on a regular burn rotation for the past 15 years. There is ample longleaf pine regeneration in this zone, particularly following the park's first prescribed fire in 1999. Additionally, maritime influences may help reduce the encroachment of gallberry, titi, and wax myrtle along ecotonal areas of sandhill, as seen in flatwoods portions of the park. Wiregrass is the dominant groundcover species here, and can be contiguous in places. Other plant species in this zone include green eyes (*Berlandiera subacaulis*), pinewoods milkweed (*Asclepias humistrata*), gopher apple, sparkleberry (*Vaccinium arboreum*), and woody goldenrod. The eastern tract of this sandhill grades into mesic flatwoods, wet flatwoods, then salt marsh, while the western section grades into maritime hammock.

Another large area of sandhill occurs east of Bauer Road in portions of management zones TB-O, TB-N, and TB-L. This area appears to have been selectively timbered in recent decades, as a number of large longleaf stumps are found throughout the zone. There is a scattering of mature overstory pines, along with ample longleaf regeneration throughout this sandhill community. The oldest generation of regrowth appears to have occurred shortly after harvest, and is followed by regrowth from

seed creating a multi-aged stand. This area is the best example of sandhill on the park and is in excellent condition.

The last area of sandhill occurs in management zone TB-GG, which is on the southern boundary of Tarkiln. This small section of sandhill is disjunct from other upland natural communities due to adjacent residential development. Recent prescribed burns have improved the quality of this section of sandhill, but overall it is still in fair condition due to multiple ATV trails, lack of fire, and low herbaceous diversity.

General Management Measures: The best management for sandhill is consistent prescribed fire every 2-4 years. Variability in the season, frequency, and intensity of fire is also important for preserving species diversity, since different species in the community flourish under different fire regimes.

Avoiding widespread soil disturbance, such as roller chopping, can prevent the establishment of weedy species and protect the existing, established, native groundcover. This groundcover, especially wiregrass, is unlikely to recover if lost to mechanical treatment. Also, all areas of sandhill should be monitored periodically for exotic plant species, specifically cogongrass (*Imperata cylindrica*) and natalgrass (*Melinis repens*).

Scrubby Flatwoods

Desired Future Condition: Scrubby flatwoods only occur within the boundary of Big Lagoon. The dominant tree species of the interior of scrubby flatwoods should be slash pine. There should be a diverse shrubby understory often with patches of bare white sand. A scrub-type oak "canopy" should contain a variety of oak age classes/heights across the landscape. Dominant shrubs should include sand live oak (*Quercus geminata*), myrtle oak (*Quercus myrtifolia*), Chapman's oak (*Quercus chapmanii*), saw palmetto, and rusty staggerbush (*Lyonia ferruginea*). Cover by herbaceous species should be low to moderately dense. Grasses include wiregrass, broomsedge bluestem (*Andropogon virginicus*), and little bluestem (Schizachyrium scoparium).

Big Lagoon

The condition of the community is considered fair. Some of as the mature slash pine canopy was severely impacted by tropical systems a decade or more ago in the eastern and southern portions of the park. Saltwater inundation to depths of 10 feet occurred in some areas. However, this community has improved over the past decade, with little to no storm activity, adequate rainfall and application of prescribed fire in recent years.

Recruitment was thought to be stagnant, likely because of saltwater intrusion. However, recruitment is now progressing, where sapling slash pine have been observed. Additionally, understory species are also slowly returning to this community.

General Management Measures: Management measures for the park's scrubby flatwoods will include periodic prescribed burning. The Optimal Fire Return Interval for this community should be 5-15 years when aiming to achieve a mosaic of burned and unburned areas and based on the adjacent natural community. In some areas, fire return intervals may be higher where scrub is immediately adjacent. Burning at intervals consistently less than 5 years could diminish acorn production and decrease food available for wildlife.

Given the location of the park, this community is likely strongly driven by saltwater intrusion and tropical activity. Prescribed fire should be applied with caution to prevent destruction of the community. Time since storm and degree of storm damage should be accessed when developing burn prescriptions for this community at the park.

Scrub

Desired Future Condition: Scrub occurs within the boundary of Big Lagoon and Perdido Key. Dominant species over the park's scrub acreage include sand live oak, myrtle oak, Chapman's oak, Choctawhatchee sand pine (*Pinus clausa var. immuginata*), saw palmetto, and Florida rosemary (*Ceratiola ericoides*). Scrub occurs on dry sandy ridges that display large open bare sand patches. The fire return interval for stand replacement fires in scrub on the peninsula of Florida is 4-15 years, but there is no evidence that fire is an important process that shapes the coastal scrub in the Florida panhandle (Drewa et al. 2008; Parker et al. 2001).

Coastal processes such as salt spray and tropical force winds are believed to play more of a role in regulating Panhandle scrub than fire (Parker et al. 2001; Huck et al. 1996; FNAI 2010). Vegetation damaged by high winds and salt spray create gaps in the canopy for recruitment where seeds can germinate and grow. Non-serotinous cones exhibited by Choctawhatchee sand pine (panhandle sand pine) allow for continuous seed source that is not dependent on fire for release. Research focusing on the pyric nature of panhandle coastal scrub suggests that this natural community does not require fire as a disturbance.

Rosemary-dominated scrub tends to retain openings between shrubs, even long after a disturbance event (e.g., fire, storm, etc.). Although this community can appear barren, a nitrogen-fixing cyanobacteria is found in the soil crust and is thought to be significant nutrient source. The density found in the soil crust varies, but increases from zero immediately after disturbance to peak at 8-15 years.

In scrub adjacent to beach dunes, a contiguous mature cover of seed producing scrub shrubs provide important refugia for the Perdido Key beach mice during and after tropical storms that damage the primary dunes. This oak scrub found on the sandy ridges closest to the Gulf of Mexico are most influenced by salt spray that "prunes" or shapes the structure of the evergreen oaks, preventing them from becoming tall, and creating patches of dead vegetation. Over long periods of time, these randomly occurring storm disturbances result in a multi-aged mosaic of various stages of scrub succession. The oak canopy varies in height based largely

on its proximity to the maritime influences of the Gulf of Mexico. Areas closer to the Gulf consist of a dense, nearly contiguous, salt pruned oak canopy. Oaks slightly farther away will be stunted in height, but no direct pruning is visible. Although hurricanes and salt spray have an obvious and direct effect on this community, other natural processes that shape or maintain this community are unknown.

Scrub community should grade into various flatwoods communities without barriers such as roads, trails, etc. Presence of exotic plants and animals should be minimal and under control.

Big Lagoon

Big Lagoon contains two variations of scrub, sand pine, scrub and rosemary scrub. Rosemary scrub occurs at higher elevation along the historic dune ridges, which occurs adjacent to the park drive and adjacent to Big Lagoon.

The scrub community at Big Lagoon was somewhat adversely effected by tropical systems in 2004 and 2005. However, it is recovering, albeit slowly. This community is in fair condition in the park. The rosemary scrub was recently burned in many locations adjacent to the scrubby flatwoods at the park, which may take decades to recover. Very few sand pine recruits were documented in this community, possibly a residual effect following the previous tropical storm activity. Although the hurricanes were over a decade away, recovery time is unknown.

The sand pine scrub is also in fair condition. This community can easily become overgrown, with dense sand pine and thick, almost ruderal understory. Due to a wildfire in the 1990s that resulted in loss of park structures, the sand pine scrub is mechanically treated to reduce fuel due to the urban interface of the park. The mechanical treatment began in the 1990s following a wild fire that began in the scrub. The mechanical treatment has led to the somewhat ruderal understory growth. However, given the urban interface, mechanical treatment will likely need to continue. The mature canopy sand pine in this community was adversely impacted by tropical systems a decade or more ago, but seems to be recovering.

Perdido Key

The scrub found at Perdido Key is extremely open and spacious, with vast sandy white patches between stands of salt pruned oaks and pines. Currently the scrub is in good condition with almost no impacts from park visitation. Only small amounts of exotic plants such as torpedograss (*Panicum repens*) can be found within management zones PK-1, PK-2 and PK-3 along SR 292. Large-leaved jointweed (*Polygonella macrophylla*), endemic to panhandle coastal scrub, occurs here and is routinely blooming in the fall, replenishing its seedbank. Also occurring in this natural community are the two state-endangered golden aster species including Godfrey's golden aster and Cruise's goldenaster.

The scrub community adjacent to the beach dunes is vital for the survival of the Perdido Key beach mouse. This community serves as a reservoir for food and cover

for beach mice during and after catastrophic storms that may damage or destroy the primary dune systems. In general, the larger the contiguous area of habitat, the better survivability and habitat quality for beach mice. As with beach dune, the soils and vegetation are highly sensitive to, and are easily damaged by off road vehicle use and foot traffic.

General Management Measures: Visitor and management access to coastal scrub should be controlled through designated at-grade footpaths. Unauthorized paths or walkways through this community should be minimized as these paths serve as corridors that allow coastal winds and salt spray to penetrate into the scrub creating soil erosion and mortality of trees, thus further damaging and fragmenting this community. This is particularly important for Big Lagoon, given the slow recovery following previous tropical activity. Additional accesses or development should avoid coastal scrub where possible to prevent impacts. Motor vehicle use in this area should continue to be limited or eliminated.

The use of ignition techniques to mimic stand replacing or catastrophic canopy fires should not be applied to coastal scrub in the park since researchers (Drewa et al. 2008; Parker et al. 2001) have concluded that stand replacing fire was not the natural process driving coastal panhandle scrub communities. Use of stand replacing fire would not mimic a normal natural process in these communities. Fire would only open this community up to abnormally high wind and water erosion, thereby creating larger gaps between the already fragmented coastal scrub along this well-developed coast. Prescribed fire from neighboring pyric communities should be allowed to naturally trickle in to this community to prevent the formation of a hard edge between natural communities. However, fire should never be forced, especially in rosemary scrub. Many scrub plant species require 15-30 years to reach adult maturity. Therefore, patches of mature plants are needed to provide refuges for older plants within the habitat and a seed source for recovery post-tropical storm damage.

Due to the urban interface of the park and the often volatile-fuels associated with overgrown sand pine scrub, the habitat is managed by mechanical treatment. However, the mechanical treatment regime should mimic the natural storm or burn intervals and should not occur more frequently than 10 years. The mechanical treatment should ensure mature representative oak species remain on site to provide adequate food and cover for wildlife.

Exotic and nuisance animals should be controlled, including feral cats, coyotes, red foxes and armadillos (*Dasypus novemcinctus*), to protect the population of beach mice. Exotic plants, including torpedograss and cogongrass should be monitored and treated before establishing large stands within the parks. SR 292 currently acts as a corridor for exotics to enter Perdido Key, therefore staff will consistently have new exotics introduced via this main road adjacent to Perdido Key.

Seepage Stream

Desired Future Condition: Seepage stream only occurs within the boundary of Tarkiln Bayou. A seepage stream can be characterized as a narrow, relatively short perennial or intermittent stream formed by percolating water from adjacent uplands. As they are typically sheltered by a dense overstory of broad-leaved hardwoods which block out much of the sunlight, very few plants species often occur; however, they may have filamentous algae, ferns, and liverworts growing in clumps at the stream's edge. 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.

Tarkiln Bayou

The vast, low, wet areas of the preserve are ultimately drained by various seepage streams. Most of these streams are small and have somewhat poorly defined streambeds. Many of these smaller streams are commonly referred to as a titi or wetland branch. Most of the smaller streams are ephemeral. A few of the seepage streams east of Bauer Road are fairly well defined, and can have flowing water year-round. Much of the property east of Bauer Road is drained by the 3 larger seepage streams mentioned in the section entitled Hydrology.

In general, surface and near surface water flow is eventually directed into the preserve's seepage streams. The water in these streams is generally clear, except following heavy rain events. With few exceptions, the streams are heavily shaded by a surrounding thicket of streamside baygall. Dominant trees in these streamside forests are titi, sweetbay, slash pine, pond cypress, and blackgum. Some streamside areas are low and swampy with a lush carpet of sphagnum moss. Animals found within these stream habitats include mosquito fish, killifish, gopher frog, cricket frog, pig frog, and cottonmouth. Additional streamside biota surveys would be helpful in determining future management decisions.

Ecotones between streamside hardwood communities and more open flatwoods communities have degraded due to lack of frequent fire. Surveys have identified many streamside areas where pitcherplants and wiregrass are now overgrown with titi. Burn prescriptions for these zones should focus on reducing shrubby hardwoods in these areas.

General Management Measures: The park should avoid altering the hydrology of the seepage streams especially when planning new firelines or development. Herbicide use should be limited in these streams as the amphibians that depend on them may be sensitive to pollutants. Appropriate low water crossings should be constructed if firelines are needed over seepage streams. These low water crossings would be low enough to permit unrestricted water flow (above and below ground) within this community.

Water

Desired future condition: Open water only occurs within the boundary of Big Lagoon. The open water areas within the park will be managed to remove priority invasive plant species (Florida Exotic Pest Plant Council (FLEPPC) Category I and II species) and steps should be made to prevent additional hydrologic disruption from occurring.

Big Lagoon

There is one location at the park defined as water, the Grande Lagoon Lake. The lake is an estuary branch or bayou that breaks off from the main body of Big Lagoon and is in the southwest section of the park. This community is the deeper waters associated with the estuarine tidal marsh habitat found ringing the lake. The condition of the community is considered fair given the amount of tropical storm debris remaining in Grande Lagoon Lake.

General Management Measures: Staff will continue to control any aquatic invasive exotic plants. Care must be taken to prevent disruption to the estuary hydrology. Assess the extent of tropical storm debris and the feasibility of removal. Debris removal is discussed in the Resource Management Program of this component.

Wet Flatwoods

Desired Future Condition: Wet flatwoods occur within the boundary of Big Lagoon and Tarkiln Bayou. The desired future conditions of wet flatwoods should be represented by an overstory of scattered slash pine with a mixture of low shrubs and herbs in the groundcover. The canopy should be open, with widely scattered pines and of variable age classes. Sparse to no midstory should be present. Native herbaceous cover is dense and includes wiregrass, pitcherplants, and other imperiled species such as terrestrial orchids and butterworts (*Pinguicula* spp.). Common shrubs will include sweet pepperbush (*Clethra alnifolia*), fetterbush, large gallberry (*Ilex coriacea*), titi, and wax myrtle. Soils should be saturated much of the year with little to no duff accumulation. The natural hydrology has been restored and is maintained. The Optimal Fire Return Interval for this community is 2-4 years.

Big Lagoon

Most of the wet flatwoods at Big Lagoon are in good ecological condition. At the park, the wet flatwoods patches are frequently found in linear strips following ancient dune swales. These strips are situated at the ecotone between baygall and scrubby flatwoods in most locations. Some older slash pine tree mortality has occurred due to the reintroduction of prescribed burns due to consumption of duff that has built up due to fire exclusion, primarily around the baygall community.

Given the location of Big Lagoon, this natural community is susceptible to saltwater inundation. During previous tropical activity depths of 4-10 feet occurred in some areas.

Tarkiln Bayou

This community type occurs throughout Tarkiln Bayou, and is very similar in species composition to wet prairie. Longleaf pine-dominated wet flatwoods at Tarkiln Bayou tend to occur in conjunction with mesic flatwoods, wet prairie, and shrub bog around seepage areas. These wet pinelands occur on poorly-drained soils that have an extended hydroperiod, holding water for most of the year. In some cases, the wet flatwoods are in excellent condition, and are dominated by thick beds of wiregrass with relatively open vistas across a low, herbaceous understory. These areas have a widely scattered overstory of longleaf pine and an overall high diversity of plant species. In other cases, lack of frequent fire has left large areas of wet flatwoods heavily overgrown with titi, bay trees, wax myrtle, lyonia, gallberry, sweet pepperbush, and other wetland, hardwood trees and shrubs. These overgrown areas begin to resemble shrub bog, with imperiled wetland species becoming shaded out. If fire exclusion continues, titi will develop a closed canopy and this natural community will eventually succeed into shrub bog.

Some of the wet flatwoods areas cover large tracts of land, such as those in management zones TB-Q and TB-II, while others are small pockets within mesic flatwoods or linear communities along the edges of titi-dominated shrub bog. Many of these smaller ecotonal communities are lumped in with the mesic flatwoods natural community. Wet flatwoods along shrub bog and seepage communities can quickly become overgrown with titi when fire is absent. These herbaceous plant dominated-wetlands rely on frequent fires every 2-3 years in order to keep titi and other hardwoods from becoming dominant. The wet flatwoods at the preserve are generally characterized by the presence of imperiled pitcherplants, dense wiregrass, clubmoss, redroot, sundews, and bog buttons. These understory plants are less frequent in wet flatwoods areas that lack regular fire, and have been overgrown by woody species.

Overall, most of the wet flatwoods at Tarkiln are in fair ecological condition. Some minor hydrological alterations, such as canals/ditches through some of the flatwoods have altered the community somewhat. In most cases, all the components of this community are intact, and with the continued use of prescribed fire, the community should return to good condition.

General Management Measures: Prescribed fire should be used to maintain this community. The fire return interval should range from 2-4 years. In areas that have not been burned regularly, duff should be assessed prior to burning, and duff moisture parameters and appropriate ignition techniques should be included in prescriptions to prevent mortality of trees and other species. Hydrological disruptions or alterations should be avoided, and appropriate low water crossings should be installed to allow prescribed burning to take place. Park staff should avoid the creation of mineral firelines if at all possible, as they speed up erosion and

cause hydrological issues. Historic fire plow scars should be mapped and assessed for restoration needs.

Wet Prairie

Desired Future Condition: Wet prairie only occurs within the boundary of Tarkiln Bayou. This community is entirely herbaceous, and can be found on continuously wet, but not inundated soils. Only a few stunted slash pines and pond cypress are found intermixed. This groundcover is dense, and exceptionally species-rich with potentially more than 100 different species in one prairie. Dominant species will be wiregrass, foxtail club-moss (*Lycopodiella alopecuroides*), yellow butterwort (*Pinguicula lutea*), and savannah meadowbeauty (*Rhexia alifanus*). Pitcherplants and other carnivorous plant species, and terrestrial orchids are present and abundant in some areas as well.

Tarkiln Bayou

Aerials taken in the 1950s clearly show vast areas, particularly east of Bauer Road, as open grasslands either completely void of overstory pines, or very low overstory density. Many of these wet prairies are now preserved on park land. However, lack of frequent fire, and in some cases alteration of natural hydrology, has resulted in some degree of habitat degradation. Overstory pine density has increased significantly, and linear shrub bog, streamside communities have expanded into former open prairie. Suppressed wiregrass sprigs and pitcherplants struggle for sunlight underneath more recent titi shrubs. The objectives of prescribed burning in these areas should focus on thinning out recent pine recruitment and top kill of young titi shrubs that have invaded former prairie. Re-establishing former ecotonal boundaries between wet prairie and streamside shrub bog will be accomplished gradually over many successive burns.

Wet prairie at Tarkiln Bayou is very similar to areas described as wet flatwoods except that prairie is characterized by the low number or complete lack of overstory pines. As stated above, burning is needed in most of these areas to restore this characteristic. In general, understory plants include at least a few of the following: dense wiregrass, red root, whitetop pitcherplant, purple pitcherplant, parrot pitcherplant, red pitcherplant, butterworts, yelloweyed grass, bog buttons, hat pins, sundews, clubmoss, meadowbeauty, savanna aster, rush featherling (*Pleea sp.*), grass pink orchids, platanthera orchids, milkworts, fewflower milkweed, toothache grass, yellow colicroot and yellow stargrass.

Extensive areas along the eastern and southern portions of the Tarkiln Peninsula are wet prairies that have become overgrown in recent decades. These areas historically had dense wiregrass understories with pitcherplants. The Escambia County soil survey specifies these areas as Plummer sand where native vegetation consists only of a ground cover of water-tolerant herbs and grasses. This is consistent with much of the area delineated as wet prairie west of Bauer Road, although habitat conditions have degraded.

General Management Measures: Frequent fire and proper hydrological regime are important processes to this diverse herbaceous natural community. Restoration of wet prairie should focus on titi removal and continuation of fire. Wet prairies with soft, saturated soil are sensitive to soil disturbance from vehicles and equipment used in restoration. Roads and firebreaks should be designed to prevent hydrological disruption. Some roads in the park are already compromising water flow and causing erosion of the roads. These should be addressed and proper crossings that allow hydrological connections, such as low water crossings, should be installed. Wet prairies should not be isolated from neighboring natural communities on which they depend for headwaters of seepage. Firelines should not be installed along the ecotones between wet prairies and their neighboring communities to allow fire spread into both communities. Herbicide use should be avoided in these natural communities. If needed, herbicides should only be used with extreme caution in these natural communities as many of the plant species are sensitive to overspray, drift, and root transfer.

Xeric Hammock

Desired Future Condition: Xeric hammock only occurs within the boundary of Tarkiln Bayou. Typically considered a late successional stage of sandhill, this community occurs in small isolated patches on excessively well-drained soils. Vegetation consists of a low closed canopy dominated by sand live oak, which provides shady conditions. Typical plant species also include Chapman's oak (*Quercus chapmanii*) and laurel oak. Slash pine and longleaf pine also are a minor component. Understory species include saw palmetto, fetterbush, myrtle oak (*Quercus myrtifolia*), and yaupon holly. A sparse groundcover layer of wiregrass and other herbaceous species (including saw palmetto and smilax vines) exists in areas with partial sunlight. A continuous leaf litter layer is present where large stature oaks are found.

Tarkiln Bayou

Two relatively small areas of xeric, oak-dominated communities east of Bauer Road are best described as xeric hammock. The first of these areas, found in management zone TB-L, consists of a closed canopy of sand live oak, post oak, and laurel oak, which surround an abandoned cattle dip vat along a park service road. This oak hammock is only a few acres in size, and has an understory dominated by saw palmetto, bracken fern, and smilax. It is likely that the current vegetation growth patterns in this area were influenced by past land uses associated with cattle ranching. Nevertheless, some of the post oaks and sand live oaks appear to be old-growth trees, indicating that this stand of hardwoods is well established. Prior to the installation of the cattle dip vat, this area would have most likely resembled sandhill, based on the Foxworth sands and oak species found at this location.

A second area of xeric hammock is located south of the unnamed blackwater stream in management zone TB-P. This xeric hammock encompasses an area where islands of very large, old live oaks occur. It appears that this was a

developed site at one time, with concrete slabs strewn about and minimal herbaceous cover. Very limited vegetation occurs here besides the occasional palmetto clump, smilax vine, and American beautyberry shrub. Due to the ruderal nature and the cultural significance of these xeric hammocks, neither of these areas are to be restored to sandhill.

General Management Measures: The xeric hammock areas at Tarkiln are designated to remain hammock due to their cultural significance. While this community will not be specifically targeted for prescribed burning, park staff should allow burns in neighboring zones to ignite the edges of the hammock and creep in and extinguish naturally. This will prevent the oak canopy from expanding beyond its current extent, while maintaining the existing cultural area.

Altered Landcover Types

Canal/Ditch

Desired Future Condition: Canals/ditches occur within the boundary of Big Lagoon and Tarkiln Bayou. The canal/ditches within the park will be managed to remove priority invasive plant species (Florida Exotic Pest Plant Council (FLEPPC) Category I and II species) and steps should be made to prevent additional hydrologic disruption from occurring. Other management measures include restoration efforts designed to minimize the effect of the spoil areas on adjacent natural areas. Cost-effectiveness, return on investment and consideration of other higher priority restoration projects within the park will determine the extent of restoration measures in ruderal areas. The canal/ditch should be restored to its natural contours to allow hydrologic flow and connectivity between adjacent natural communities.

Big Lagoon

This altered landcover at Big Lagoon includes a pond known as the Long Pond south of the campground road, mosquito ditches running east to west on the southern edge of the baygall community, additional ditches south and west of the campground that empty into the Grande Lagoon Lake and 2 additional ditches that sit on the eastern boundary next to the Grand lagoon subdivision.

The hydrological flow of the park ditches has been altered due to tropical activity, erosion and reoccurring beavers. Tropical storms brought in storm debris from the surrounding development. The remaining debris has resulted in blockages throughout the ditches. Similarly beavers continually create dams along the ditches, also resulting in blockage of the stream flow. Resulting erosion in dispersed locations along the ditches also impacts the stream flow. Collectively, water from the ditches now regularly flood the park campground and the adjacent uplands.

Tarkiln Bayou

A drainage ditch at Tarkiln Bayou impacts surface flow that runs along the northern park boundary on the Bronson Field, U.S. Naval Installation. This ditch runs from the beaver pond, just north of management zone TB-B, west into Perdido Bay.

General Management Measures: Improve and maintain the hydrology of this altered community as much as possible. Care must be taken to prevent any further disruption to hydrology. The culvert at Big Lagoon's secondary ingresss/egress needs to be restored and enlarged to limit additional ditch erosion by tropical systems. Removal of nuisance beavers may be needed to reduce flooding as that population appears to be increasing over time. The debris remaining in the ditches should be assessed, to determine need for removal to restore the desired stream flow. The park staff will continue assessing the hydrologic impacts of the ditch. Priority invasive plants (FLEPPC Category I and II species) will be removed from all developed areas. The feasibility of restoration of the drainage ditches is discussed in the Resource Management Program section of this component.

Developed

Desired Future Condition: Developed areas occur within the boundary of Big Lagoon, Tarkiln Bayou, and Perdido Key. 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 (FLEPPC 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.

Big Lagoon

There are approximately 41 acres of developed areas at Big Lagoon. Developed areas include parking areas, buildings, campgrounds, observation towers and other facilities as well as maintained rights-of-way and roadsides. Many of the exotic plants present at the park have been observed in developed areas around park buildings, including residences.

Currently, park visitors are impacting the beach dune and scrub communities near the observation tower, thereby increasing the footprint the development. Proper signage and enforcement are needed to minimize and prevent further degradation of the area.

Tarkiln Bayou

Developed areas at Tarkiln Bayou include parking areas, a restroom, and other facilities as well as maintained rights-of-way and roadsides. Maintained rights-of-ways and roadsides often have the highest occurrence of exotic plants coming from adjacent residential development.

Perdido Key

Perdido Key parking areas, bathrooms, covered picnic areas and other facilities, as well as maintained rights-of-way and roadsides are included as developed. All facilities at the park were replaced after Hurricane Ivan in 2004 and are in good condition.

General Management Measures: Staff will continue to control invasive exotic plants in developed areas of the park. Defensible space will be maintained around all structures in areas managed with prescribed fire or at risk of wildfires.

To ensure maintenance of adjacent communities, proper signage and enforcement are needed to minimize and prevent visitors from creating unauthorized trails and degrading natural areas.

When choosing landscaping for developed areas, park staff should choose only native plants found within their proper ranges. No new native plants should be introduced to the park if there is no historical record of that plant inhabiting the park in the past.

Spoil Area

Desired future condition: Spoil areas only occur within the boundary of Big Lagoon. The spoil areas within the park will be managed to remove priority invasive plant species (Florida Exotic Pest Plant Council (FLEPPC) Category I and II species). Other management measures include restoration efforts designed to minimize the effect of the spoil areas on adjacent natural areas. Cost-effectiveness, return on investment and consideration of other higher priority restoration projects within the park will determine the extent of restoration measures in ruderal areas.

Big Lagoon

A 7.7-acre area at the park is covered with spoil material from maintenance dredging projects from the ICW. This community is the area under and around the boat launch parking lot and the septic dosing field. The condition of the community is considered fair. Spoil material is no longer received by the park in this upland area from channel maintenance. Partial revegetation has occurred naturally from seed sources from surrounding natural communities.

General Management Measures: Control of FLEPPC Category I and II species in this area remains a priority to prevent their spread into the natural communities of the park. A portion of this community is being considered for additional parking and a new bathhouse. The remaining habitat should be restored and is discussed in the Resource Management Program of this component.

Utility Corridor

Desired Future Condition: A utility corridor only occurs within the boundary of Tarkiln Bayou. The utility corridors within the park will be managed to minimize the effect of fragmentation on adjacent natural areas. Priority invasive plant species (FLEPPC Category I and II species) will be removed from all developed areas. Other management measures include proper stormwater management and corridor maintenance measures that are compatible with prescribed fire management in adjacent natural areas.

Tarkiln Bayou

A utility corridor runs through multiple zones at the preserve, TB-U, TB-W, TB-X, TB-Y, TB-Z, and TB-AA. Because of the nature of the utility corridor it is used as the boundary and fire break between management zones.

General Management Measures: Staff will continue to control invasive exotic plants along the corridor. If infestations of exotic plants occur in response to mowing, park staff will need to coordinate with the county to ensure equipment is properly cleaned before it is moved onto the preserve property.

Natural Communities Management Goals, Objectives, Action Items

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

The 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 wild land 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 A: Within 10 years, have 3,980 acres of Big Lagoon and Tarkiln Bayou maintained within the optimum fire return interval.

Action 1 Develop/update annual burn plan.
Action 2 Manage fire dependent communities at Big Lagoon by burning between 52 – 132 acres annually.
Action 3 Manage fire dependent communities at Tarkiln Bayou by burning between 911 – 1,821 acres annually.
Action 4 Develop and initiate a plan to annually contract burn accessible portions of Tarkiln Bayou east of Bauer Road.

Table 2 contains a list of all fire-dependent natural communities found within Big Lagoon and Tarkiln Bayou, their associated acreage and optimal fire return interval, and the annual average target for acres to be burned at each park.

Table 2: Prescribed Fire Management

Natural Community	Acres	Optimal Fire Return Interval (Years)
BIG LAGOON STATE PARK		
Wet flatwoods	200	2-5
Mesic Flatwoods	2	2-5
Scrubby flatwoods	124	5-15
Depression Marsh	12	2-4
TARKILN BAYOU PRESERVE STATE PARK		
Mesic Flatwoods	1,216	2-5
Wet Flatwoods	1,127	2-4
Depression Marsh	1	2-4
Sandhill	334	2-4
Wet Prairie	689	2-4
Shrub Bog	275	2-4
ANNUAL TARGET ACREAGE		
Big Lagoon Annual Target Acreage	52-132	
Tarkiln Bayou Annual Target Acreage	911 – 1,821	

Prescribed fire is planned for each burn zone on the appropriate interval. The park's burn plan is 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.

The creation of firebreaks at Big Lagoon is complicated in many areas due to the existence of ditching created primarily to reduce breeding habitat for mosquitoes. There is also a large baygall and basin swamp that impedes firebreak development

across BG-D, E, F, I and K. Additionally, decades of fire exclusion have resulted in the build-up of heavy fuel loads (both fine dead fuels and live understory fuels) that now preclude safe burning. Most of the fire type acreage within the northern management zones have one or both of these concerns. Specialized, low ground pressure holding equipment such as a Marsh Master II, Florida forest service bombardier or Soft Track will be necessary in order to conduct prescribed burns within this northern portion of the park.

All of the park's accessible and traversable zones containing fire dependent communities are currently delineated by perimeter fire lines. While not all portions of every fire management zone may carry fire, the entire zone is usually included in the burn prescription and functionally treated as the "burn zone". All fire lines are inspected annually and perimeter vegetation mowed in order to maintain proper width. Management zones scheduled to be burned in a given year, may also be lightly disked along the outside edge in order to add a mineral soil component where deemed necessary.

Apart from areas bordered by Big Lagoon, the entire Big Lagoon State Park boundary is urbanized. Management zone BG-K, L and a portion of D are across Gulf Beach Highway from high density residential and commercial development, including smoke management areas, seriously questioning the safe use of prescribed fire as a management tool. Acreage mechanical fuel reduction is most likely the best viable alternative in these areas for maintaining natural communities and reducing the build-up of live understory fuels such as evergreen shrubs.

In order to track fire management activities, the 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 and experience, backlog, etc. The database is also used for annual burn planning which allows the 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 Community Restoration

In some cases, the reintroduction and maintenance of natural processes is not enough to reach the desired future conditions for natural communities 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 may 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 community 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, and small-scale vegetation management.

Following are the natural community/habitat restoration and maintenance actions recommended to create the desired future conditions in the estuarine tidal marsh and estuarine unconsolidated substrate communities.

Objective B: Conduct habitat/natural community restoration activities on variable acres of spoil area at Big Lagoon.

Action 1 Develop restoration plan for spoil area.
Action 2 Implement Plan.

Portions of the spoil area are slated for construction involving expansion of the park boat ramp, restroom facilities and associated parking. The spoil is material from historic maintenance dredging of the ICW. Because this site no long receives spoil deposits, it should be restored to its former natural community to reduce the probability of invasive plants in this primarily ruderal habitat. The former natural community is unknown. The spoil is present on aerial photography going back to the 1940s. However, the surrounding habitat is coastal scrub, with rosemary and low oaks. Some fragmented scrub species have self-colonized this habitat.

Objective C: Conduct habitat/natural community restoration activities on 250 acres of shrub bog and wet prairie natural communities at Tarkiln Bayou.

Action 1 Develop/update shrub bog and wet prairie restoration plan
Action 2 Implement restoration plan.

The restoration efforts will include the removal of overgrown and encroaching woody shrubs and trees (e.g., titi, black titi) from long fire excluded wet prairie and shrub bog sites will be the highest priority regarding natural community restoration at the park. A combination of hand removal, and mechanical removal will be utilized as per specific site conditions. Mechanical removal should only be considered if drier conditions allow for access without rutting and/or hydrologic disruption. Herbicide should not be used due to the potential for non-target impacts to focal bog species found within these communities. Regular application of prescribed fire will be a high priority for all management zones containing wet prairies. Removal of woody biomass via fire, mechanical and hand removal will help restore proper soil moisture within wet prairie and seepage slope soils, all of which will begin slowly re-establishing impoverished (nutrient poor) soil conditions that favor the suite of carnivorous plants characteristic of these herbaceous wetlands. Some sites may require follow up efforts to remove persistent off-site hardwoods that impede or limit the effectiveness of prescribed burns. Desired fire effects within wet prairie and seepage slope portions of management zones will be a major factor influencing

the development of burn prescriptions. The effectiveness of prescribed fire within these wetlands shall be evaluated and documented during regularly scheduled post burn evaluations. If necessary, additional management actions will be recommended at that time. Vegetation monitoring should also occur pre and post restoration to determine the effects of hardwood removal.

Objective D: Conduct habitat/natural community restoration activities on up to 59.2 acres of beach dune natural community after major impacts from tropical storms at Perdido Key, as needed.

Action 1	Develop/update site specific restoration plan after a major storm event.
Action 2	Implement dune creation and/or dune revegetation restoration plan.

The park should assess, plan and restore beach dunes after tropical storms when impacts are moderate to severe. The park should focus on planting in order to mimic the natural dune building process. The park should monitor the progress of dune restoration by using photo points. In addition, during the planning stage of restoration, the park should ensure that patches of beach with little to no vegetation remain for shorebird nesting habitat.

After dune vegetation is planted, staff should monitor for survival monthly. If survival drops under 50%, additional plants should be added to the disturbed site. All vegetation that is to be added to the beach dune community should be native to the park, and genetic diversity of the surrounding area should be maintained. Plant cuttings or seeds from original dune vegetation at Perdido Key would be ideal, but sometimes not feasible. If no local vegetation is available for dune restoration, plants should be obtained within a 50-mile radius of the park. The addition of beach dune vegetation is not only vital to the stabilization and creation of beach dunes, it is also imperative for providing food and refuge for the Perdido Key beach mouse.

Natural Community 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 E: Restore motor exclusion area by reestablishing buoy markers at Big Lagoon.

Action 1	Develop/update site specific restoration plan for placement of buoy markers.
Action 2	Implement plan.
Action 3	Design and implement interpretive signage.

Previously motor exclusion areas were delineated with buoys indicating the shallow water areas to protect seagrass beds and mud flats and reduce erosion of the Estuarine tidal marsh and unconsolidated substrate. However, the buoys were lost during tropical activity and have not been replaced. Similar buoys should be established along the lagoon to indicate designated motor exclusion areas. As with any structures placed in a coastal environment, they will have to be maintained following storms, normal wear from the elements, or vandalism, in collaboration with the Florida Coastal Office and Coast Guard.

Objective F: Prevent the use and creation of unauthorized trails from SR 292 to the beach at Perdido Key.

Action 1 Visually inspect SR 292 for the use and creation of unauthorized trails through the beach dune natural community.

Action 2 Report the use of unauthorized trails to local law enforcement when encountered.

Previously, one of the more difficult problems at Perdido Key State Park was the creation and use of numerous unauthorized trails that crossed the dunes all along the park from SR 292 to the Gulf of Mexico beach. Many visitors would park along SR 292, or walk from the housing areas adjacent to the park, and cross the dunes using these unauthorized trails. This occured even though the authorized parking areas were rarely full. Consequently, the trails created through the dunes remained in a consistently damaged state, and never had an opportunity to recover with native vegetation. Also, the unauthorized trails led to a higher disturbance rate to nesting sea turtles and shorebirds, as well as the Perdido Key beach mouse.

In 2003-2004 sand fencing and signage was installed to discontinue access to the unauthorized trails. Hurricane Ivan's storm waters broke through the dunes in these sparsely vegetated trails and removed the signs and fencing. In 2005, a post and wire boundary fence was added along the highway right-of-way. This fence was subsequently damaged by storms during the summer of 2005. As of 2009 the Florida Park Service spent $80,000 to erect appropriate fencing signs along SR292 to eliminate parking on the right-of-way. As of now, parking along SR 292 and walking over the dunes is much less common. Although a few social trails still exist, overall the problem has become much less of an issue. It is vital that park staff maintain the fencing along the roadway to prevent the creation of new unauthorized trails before they become established again.

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), Florida Fish and Wildlife Conservation Commission (FWC) or the Florida Department of Agriculture and Consumer Services (FDACS) as endangered, threatened or of special concern.

The 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 FWC'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 USFWS, FWC, 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.

Imperiled Plant Species

Big Lagoon

Big Lagoon has three imperiled plant species that occur at the park. Curtiss' sandgrass is an endemic grass to Florida. The global population occurs in the panhandle and in two isolated counties on the Atlantic Coast. Curtiss sandgrass is found mostly in coastal flatwoods and is an ecotonal species, occurring in wet areas adjacent to fire-maintained communities. Fire maintenance and intact hydrology are crucial to this species. The sandgrass will disappear if the habitat becomes shaded or too dry. Large-leaved jointweed (*Polygonella macrophylla*) also occurs at the park. Jointweed is endemic to the Southeast and is found in Alabama and Florida. Based on FNAI records, 5% of the Florida population occurs at Big Lagoon State Park. Jointweed grows in sandy soils in coastal scrub and scrubby flatwoods and thrives in unshaded habitat that is kept open from natural disturbances, such as fire, salt spray-pruning, or storm events that result in removal of the canopy (Jenkins et al. 2007). Godfrey's goldenaster (*Chrysopsis godfreyi*) occurs on historic dune ridges and along sandy paths through coastal scrub and scrubby flatwoods at the park.

White-top pitcherplants and Gulf Coast redflower pitcherplants appear to be extirpated at Big Lagoon. Extirpation likely occurred due to prolonged fire exclusion, altered hydrology, encroachment of woody species and partial impoundment by beavers (Johnson 2001). In 1983 "a few hundred" of both pitcherplant species were documented by then District biologist Tom Francis. The pitcherplants were found in seepage areas on the west-central side of the park. Johnson (2001) reported that the park supported extensive areas of open mixed-grass wet prairies that graded into wet flatwoods.

Tarkiln Bayou

Due to the extensive bog and wetland communities at Tarkiln Bayou (e.g., wet prairies, seepage streams, shrub bog, and wet flatwoods), there are naturally a plethora of wetland plant associates. At Tarkiln, there are 3 state endangered wetland species: spreading pogonia (*Cleistes divaricata*), yellow fringeless orchid (*Platanthera integra*), and whitetop pitcherplant (*Sarracenia leucophylla*) and 6 state threatened species: spoonleaf sundew (*Drosera intermedia*), rose pogonia (*Pogonia ophioglossoides*), crested yellow fringed orchid (*Platanthera cristata*), parrot pitcherplant (*Sarracenia psittacina*), gulf purple pitcherplant (*Sarracenia rosea*) and Gulf Coast redflower pitcherplant (*Sarracenia rubra* subsp. *gulfensis*). Prescribed fire is essential to maintaining suitable habitat for these wetland species. Without frequent fires (every 2-3 years) wet flatwoods and wet prairie habitats quickly become overgrown by wetland, hardwood shrubs such as titi and gallberry. Unlike much of the current habitat conditions at the park, these wetland species require an open herbaceous understory with ample sunlight, and require nutrient-poor situation to survive and flourish.

All of these species have been in decline at the park due to fire suppression and the subsequent invasion of titi and other hardwood species (Johnson 2001). Reintroduction of prescribed burning has not had the desired effect on the canopy-sized titi at the park; natural community restoration and improvements are needed to maintain the wetland communities and associated species diversity. Hardwood control/removal from the parks' wetland habitats will need to become a high resource management priority. Hardwood removal should be implemented by hand or if hydrological conditions allow by mechanical means. Herbicide should be avoided due to the potential for non-target impacts to listed plant species and herpetofaunal species that utilize wetland habitats.

Largeleaf jointweed is associated with the park's maritime hammock community. Not much is known about the jointweed's response to fire, but it appears to prosper in open to partially open habitat. Measures to reduce visitor impacts along the subtle bayshore dunes will help protect the largeleaf jointweed that occurs just south of the Naval Recreation Area. The largeleaf jointweed should be mapped and its footprint should be tracked over time. This will aid in monitoring the health/status of the population limited to the narrow ecotone between maritime hammock and bayshore dunes and assist in identifying management needs.

Little ladiestresses (*Spiranthes tuberosa*) are associated with flatwoods and typically respond to habitat disturbances, such as prescribed fire. Regular fire return intervals at the park will help maintain this species' population.

Perdido Key

Imperiled plant species are managed at Perdido Key through the upkeep of the park's natural communities. All imperiled plant species should be monitored once every three years for population health, and yearly visits should document the continued persistence of each species within the park. Three imperiled plant species

are currently associated with the dune, grassland and scrub systems found at the park. Cruise's goldenaster and Godfrey's goldenaster are found in the beach dune and coastal grassland natural communities, while the large leaved jointweed can be found within the coastal scrub community.

Godfrey's goldenaster is endemic to the barrier islands from Franklin County to Escambia County. This goldenaster may be in bloom from October – January, but typically blooms in late October – November. The bright yellow flower heads of this low sprawling plant are easy to spot. The plant has a small basal rosette with dense woolly leaves. The branching stems tend to run along or at least close to the ground, and may have woolly leaves as well. A current survey for the plants is needed, although park the biologist confirms that this species is locally abundant at the park.

Cruise's goldenaster is another endemic plant found on the barrier islands from Walton to Escambia County. This aster also blooms from October – January, and has bright yellow flowers that are slightly smaller than those of the Godfrey's goldenaster. Park staff have not located this imperiled plant at the park since Hurricane Ivan struck the region in 2004. It is assumed this species still exist in the park, and that more detailed surveys are needed. Both of the golden aster species are vulnerable to storm surge, dune erosion and salt spray from tropical storms.

Perdido Key provides extensive habitat for State listed large-leaved jointweed. These durable plants have segmented stems and tiny white flowers that bloom in the early fall. These hardy plants grow in the semi-arid sands of the coastal scrub habitats. They require a relative open canopy cover, and thrive in the sparsely vegetated scrub at Perdido Key. Major concentrations of the plants occur in management zones PK-1 and PK-2. Protection of these management zones from visitor and development impacts, and preventing soil disturbance are crucial for managing this species. Additional surveys are needed to determine total population size, and to assess population trends.

Imperiled Animal Species

Big Lagoon

Although sea turtles do not nest at Big Lagoon, they are part of the stranding monitoring/retrieval and cold stun surveys conducted at Big Lagoon when temperatures drop below the threshold. Cold stunning is a process that causes sea turtles to become immobile due to the dramatic decrease in water temperature. When the water temperatures drop below 50 degrees, sea turtles become at risk. Their bodies cannot withstand such cold conditions since their body temperatures also drop. They become paralyzed, helplessly floating near the surface where they are vulnerable to scavengers and illness. A cold stunned turtle may even appear to be dead.

Although shorebirds and seabirds utilize Big Lagoon, the park does not contain adequate nesting habitat. There is an old dredge spoil area over by the park boat

ramp at the intersection of BG-A and BG-M that did support a single snowy plover (*Charadrius nivosus*) pair in 2007. A nest was not located, however then park biologist, Anne Harvey, documented plovers with downy chicks. It is likely the spoil area was overwashed by tropical storm activity in 2004 and 2005 and the vegetation was eliminated and/or disrupted. Due to the amount of vegetation, proximity of pine trees and boat access, it is unlikely that this area will regularly support nesting shorebirds. However, the tidal flats in in the southeast corner of BG-A, near the observation tower do support non-breeding shorebirds. Piping and snowy plover are typically observed in low numbers and only at low tides when the mud flats are exposed. The snowy plovers are likely from nearby Gulf Island National Seashore. The tidal flats are Critical Habitat for wintering piping plovers and should be protected from human disturbance. Piping plovers used to be numerous at the park, but are rarely observed anymore. Piping plovers have high winter site-fidelity and the declines at the park may be due to declines in their breeding grounds. Regular year-round surveys occur at the park through a partnership project between the Florida Park Service, Audubon Florida and the Florida Fish and Wildlife Conservation Commission (FWC). If shorebird nesting is documented, it will likely be necessary to monitor coyote activity at the park and control their population as necessary.

A variety of seabirds and shorebirds use Big Lagoon during migration, staging, feeding or as a fly over. These species include the least tern (*Sternula antillarum*), sandwich tern (*Thalasseus sandvicensis*) and Caspain tern (*Hydroprogne caspia*), magnificent frigatebirds (*Fregata magnificens*), American avocet (*Recurvirostra americana*), gull-billed tern (*Gelochelidon nilotica*) and black skimmer (*Rynchops niger*).

The saltmarsh topminnow (*Fundulus jenkinsi*) inhabits low-salinity salt marshes and estuaries dominated by cordgrasses (*Spartina* spp.) from Galveston Bay, Texas, east to the extreme western portion of the Florida panhandle (Peterson et al. 2003). At Big Lagoon, the saltmarsh topminnow primarily occurs in the estuarine tidal marsh around Grand Lagoon Lake and the tidal marsh ribbons boarding Grand lagoon. Currently, the topminnow population is considered ‘stable’ based on regular but infrequent monitoring by permitted researchers. Monitoring occurs due to the vulnerable coastal habitat the topminnow occupies and the declining population throughout its range. Dredge and fill practices as well as marsh erosion have reduced the amount of habitat available and the prey availability for this species. Maintaining and protecting the tidal marsh habitat is vital for persistence at the park.

Tarkiln Bayou

Sandwich terns (*Thalasseus sandvicensis*), least terns (*Sternula antillarum*), and black skimmer (*Rynchops niger*) also use Tarkiln Bayou for foraging during the breeding season and during migration, and as a staging site for portions of the year. Most of their foraging activity takes place over adjacent waters in the bay. Appropriate management actions for this species include conserving and maintaining suitable natural area with little to no human disruption or alteration,

particularly during staging periods directly before and after migration when disturbance can have detrimental impacts on energetics. This is considered Management Action 14 (Other) in the table below.

Neo-tropical migrants, such as the American redstart (*Setophaga ruticilla*) often use the maritime hammock community at Tarkiln Bayou as a stop-over during migration. Recreational development and disturbance within the maritime hammock portions of the park should be sensitive to these resting areas, and management measures to reduce disturbance should be implemented as needed. Peregrine falcons (*Falco peregrinus*) and merlin (*Falco columbarius*) are also observed during migration. Appropriate management actions for this species include conserving and maintaining suitable natural area with little to no human disruption or alteration. This is considered Management Action 14 (Other) in the table below.

Wading birds, such as little blue heron (*Egretta caerulea*), tricolored heron (*Egretta tricolor*), reddish egret (*Egretta rufescens*), and wood stork (*Mycteria americana*) are found in the freshwater wetlands throughout Tarkiln Bayou, (e.g., basin swamps, basin marshes, etc.). Good quality wetlands are important for their foraging and nesting. It is unknown at this time if any rookeries occur at the park. Targeted breeding season surveys should be completed to determine if any exist. Hydrology should be maintained without alteration in these wetlands.

An initial survey for flatwoods salamander was conducted at Tarkiln Bayou in 2001 in cooperation with FWC. Although no evidence of flatwoods salamander was discovered, follow up surveys during ideal wet conditions should be considered. Three sites were again surveyed in 2015; 1 site was considered as highly likely and 2 sites were considered potential ponds. These sites should be managed as if the salamanders were present (i.e., regular burning, wood biomass reduction when needed to maintain the ecotone between wetland and upland, no herbicide use, etc.). Additionally, annual surveys during the larval periods should be completed. While the capture or other direct observation is the only positive means of ensuring the presence of flatwoods salamanders, they should not be assumed to be absent from wetlands that support any suitable habitat conditions. Accordingly, all sites with suitable historic conditions should be restored as necessary, and larval flatwoods salamander surveys should be conducted during the appropriate time of year in order to further determine presence or absence.

Southern dusky salamanders are associated with mucky areas, in or near slow-moving and stagnant streams, swamps, and other wetland natural communities. Suitable wetlands should be unaltered with intact hydrology. In addition, as with maintenance of habitat for flatwoods salamanders, wetlands should be maintained with fire and/or habitat restoration to reduce encroaching and overgrown hardwoods. Again, herbicide should not be used due to the potential detrimental impacts to amphibian species such as the southern dusky salamander.

Perdido Key

Perdido Key State Park is vital to the existence and reproduction of many imperiled species. Much of Florida's coastal habitats have been lost to human development and coastal armoring. This park and its associated beach dune and scrub habitat provide undisturbed coastal communities that act as breeding, nesting, resting and feeding grounds for many protected animals.

Most notable of the imperiled species is the Perdido Key beach mouse, which was listed as endangered by the USFWS in 1976. This mouse is one of North America's rarest mammals, and currently only exists in three protected places on earth, Perdido Key State Park, Gulf State Park and the Johnson Beach Unit of Gulf Island National Seashore. For the first time since 1985, this beach mouse can be found at all three public lands (USFWS 2014). Perdido Key State Park contains 248 acres of Perdido Key beach mouse habitat, and 238 of those acres are federally described as Critical Habitat. At the lowest point for this animal, the population was estimated to be at only 13 individuals in the world. The beach mouse was considered extirpated from Perdido Key State Park following hurricane Frederick in 1979, but the mouse was reintroduced to the park in February 2000. Originally, three pairs of juvenile mice were translocated from nearby Johnson Beach, followed by an additional 16 pairs of juvenile mice the following year. This was done through a cooperative effort with U.S. Fish and Wildlife Service, The National Park Service, U.S. Department of Agriculture and the Florida Fish and Wildlife Conservation Commission. As of March 2006, total beach mice numbered less than 50 individuals, and were only occupying 25% of the available habitat at the park. FWC noted that no mice were observed at the park between April 2008 and May 2009. The population eventually rebounded by the end of 2010, with 84% of the available habitat being occupied at Perdido Key State Park. Since then, the populations have continued to increase with over 96% of the 81 track tubes showing beach mouse occupation at the park as of January 2015. While FWC does not have enough information to accurately estimate a population size, a trapping effort between June 1, 2014 and January 21, 2015 revealed 540 individuals from six trapping grids in Perdido Key State Park (Gotteland et al. 2015).

The continued existence of the beach mouse at this park is threatened by the intermittent presence of a rather high density of feral and free ranging cats. Predation by cats is considered one of the top causes for concern for this species, second only to habitat loss from coastal development. Also, habitat quality has fluctuated throughout the past ten years due to multiple storm events, which also puts pressure on this extremely specialized species (Caughley and Gunn 1996).

Artificial lighting at night is another problem that is negatively affecting beach mice. The mice prefer dark beaches, and tend to increase surface activity on darker nights, near the new moon. The added light can increase the success predators have catching the mice, and alter the normal behavior of the mice. Trapping data has shown that beach mice generally do not use areas of the park affected most by the artificial lighting. These areas are typically along the east and west boundaries of the park and along the edges of the highway where the lighting is more

prevalent. Reduction of this light pollution will likely increase the amount of available and useable habitat for the beach mouse (Bird et al. 2004). These lighting violations are also negatively impacting sea turtle nesting, causing hatchling disorientations to occur regularly. Park staff are in contact with FWC, and all lights currently impacting imperiled species on Perdido Key are to be retrofitted with "wildlife friendly" lighting.

Imperiled sea turtles periodically nest on the beaches of Perdido Key State Park. Loggerhead sea turtles (*Caretta caretta*) are the main nesting sea turtle observed, with 4 nests laid in 2013, and 2 nests laid in 2014. Since 1996, Perdido Key has had an average of 2.6 loggerhead nests per season. Kemp's ridley sea turtles (*Lepidochelys kempii*) also occasionally nest within the park, and four total nests have been laid here since 1996. Green sea turtle (*Chelonia mydas*) have not nested at this beach in recent history, but have been documented utilizing waters adjacent to the beach. In accordance with FWC protocol, park staff and trained park volunteers survey the full length of the beach daily, identifying new nests, locating eggs, and erecting boundary postings with signage. Nests are excavated after either hatching occurs, or 70 days have elapsed from when eggs were deposited. All nests are documented and recorded, including those lost to erosion or predation.

Nesting shorebirds are monitored weekly at Perdido Key during the nesting season (Feb. 15 – Sept. 1), and normally include snowy plovers (*Charadrius nivosus*) and least terns (*Sternula antillarum*). Other imperiled species such as Wilson's plovers, black skimmers (*Rynchops niger*), and American oystercatchers (*Haematopus palliatus*) utilize this park for foraging and loafing, but have not nested within the park boundary in recent history. Least terns will commonly set up small colonies (~70 nests) on the western boundary of the park in management zone PK-2, while the snowy plover nests can be interspersed throughout the beach dune habitat. In 2014, 75 least tern nests were documented nesting on the western boundary of the park, and one snowy plover nested directly south of the outparcel housing community in management zone PK-2. Of the 75 least tern nests, 55 of them were lost to predation and 12 were abandoned by the adults. Of the six nests that hatched chicks, only four fledged chicks from this location. The one snowy plover nest within the park was abandoned before any chicks hatched. Fledgling success is generally low here due to impacts from park visitors, impacts from predation and the continual presence of dogs on the beach.

Perdido Key is also utilized for resting and feeding by migrating and wintering shorebirds. Species currently experiencing population declines such as the red knot (*Calidris canutus rufa*) and piping plover (*Charadrius melodus*) will be monitored within the state park year-round. Nearby conservation land Big Lagoon State Park has been designated by USFWS as Critical Habitat for Wintering Piping Plovers as of July 10, 2001. While Perdido Key State Park itself is not identified as critical habitat, its close proximity and similar habitat make it an ideal resting and feeding location for migrating Piping Plovers. Surveys and management for piping plover should follow the Comprehensive Conservation Strategy (U.S. Fish and Wildlife Service 2012). All parks, including Perdido Key, will participate in FWC's winter shorebird survey to accurately capture how many birds are using Florida beaches for

wintering and resting. When important resting and feeding areas are identified at these parks, proper signage and protection will be erected.

On top of the one FWC winter shorebird survey, Audubon and/or park personnel survey the beach at Perdido Key bimonthly for all bird species from September to February 15th. It has been documented that a group of snowy plovers ranging in size from 1 to 14 individuals are using the state park as a wintering area. Because of this, it is vital to continue predator control at the park, and keep dogs off of the beaches.

Areas throughout Perdido Key are to be posted for nesting and resting birds, regardless of visitor use. Timing, size, and enforcement of the closed areas for beach nesting and resting shorebirds and sea turtles are critical to their effectiveness. Posting of significant wildlife habitat in advance of seasonal occupation (pre-posting) can make the difference between occupied and unused nesting sites. Providing a sufficient buffer to ensure that disturbances do not result in abandonment is critical. In areas of intense recreational pressure, outreach and enforcement need to accompany any posting effort. The DRP will continue to coordinate with FWC on enforcement and protection measures for critical shorebird and sea turtle nesting and resting areas.

The DRP will seek a balanced approach to minimize visitor impacts to shorebirds and the parks' sensitive coastal habitats, while managing resource-based recreational activities. In collaboration with FWC, other government agencies, local non-governmental organizations, and park staff will identify and delineate habitats and educate the public about shorebird protection. Management decisions will be informed by analysis of data on habitat use in the park during prior nesting seasons. This analysis will suggest areas of importance where focused management actions are needed. These actions will typically include:

- Demarcating potential shorebird habitat by enclosing the perimeter of the habitat and buffer area with appropriate fencing and signage using guidelines from the Florida Shorebird Alliance (Avissar et al. 2012).
- Encouraging and focusing visitor activities into areas less suitable for shorebird nesting habitat.
- Monitoring during the nesting season to identify and protect new breeding sites.
- Providing interpretive and educational outreach to the public prior to and during the nesting season to encourage visitor use that protects shorebirds and their habitat.
- When the same breeding sites are used year after year, posting the protected area will occur prior to the season (pre-posting).
- When new breeding sites are indicated, appropriate measures will be implemented, including demarcating new protected areas and expanding or initiating interpretive programs.
- Coordinating with FWC and local law enforcement agencies to ensure compliance with park rules and shorebird protection, as needed.

When it is necessary to limit recreational activities or visitor access to protect nesting habitat, park staff or volunteers will provide onsite interpretation to educate visitors about the management of imperiled shorebird habitat and identify suitable recreational areas. Pre-posting the identified habitat areas combined with early public notification regarding the park's shorebird protection program will improve visitor compliance with park rules and promote broad-based public stewardship of shorebird nesting, resting, and foraging habitats in the park. For more information and details of monitoring protocols, please visit DRP's shorebird and seabird management plan.

American kestrels and merlin are observed in significant numbers during migratory periods at Perdido Key. Appropriate management actions for this species include conserving and maintaining suitable natural area with little to no human disruption or alteration. This is considered Management Action 14 (Other) in the table below.

Swallow-tailed kites typically use Perdido Key for foraging, but it is uncertain whether they nest at the park due to a lack of detailed surveys for this species. Wading birds, such as little blue heron, snowy egret and tricolor heron and white ibis are found in the freshwater swales and salt marshes. Good quality wetlands are important for their foraging and nesting. Hydrology should be maintained in these wetlands, and the use of herbicide should be minimized as much as possible. Although all of these species are in the process of delisting by FWC, it is still important to maintain quality wetlands for these birds.

Though no longer listed as imperiled, Southern bald eagle (*Haliaeetus leucocephalus*) can be found at Perdido Key and is noted here because of the USFWS guidelines for activities near eagle nests during the October 1 through May 15 nesting season. Special precautions are taken near active bald eagle nests, including buffers to prevent disturbance. Historically eagles nested in pine trees located in management zones PK-1 and PK-3. Special precautions are also taken to protect osprey (*Pandion haliaetus*) and great horned owl (*Bubo virginianus*) nests that can occasionally be found in snags at the park. Ospreys and owls need snags for nesting and perching, therefore snags should be left in place for predatory bird management. The nesting success of these birds is monitored throughout the breeding season.

Shared Species

During the seasonal migrations, numerous other imperiled bird species use all three parks as an important stopover point for the trans-gulf flight. Merlin (*Falco columbarius*) and swallow-tailed kite (*Elanoides forficatus*) are observed during migratory periods. A small number of merlin and other raptors overwinter at the park, often using snags for perches. Appropriate management actions for these species include conserving and maintaining suitable natural area with little to no human disruption or alteration. This is considered Management Action 14 (Other) in the table below. Swallow-tailed kites typically use the park only by flying over; however, they may also use the park for foraging since they tend to forage for insects over wet open areas. Wading birds, such as little blue heron and tricolored

heron are found in wetland habitats. Both of these wading bird species mentioned above are designated as Threatened by FWC. Good quality wetlands are important for their foraging and nesting. Hydrology should be maintained in these wetlands, and spraying of insecticide should be minimized as much as possible.

American alligators (*Alligator mississippiensis*) are observed in marsh habitat at Big Lagoon. The most significant threats to American alligators at the park are from interactions with visitors. Alligators occasionally require removal because they become a threat to the public after recurrent feeding. Additionally, the habitually fed and undaunted alligators are more at risk of poaching by the public due to their visibility. Visitors should be educated on the dangers of feeding or molesting alligators both in terms of harm to the alligator and the visitor. American alligators are also occasionally observed along the northern shoreline of Perdido Key adjacent to Old River. Because there is no direct access to this shoreline for visitors from land, the potential for human interaction is low. As long as staff and visitors do not feed these animals, they should maintain their fear of humans and not need any type of outside intervention. If these animals become aggressive to visitors, park staff will contact the appropriate FWC personnel.

Southern hognose snakes (*Heterodon simus*) prefer sandy habitats and can be found in sandhill as well as various flatwoods communities at Big Lagoon. The southern hognose snakes are only found throughout the Southeastern portion of the U.S. and appear to be declining throughout this region due to loss of habitat, including the loss of longleaf pine forests. Improvement and/or restoration of upland communities through prescribed fire or other means will improve the habitat conditions and therefore provide more suitable conditions for the persistence of this species. Southern hognose snakes are also documented as utilizing the mesic flatwoods and scrub communities at Perdido Key State Park. These secretive snakes live most of their lives underground, therefore determining a population size is difficult. Most of the park sightings are associated with SR 292 road crossing attempts by these small reptiles. Park staff should be wary of snakes crossing this road, or of snakes sunning themselves on the asphalt in winter months.

Gopher tortoises (*Gopherus polyphemus*) occur at Big Lagoon, but little is known about the health of the population, distribution, etc. Gopher tortoises are also found at Tarkiln Bayou in the sandhill community. Although the population size is unknown, it is assumed to be low due to the lack of an abundance of apparent burrows. With continued improvement of the sandhill and surrounding communities with the regular application of prescribed fire, populations should increase. Gopher tortoise burrow surveying and mapping shall be scheduled and conducted following prescribed burns. Park staff should coordinate with district biologists and FWC to establish a park-specific protocol. If burrows are identified, they shall be mapped and incorporated into the appropriate burn zone description/narrative so that both spatial and written record of occurrences are preserved for long-term tracking and management purposes. Developing a detailed tortoise monitoring program is discussed in the Resource Management Program of this component.

West Indian manatees (*Trichechus manatus latirostris*) are occasionally spotted in waters adjacent to Big Lagoon. Most of the Intracoastal Waterway is a No Wake zone south of the park which tends to reduce boater speed near the park in Grand Lagoon. The FWC no longer includes the manatee on its list of state imperiled species. However, the IUCN (International Union for the Conservation of Nature) lists the Florida manatee subspecies as endangered due to the low population size and population declines. If manatees find their way into the Grand Lagoon Lake, park staff should ensure they are protected from unintentional disturbance by park visitors. Manatees are also occasionally observed adjacent to Perdido Key's northern boundary feeding on seagrass within Old River. The shallow water in addition to no park facilities on the northern boundary, keep these animals relatively safe when adjacent to the park. If issues arise with human/manatee interactions, park staff will consult with FWC.

Table 3 contains a list of all known imperiled species within the parks 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 3: Imperiled Species Inventory

Common and Scientific Name	**Imperiled Species Status**				**Management Actions**	**Monitoring Level**
	FWC	**USFWS**	**FDACS**	**FNAI**		
PLANTS						
Curtiss' sand grass *Calamvilfa curtissii*			LT	G3, S3	1,9,10	Tier 3
Godfrey's goldenaster *Chrysopsis godfreyi*			LT	G2, S2	1 9,10	Tier 3
Large-leaved jointweed *Polygonella macrophylla*			LT	G3, S3	1,9,10	Tier 3
Spoonleaf sundew, water sundew *Drosera intermedia*			LT	G5, S3	1,4,6	Tier 2
Spreading pogonia *Cleistes divaricata*			LE	G4, S1	1,4,6	Tier 2
Rose pogonia *Pogonia ophioglossoides*			LT		1, 4, 6	Tier 2

Table 3: Imperiled Species Inventory						
Common and Scientific Name	**Imperiled Species Status**				**Management Actions**	**Monitoring Level**
	FWC	**USFWS**	**FDACS**	**FNAI**		
Crested yellow fringed orchid *Platanthera cristata*			LT		1,4,6	Tier 2
Yellow fringeless orchid *Platanthera integra*			LE	G3G4, S3	1,4,6	Tier 2
Parrot pitcherplant *Sarracenia psittacina*			LT		1,4,6	Tier 2
Gulf purple pitcherplant *Sarracenia rosea*			LT		1,4,6	Tier 2
Whitetop pitcherplant *Sarracenia leucophylla*			LE	G3, S3	1,4,6	Tier 2
Gulf Coast redflower pitcherplant *Sarracenia rubra* subsp. *gulfensis*			LT	G4, S3	1,4,6	Tier 2
Little ladiestresses *Spiranthes tuberosa*			LT		1,4,6	Tier 1
FISH						
Saltwater topminnow *Fundulus jenkinsi*	ST			G3, S2	10	Tier 1
AMPHIBIAN						
Reticulated flatwoods salamander *Ambystoma bishopi*	FE	FE		G2, S2	1,3,4,6	Tier 2
Southern dusky salamander *Desmognathus auriculatus*				G4, S1S2	1,4,6	Tier 1
REPTILES						
American alligator *Alligator mississippiensis*	FT	FT(S/A)		G5, S4	10	Tier 2
Gopher tortoise *Gopherus Polyphemus*	ST	C		G3, S3	1,6,7,8, 10,13	Tier 2
Gulf salt marsh snake *Nerodia clarkii clarkii*				G4T4, S2	8	Tier 1

Table 3: Imperiled Species Inventory						
Common and Scientific Name	**Imperiled Species Status**				**Management Actions**	**Monitoring Level**
	FWC	**USFWS**	**FDACS**	**FNAI**		
Loggerhead sea turtle *Caretta caretta*	FT	FT		G3, S3	13	Tier 2
Green sea turtle *Chelonia mydas*	FT	FT		G3, S2	8,10,13	Tier 4
Kemp's Ridley sea turtle *Lepidochelys kempii*	FE	FE		G1, S1	8,10,13	Tier 4
Southern hognose snake *Heterodon simus*				G2, S2	1,6,7,8, 10,13	Tier 1
Atlantic loggerhead *Caretta caretta*				G3, S3	8,10,13	Tier 4
BIRDS						
Piping plover *Charadrius melodus*	FT	LT		G3, S2	8,9,10,13, 14	Tier 4
Snowy plover *Charadrius nivosus*	ST			G3, S1	8,9,10,13, 14	Tier 4
Wilson's plover *Charadrius wilsonia*				G5, S2	8,9,10,13, 14	Tier 4
Little blue heron *Egretta caerulea*	ST			G5, S4	1,4,6 8,10	Tier 2
Tricolored heron *Egretta tricolor*	ST			G5, S4	1,4,6,8,10	Tier 2
Swallow-tailed kite *Elanoides forficatus*				G5, S2	13	Tier 1
Merlin *Falco columbarius*				G5, S2	1,2,4,6,13	Tier 2
Magnificent frigatebird *Fregata magnificens*				G5, S1	13	Tier 1
Caspian tern *Hydroprogne caspian*				G5, S2	13	Tier 2
Gull-billed tern *Gelochelidon nilotica*				G5, S2	13	Tier 2
American avocet *Recurvirostra americana*				G5, S2	13	Tier 2

Table 3: Imperiled Species Inventory						
Common and Scientific Name	**Imperiled Species Status**				**Management Actions**	**Monitoring Level**
	FWC	**USFWS**	**FDACS**	**FNAI**		
Black skimmer *Rynchus niger*	ST			G5, S3	8,9,10,13, 14	Tier 4
Least tern *Sterna antillarum*	ST			G4, S3	8,9,10,13, 14	Tier 4
Sandwich tern *Sterna sandvicensis*				G5, S2	9,10,13,14	Tier 2
Reddish egret *Egretta rufescens*	ST			G4, S2	1,4,6,10	Tier 2
Peregrine falcon *Falco peregrinus*				G4, S2	1,2,4,6	Tier 2
Wood stork *Mycteria americana*	FT	FT		G4, S2	1,4,6	Tier 1
American redstart *Setophaga ruticilla*				G5, S2	1,4,6,10	Tier 1
Rufa red knot *Calidris canutus rufa*	FT	FT			8,9,10,14	Tier 4
Snowy egret *Egretta thula*				G5, S3	4	Tier 1
White ibis *Eudocimus albus*				G5, S4	4	Tier 1
Caspian tern *Hydroprogne caspia*				G5, S2	2,8,10,14	Tier 2
MAMMALS						
Florida black bear *Ursus americanus floridanus*				G5T2, S2	1,4,10,13	Tier 1
West Indian manatee *Trichechus manatus latirostris*	FT	FT		G2, S2	4,10,13	Tier 2
Perdido Key beach mouse *Peromyscus polionotus trissyllepsis*	FE	FE		G5T1, S1	3,8,10,12, 13,14	Tier 4

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

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.

Imperiled Species Management Goals, Objectives, Action Items

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

The DRP strives to maintain and restore viable 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 FWC'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 USFWS, FWC, 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 the 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 A: Update baseline imperiled species occurrence inventory lists for plants and animals.

DRP staff and district biologist will continue to build and refine the parks' inventory lists for flora and fauna. Documentation of any newly identified imperiled species will be a priority. Depending on funding, a full plant survey needs to be conducted at the parks to determine presence and location of other listed plant species. In addition, the parks have never been fully surveyed for herptofauna, insects, bats, or birds. If funding is available, surveys for these species should be conducted. The parks will work with FWC and DRP district biologists to conduct limited surveys, update the imperiled species lists, and utilize observations to update the arthropod control plan to minimize the impacts of spraying to potentially sensitive species.

Objective B: Monitor and document 18 selected imperiled animal species in the parks.

Action 1	Develop monitoring protocol for selected imperiled animal species, including gopher tortoises, sea turtles, nesting shorebirds, migratory shorebirds, wading birds, salamanders, and Perdido Key beach mice.
Action 2	Implement monitoring protocols for imperiled animal species including those listed in Action 1.

Once every three years, the parks will be surveyed for gopher tortoise burrows and mapped. Tortoise surveys will follow established FWC protocols to determine the number of occupied and potentially occupied burrows present at the park. Additionally, opportunistic burrow or live tortoise observations will be recorded (e.g., following prescribed burning). A detailed protocol should be developed in coordination with district biologist and FWC.

Although opportunistic gopher tortoise monitoring occurs at Big Lagoon, a detailed protocol should be developed in coordination with district biologist and FWC following the Range-Wide Conservation Strategy for the Gopher Tortoise (U.S. Fish and Wildlife Service 2013). At this time, FWC recommends following the range-wide standardized survey methodology, that utilizes a Line Transect Distance Sampling with scoping.

Sea turtle nests, including loggerhead, Kemp's ridley, and green turtles are monitored by staff using strict methods and protocols developed by FWC that fully census the population of nesting sea turtles and hatchlings, as well as hatchling success rates. Monitoring methods and protocols included nest surveys, nest inventories, and survey of disorientations and strandings (FWC Conservation Guidelines for Marine Turtles 2007).

Snowy plover, Wilson's plover, American oystercatcher, least tern and black skimmer nesting is monitored to determine the number of nesting attempts, the number of nesting adults, nest fate, sources of predation, and annual productivity. Snowy plovers, Wilson's plovers, and American oystercatchers are banded with individual color combinations to help biologists determine productivity as well as juvenile survival, adult survival, natal dispersal, and between-season and in-season dispersal. These efforts will help determine the level of connectivity for these species from Perdido Key State Park to other beaches throughout Florida, and eventually determine population growth in response to management actions.

Other shorebirds, including federally-listed piping plovers and red knots will be monitored for presence, the population using the park, habitat use, and dispersal. These two species are regularly banded with individual color combinations on their breeding grounds and collection of band re-sights allow for determining dispersal from breeding to wintering grounds. DRP staff monitor all shorebird, seabird, raptor, or wading bird species observed during surveys conducted twice a month during the winter months (September to February) and weekly during the breeding season (February to August). Shorebird, seabird and wading bird surveys occur year-round to determine presence/absence and habitat use. The shorebird and seabird surveys should be conducted in collaboration with FWC and Audubon Florida in association with grant funding for monitoring from the National Fish and Wildlife Foundation.

The mudflats at Big Lagoon adjacent to the estuarine unconsolidated substrates south of BG-A are designated by the USFWS as Piping Plover Critical Habitat. Although very few piping plover have been documented using the habitat over the past 10 years, monitoring and protection should continue. Protection efforts during the winter months and peak migration should focus on protecting locations where roosting and foraging imperiled shorebirds occur. Biweekly surveys for piping plover should continue in collaboration with FWC, The Florida Shorebird Alliance and Audubon Florida. Non-breeding shorebird survey protocols are already in place and data should be entered in the Florida Shorebird Database. Additionally, every four years the park should be included in the USFWS International Piping Plover Census.

Perdido Key beach mice are monitored for presence or absence and relative distribution through tube tracking surveys. These tubes determine presence, absence and relative distribution but have an advantage of not being dependent on sand tracking conditions. The park will continue to work with FWC to monitor these tubes periodically. Currently the tubes are monitored bi-monthly. Research of the beach dune community and its response after tropical storms is important for understanding baseline conditions and succession of dune community after storms.

A park specific monitoring protocol does not current exist for herpetofaunal species, including salamanders. The development of protocols should be in coordination with district biologists and in collaboration with the FWC and USFWS. Southern dusky salamanders and flatwoods salamanders overlap in habitat sampling methods; therefore, a joint salamander monitoring protocol should be developed.

Several wading bird species that occur at the parks were recently uplisted to state Threatened by FWC. The parks should work with district biologist and FWC to determine what level of monitoring is needed and develop an appropriate protocol. Any developed protocol should follow the Species Action Plan for Six Imperiled Wading Birds (Florida Fish and Wildlife Conservation Commission 2013).

Objective C: Monitor and document 13 selected imperiled plant species in the parks.

Action 1	Develop monitoring protocol for selected imperiled plant species.
Action 2	Implement monitoring protocols for imperiled plant species.

The Godfrey's goldenaster, Cruise's goldenaster, and the large-leaved jointweed have been selected for detailed survey and monitoring at Big Lagoon and Perdido Key. These plants are specific to the beach dune and coastal scrub natural communities. With coastal development degrading habitat all along the Gulf of Mexico, the state parks are some of the only refuges left for these imperiled plants.

Once every three years, the total population of each species will be calculated and mapped. This will allow staff to document population growth as well as decline. If populations appear to be declining rapidly, staff will coordinate actions with appropriate FWC and USFWS personnel. Every year, staff will conduct presence/absence surveys with predetermined transects within the parks. While these less detailed surveys will not provide complete population numbers, they will ensure that the plants are still persisting within the park's boundary.

Some research needed at Perdido Key State Park pertains to the locations of current plant populations. With the county trying to widen SR 292, viable habitat for these imperiled species will be lost. Also, it is possible that these plants do not persist directly adjacent to roads. A spatial analysis is needed to see if distance to road is correlated to high or low population numbers of these imperiled plant species. Working with local University of West Florida students might be the best option for these plant surveys and analysis.

Currently, there are no monitoring protocols for any imperiled plants at Big Lagoon. Hopefully, creating monitoring protocols for these few wetland species will eventually enable staff to monitor other species at the park as well. Partnerships that can be utilized for monitoring plants includes ABG, USFWS, FWC, and partnering universities.

At Tarkiln Bayou, the DRP should map large-leaved jointweed, develop monitoring protocol and associated datasheets in coordination with district biologists. All datasheets and surveys should be stored on the district server. The purpose of monitoring would be to assess changes in the species occurrence or spatial footprint and assess any potential impacts effecting the species.

There are 9 wetland associate species at Tarkiln Bayou, including spoonleaf sundew, spreading pogonia, rose pogonia, crested yellow fringed orchid, yellow fringed orchid, parrot piterplant, gulf purple pitcherplant, white-topped pitcherplant and gulf redflower pitcherplant. In general, these species have been in continual decline associated with fire suppression and wetland conversion to a non-herbaceous condition (Johnson 2001). For these species, a collective monitoring protocol should be developed in coordination with district biologists. Monitoring efforts should include documenting species, creating mapped polygons of species occurrences, and documenting evidence of bloom windows and any observed recruitment. Lastly, the monitoring efforts will help guide an adaptive wetland habitat restoration and improvement by documenting wetland conditions pre and post restoration as well as documented species response to specific restoration techniques.

Objective D: Reintroduce the flatwoods salamander at Tarkiln Bayou.

Action 1	Continue collaboration with the FWC and USFWS to monitor for presence of flatwoods salamanders at all potential locations at the park.
Action 2	Work with the FWC and USFWS to assess habitat restoration needs specific to the flatwoods salamander.
Action 3	Develop a reintroduction plan if habitat is found suitable in collaboration with FWC, USFWS and district biologists.
Action 4	Implement reintroduction plan.
Action 5	Assess population post-reintroduction to determine the success of the effort and health of the population and reassess additional population augmentation needs.

Park staff should collaborate with district biologists, the USFWS and FWC to develop a restoration plan to reintroduce flatwoods salamanders to the park. Currently, there are two ponds at the park that are listed as highly likely for Flatwoods salamanders to be currently present (but not detected). There are additional potential locations (i.e., meet some of the habitat requirements). However, the potential' locations will all need restoration due to the presence of overgrown hardwoods as a result of historic fire suppression. Prior to the creation of a restoration plan, salamander surveys should continue annually (at a minimum) to continue to monitor for presence at both 'highly likely' locations. Following the development of a restoration plan and implementation, monitoring should continue to assess the reintroduced population.

Objective E: Work with local agencies to prevent light pollution from impacting nesting sea turtles, nesting shorebirds, and the Perdido Key beach mouse.

Action 1 Determine current impacts of light pollution within the state park to nesting shorebirds, beach mice and nesting sea turtles.

Action 2 Work with FWC, USFWS and other pertinent partners to ameliorate the negative impacts of light from adjacent private developments.

Currently, the east and west boundaries of management zone PK-2 at Perdido Key State Park are experiencing negative impacts from light pollution. This includes lights being on all night, incorrect wavelengths of light being used outdoors, and light being dispersed in a wide range of angles. A lighting ordinance forcing all housing developments and businesses to use wildlife friendly lighting will be enacted May 1, 2018. Until that point, voluntary compliance is the only method of diminishing the impacts of light on nesting shorebirds, sea turtles and beach mice.

Objective F: Work with USFWS and FWC to augment the population of the Perdido Key beach mouse within the park, or translocate individuals out of the park to sustain the species.

Action 1 Work with appropriate partners to add beach mice to Perdido Key State Park if locally extirpated after a large storm event.

Action 2 Work with appropriate partners to trap mice within Perdido Key State Park and translocate them elsewhere on the island if deemed necessary to allow the species to persist.

Beach mice naturally persist through local extirpations due to storm events of the harsh, stochastic nature of coastal ecosystems. Historically, these areas would be recolonized as population densities increased and dispersal occurred from adjacent populated areas. From a genetic perspective, beach mice recover well from population size reductions (Wooten 1994), given sufficient habitat is available for population expansion after the bottleneck occurs. As residential and commercial development continues to fragment the coastal dune landscape, beach mice are no longer capable of recolonizing these areas as they did in the past (Holliman 1983). Therefore, if these mice become locally extirpated from a large storm event, the probability of natural recolonization from nearby populations is exceedingly low (USFWS 2014).

Perdido Key Beach mice have been translocated from Gulf Island National Seashore (GUIS) to the park in 2000 after local extirpation. The Florida Park Service wants to continue partnering with USFWS and FWC to maintain a healthy population of beach mice within the state park, and allow mice to be taken from the park to either GUIS or Gulf State Park to allow this imperiled species to persist into perpetuity within its native range.

Exotic and Nuisance 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.

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, the DRP actively removes exotic animals from state parks, with priority being given to those species causing the greatest ecological damage.

In some cases, native wildlife may also pose management problems or nuisances within state 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 venomous snakes or raccoons (*Procyon lotor*) and alligators that are in public areas. Nuisance animals are dealt with on a case-by-case basis in accordance with the DRP's Nuisance and Exotic Animal Removal Standard.

Exotic Plant Species

Big Lagoon

Given that Big Lagoon is now surrounded on all three landward sides with developed neighborhoods and lies within metropolitan Pensacola with a long history of settlement, migration of exotic plant propagules from nearby land covers remains a priority natural resource management issue. Park property along Gulf Beach Highway and SR 292 (principally mgmt. zones D, E, F, I, K, L, and M) receives an occasional inflow of pest plants from nearby yards, vacant lots, and corridors, and so is monitored and treated for newly established infestations as needed. Exotic plant species most frequently encountered in these boundary areas for an appreciable distance into the park include FLEPPC designated invasive plants such as cogon grass (*Imperata cylindrica*), Chinese tallow (*Sapium sebiferum*), Japanese climbing fern (*Lygodium japonicum*), Lantana (*Lantana camara*), torpedo grass (*Panicum repens*), wild taro (*Colocasia esculenta*), Chinese wisteria (*Wisteria sinensis*), Chinaberry (*Melia azedarach*), and Japanese honeysuckle (*Lonicera japonica*). In addition, other exotic plants observed in these areas include tropical bush mint (*Cantinoa mutabilis*), *Gladiolus* spp., sticky nightshade (*Solanum sisymbriifolium*), border grass (*Liriope spicata*), English ivy (*Hedera helix*), and cypress vine (*Ipomoea quamoclit*), and are often seen in landscaping or on ruderal roadsides; these species are also treated in a similar fashion as the FLEPPC category I and II plants.

An interesting case in point of the various means by which pest plants may migrate into the park involved the establishment of numerous pampas grass (*Cortaderia selloana*) clumps in the scrubby flatwoods of management zones C and C2. Resulting from storm surge associated with the hurricanes impacting the Pensacola area in the mid-2000s, pampas grass from the neighboring yards east of the park boundary were physically transported as fragments and whole plants into these xeric habitats, actually surviving and taking root. It took several years of hard work by the park staff to effectively eradicate this infestation through manual removal, but this effort was successful. Since pampas grass does not typically reproduce in nature, the species has not reestablished its population. This example demonstrates that exotic plants may migrate into the park via water transport in addition to wind and animal dispersal.

South of the scrub and mesic flatwoods along the northern park boundary, baygall and basin swamp occupies a depression feature along an east-west orientation. A ditch was excavated along this course decades ago to drain the local landscape, though the soils will still saturate following rainy conditions to support dense woody vegetation in these wetlands. Especially in its eastern extremity between the main park road and the park boundary, Chinese tallows frequently establish out of sight and can potentially grow to a large size before becoming particularly noticeable. Similarly, the wet flatwoods south of the main park road past the sharp curve to the west (mostly surrounding the campground) is another area where Chinese tallows tend to establish and grow; access through this vegetation can also be challenging on account of the numerous logs felled in past storms. In order to more effectively monitor and control these tallow trees, which is the most problematic type of infestation in terms of abundance and expanse, use of specialized tracked equipment (e.g., MarshMaster with a mower attachment) would be recommended to reduce vegetative biomass, improve accessibility, and promote a maintenance condition in these natural communities. The tallows could then potentially be more visible to spot and subsequently treat via a freshly cut stump herbicide application with triclopyr to the regrown stems. Purple sesban (*Sesbania punicea*) is another exotic plant commonly observed in saturated soils that should be treated when located.

Lastly, a significant type of infestation in Big Lagoon involves Cuban bulrush (*Oxycaryum cubense*) established along the shorelines of the Long Pond within mgmt. zone B3, which is a borrow pit feature remaining after past excavation of fill material. Since being initially identified in 2013, park staff have treated patches of this species as necessary in order to control its abundance. In addition to glyphosate that is commonly used to treat exotic herbaceous plants, other land managers have found the herbicide 2,4-D (in the aquatic-compatible version) to be successful against Cuban bulrush, especially when it occurs in dense mats (Tu et al. 2001; IFAS website on tussocks and floating islands, see References Addendum). A strength of using 2,4-D is that it is not generally effective against grasses, providing some degree of species selectivity (Cuban bulrush is a sedge and a monocot), though it will kill many dicot species.

Tarkiln Bayou

There are a variety of exotic plants present in Tarkiln Bayou, although most of them are associated with adjacent landowners. In fact, there are currently 13 FLEPPC Category I and II exotic plant species and numerous other species with lower ratings that occur at Tarkiln. Numerous adjacent landowners with exotic infestations are impacting preserve lands; most of these are adjacent county or state rights-of-ways, or adjacent or imbedded subdivisions. Cogongrass and Chinese privet are the species most frequently spread by contract mowers on rights-of-ways. Torpedograss is spread during fireline preparation, and coverage decreases between burn treatments as native grasses and forbs repopulate firelines. One small management zone (Zone U) has been repeatedly treated commercially and by FLCC (AmeriCorps) members. Once an infestation is treated, suppressed exotics fill the treated areas and the cycle repeats. Park staff should strive to work with neighboring landowners to foster cooperation and persuade them to reduce exotic plant infestations, which reduces the quantity of propagules entering the park.

More than 1,400 acres have been treated in this last interim, with 120 infested acres treated overall. The contractor treated approximately 8 acres, with DRP staff and FLCC (AmeriCorps) treating the rest. Portions of the treated acreage are now in maintenance condition. In general, areas in maintenance condition can be described as having nonexistent, declining, or contained populations of exotic plants. More specifically, areas in maintenance condition are manageable to treat with existing staff and resources, have individual infestations (when present) that are not expanding in extent or density, lack mature reproducing individuals, and do not pose a significant threat to rare species or communities.

Access to portions of Tarkiln Bayou can be limited seasonally due to sheetflow and badly rutted firelines. Beavers also periodically expand their range and impound waters, impeding travel until the nuisance individuals are removed. The park staff should continue to collaborate with Naval Air Station-Pensacola to address nuisance beaver response on Bronson Field and the preserve.

Various exotic animal species are known to occur in the park, including coyote, feral cat, nine-banded armadillo, nutria, Mediterranean gecko, and brown anole. Typically, less than a dozen animals are removed annually form the park. All of the species listed above can have detrimental impacts to either wildlife or sensitive habitat in the park. Currently, there are no documented impacts from coyote, however, impacts should be monitored (e.g., digging into to gopher tortoise burrows to predate breeding individuals). Feral cats should be removed from the park when documented due to their impacts on native wildlife, such as migratory and breeding bird species. Standard park procedures should be implemented. All cats that are captured at the park will be delivered to the local Animal Control. Nine-banded armadillo pose a threat through competition with native wildlife. For example, armadillos will dig up insect larvae for food, potentially competing with species such as skunks or other terrestrial mammals.

Nutria can substantially impact wetland and associated vegetation. Nutria currently occur at the park; however, the level of impact and abundance are currently unknown. Park staff in coordination with district biologists and the USDA should evaluate current impacts and address the issue as needed.

To date, feral hogs have not been documented in Tarkiln Bayou. However, they are currently observed in the Jones Swamp several miles to the northeast. Park staff should monitor for signs of feral hog presence and implement control measures when needed. Feral hogs can significantly impact the park's wetlands, such as wet prairie.

Perdido key

The main exotic plants found at Perdido Key State Park include cogongrass and torpedograss. The cogongrass is found is small, discrete patches within the coastal scrub and interdunal swale matrix in slightly wetter areas. These patches of cogongrass have been recently treated by AmeriCorps and are regularly monitored for survival and new growth. Cogongrass is difficult to eradicate, so tenacity and repeated treatments are needed. The other somewhat common exotic is torpedograss, which can be found along the roadways of SR 292. Park staff is working on identifying the best treatment regimen for this roadway exotic. It is expected that treating with herbicide will only open up the area for another exotic to move in, so revegetation of the area with natives after treatment may be the best solution when large sections are treated. Currently, Perdido Key has only a small amount exotic plants at the park, and staff are diligently treating the existing areas and surveying for new exotics as they show up.

Other exotics such as sago palm (*Cycas revoluta*), pampassgrass (*Cortaderia selloana*), and Senegal date palm (*Phoenix reclinata*) show up after large hurricanes, and are treated as they are encountered. Other plants like hairy indigo (*Indigofera hirsuta*) and smooth rattlebox (*Crotalaria pallida* var. *obovata*) have been locally eradicated from the park previously, but still show up from time to time.

The last main exotic plant issue comes from a revegetation effort on the beach dunes after hurricane Ivan. In order to stabilize the beaches, sea oats and beachgrass were planted in management zone PK-2. Although *Panicum amarum* was requested, some Texas panicum *(Urochloa texana)* was planted at the park accidentally by the contractor. This grass species does not thrive well in Florida beach dunes, and has died off in almost all the areas it was planted. Staff hand pulls the grass as it is encountered, and it does not appear to be spreading to any new areas.

Park staff at Perdido Key has treated 18.45 acres of exotic plant species between 2005 and 2015. 2008 was the first year that exotics were treated and reported to the Invasive Exotic Plant Database (IEDBP), and almost all of the treatment was focused on cogongrass.

Treatment at the earliest hint of invasion is always the most efficient approach and is more likely to result in eradication of the problem. Early Detection and Rapid Response (EDRR) programs are being developed on the federal and state levels. A Weed Risk Assessment is now available through the USDA Animal and Plant Health Inspection Service (APHIS) and the University of Florida's Institute of Food and Agricultural Sciences (IFAS); this tool is used to predict the invasiveness potential of an exotic species before it becomes the management problem that make it a FLEPPC Category I or II species. FNAI is now working with FWC and all of Florida's Cooperative Invasive Species Management Areas (CISMA) to determine the species that are local threats, and to provide identification information and treatment assistance. Good management practice would include staying current with the local CISMA's EDRR list, in this case the Six Rivers CISMA. By working with this CISMA, park staff can obtain information on invasive species currently threatening their area. For instance, at this time, Perdido Key staff should be keeping an eye out for natalgrass (*Melinis repens*) as it moves west from its introduction point in south Florida.

Park staff and volunteers participating in exotic plant treatment at the parks are trained in the identification of exotic species as well as common native species generally encountered in and around the park; they are also trained in techniques, strategies, and the personal protective equipment (PPE) used when applying herbicide against the infestations. Surveys of exotic plant species are conducted at least every two years (often sooner than that) and this information is entered into the DRP's Natural Resource Tracking System (NRTS) database with the records describing the species observed, the management zone, a narrative relating more specific habitat / location information, extent of the infestation (in acres), and the density of individuals. Subsequent treatment efforts are also similarly described in the NRTS database. AmeriCorps service members, each fulfilling a one-year term, have been stationed at this park since 2012 (teams of two people since 2013) and have been instrumental in assisting the park staffers to substantially reduce the abundance of exotic plants on park property. Over the previous planning cycle extending back to the last UMP revision in 2006, 62.3 infested acres of exotic plants have been treated via herbicide application or hand pulling. Infested acreage is an estimate of the area covered by exotic vegetation and is calculated by multiplying the extent in gross acres by an abundance metric, the cover class.

Exotic Animal Species

Big Lagoon

There are two exotic animal species at Big Lagoon that staff regularly manages: feral domestic cats (*Felis catus*) and coyotes (*Canis latrans*). Addition exotic species that occur at the park, imported fire ants (*Solenopsis invicta*), crazy ants (*Nylanderia fulva*), Mediterranean gecko (*Hemidactylus turcicus*), Texas horn lizards (*Phrynosoma cornutum*) and Cuban brown anole (*Anolis sagrei*) to name a few. Approved pesticides are used to target the ant species around the use areas of the park. The remaining species are dealt with when necessary. Feral cats are very effective at hunting small mammals and birds. In addition to feral cats, well-fed

owned cats can range away from home and into the natural system. Feral cats have been present at the park for many years. Monitoring for the presence of feral cats should be integrated with any routine activities that occur within the natural communities at the park. Trapping should be initiated when cat tracks are found and all cats should be delivered to the Escambia County Animal Control.

Coyotes are present in fairly substantial numbers at the park. Not only have coyotes become a nuisance issue with park visitors (i.e., observed regularly on the park roads, campground, dumpsters, ranger station, etc.), they've have been documented digging into gopher tortoise burrows at the park and into softshell turtle nests. The level of impact to wildlife at the park is unknown, however, monitoring of tortoise burrows and the presence of coyote tracks should be considered.

North American beavers are established throughout the park's ditches. Because beavers tend to impound water, the park has issues with flooding of use areas, particularly the park campground and the park drive. The presence of beavers and the level of dam impoundment should be evaluated periodically to determine potential impacts to the park. Flow devices should be explored to reduce beaver-related flooding problems.

Raccoons can be a nuisance by raiding campsite dumpsters and stealing food from park visitors. Once raccoons become habituated, they can become a danger to visitors. Efforts to remove the raccoons and educate the public on the impacts of feeding wildlife are needed at the park.

Alligators are frequently observed within the park wetlands. These alligators are occasionally fed by park visitors and become habituated to the presence of humans. Because habituated alligators have the potential to be dangerous to park visitors, FWC removes problem alligators when necessary. Efforts to increase interpretive signage at the park and enforcement of park regulation related to feeding wildlife are needed to reduce these occurrences.

Regular monitoring of sensitive habitat (such as wetlands) for signs of nine-banded armadillo (*Dasypus novemcinctus*) or feral hog (*Sus scrofa*) damage is needed. If damage is detected, efforts to control these species will be considered.

<u>Perdido Key</u>

For a small park, Perdido Key has quite a few exotic and nuisance animals disturbing native wildlife. Coyotes harass nesting sea turtles, depredate sea turtle and shorebird nests, and eat flightless chicks and newly hatched sea turtles. They also flush nesting shorebirds at the park which prevents birds from settling within the habitat for nesting, or causes nest abandonment. In addition, the presence of coyotes and foxes can flush nesting shorebirds, leaving eggs and chicks vulnerable to predation by other species including ghost crabs, herons, crows and snakes. Predator control was initiated in 1997 and continues when funded. Following a year of heavy removal, productivity for nesting shorebirds increases. The presence of

coyotes and other mammalian predators should be monitored and detected while surveying for shorebirds, sea turtle nests, and beach mice. Any observations of known predation to nests should be recorded and reported. Park staff should work with district biologist to assess the threat of predation, and work with trappers to decide the best method to achieve control. The screening of sea turtle nests in order to prevent depredation from coyotes should continue. Trapping coyotes in winter prior to shorebird and sea turtle nesting season is recommended as the most effective method of control due to cooler temperatures and to minimize disturbance to shorebird nests during the trapping process.

Raccoons (*Procyon lotor*) and Virginia opossums (*Didelphis virginiana*) can be nuisances by raiding trashcans and stealing food from park visitors. Once these mammals become habituated, they can become a danger to visitors. In addition, raccoons and opossums can be effective predators of sea turtle and shorebird nests.

Feral cats and red and gray foxes can be detrimental to populations of beach mice and shorebirds. Both foxes and feral cats are very effective at hunting small mammals, including beach mice. A well-fed cat can range away from home and into the dune system where beach mice are found, and hunt mice for sport. Feral cats have been present at the park for many years as a result of adjacent homes on both the east and west sides of the park having outdoor cats. While it is unknown exactly why beach mice populations have declined in recent years, feral cats certainly may have contributed. Monitoring for the presence of feral cats and foxes should be integrated with the monitoring of beach mice. Trapping should be initiated when cat and fox tracks are found, or when beach mice presence declines.

Table 4 contains a list of the Florida Exotic Pest Plant Council (FLEPPC) Category I and II invasive, exotic plant species found within the parks (FLEPPC, 2011). 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 parks, see Addendum 5.

Table 4: Inventory of FLEPPC Category I and II Exotic Plant Species

Common and Scientific Name	FLEPPC Category	Distribution	Management Zone (s)
BIG LAGOON STATE PARK			
Mimosa *Albizia julibrissin*	I	1	BG-A
Cogongrass *Imperata cylindrica*	I	2	BG-A, BG-H, BG-L
		6	BG-D, BG-F, BG-I
Lantana *Lantana camara*	I	2	BG-I, BG-M

Table 4: Inventory of FLEPPC Category I and II Exotic Plant Species			
Common and Scientific Name	**FLEPPC Category**	**Distribution**	**Management Zone (s)**
Japanese climbing fern *Lygodium japonicum*	I	1	BG-D
Chinaberry *Melia azedarach*	II	1	BG-D
Torpedo grass *Panicum repens*	I	1	BG-K
		2	BG-A, BG-B4, BG-I, BG-J
		3	BG-M
		6	BG-E
Chinese tallow tree Sapium sebiferum	I	1	BG-E
		2	BG-A, BG-B1, BG-B3, BG-C, BG-C2, BG-F, BG-G, BG-H, BG-I, BG-J, BG-L, BG-M
		3	BG-B2, BG-D
Purple sesban *Sesbania punicea*	II	2	BG-B1, BG-D, BG-H, BG-I, BG-M
Chinese wisteria *Wisteria sinensis*	II	2	BG-B1
TARKILN BAYOU PRESERVE STATE PARK			
Mimosa *Albizia julibrissin*	I	1	TB-GG, TB-R, TB-U
		2	TB-L
Air-potato *Dioscorea bulbifera*	I	2	TB-L
Cogongrass *Imperata cylindrica*	I	1	TB-S
		2	TB-L, TB-P
		6	TB-A, TB-B, TB-GG
Lantana *Lantana camara*	I	1	TB-GG, TB-KK
Chinese privet *Ligustrum sinense*	I	2	TB-P
		4	TB-U
		6	TB-DD

Table 4: Inventory of FLEPPC Category I and II Exotic Plant Species			
Common and Scientific Name	**FLEPPC Category**	**Distribution**	**Management Zone (s)**
Japanese honeysuckle *Lonicera japonica*	I	2	TB-A, TB-B, TB-P, TB-S, TB-U
Japanese climbing fern *Lygodium japonicum*	I	1	TB-A, TB-P, TB-S
		2	TB-L, TB-U
Cat's claw vine *Macfadyena unguis-cati*	I	2	TB-D, TB-E
Torpedo Grass *Panicum repens*	I	2	TB-L
Chinese tallow *Sapium sebiferum*	I	1	TB-GG, TB-KK
		2	TB-H, TB-HH, TB-I, TB-JJ, TB-K, TB-L, TB-O, TB-P, TB-Q, TB-R
		4	TB-U
Purple sesban, rattlebox *Sesbania punicea*	II	3	TB-U
Chinese wisteria *Wisteria sinensis*	II	1	TB-H, TB-KK, TB-S, TB-U
		2	TB-GG, TB-P
Elephant ear *Xanthosoma sagittifolium*	II	1	TB-GG
PERDIDO KEY STATE PARK			
Cogongrass *Imperata cylindrica*	I	2	PK-3, PK-1
		3	PK-1
Torpedograss *Panicum repens*	I	2	PK-2
		6	PK-3

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 Species Management Goals, Objectives, Action Items

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

The 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 A: Annually treat 34 acres of exotic plant species in the parks.

Action 1	Annually develop/update exotic plant management work plan.
Action 2	Implement annual work plan at Big Lagoon by treating 8 acres annually.
Action 3	Implement annual work plan at Tarkiln Bayou by treating 20 acres annually.
Action 4	Implement annual work plan at Perdido Key by treating 6 acres annually.
Action 3	Survey management zones at Tarkiln Bayou on bi-annual schedule to detect new infestations and evaluate existing for prioritization of treatments.
Action 4	Annually work with 1-2 of the Wildland Urban Interface subdivisions adjacent to or embedded within Tarkiln Bayou in order to educate homeowners or landowners about invasive plant species and reduce potential/active threats to the preserve's habitats.

Big Lagoon

The average number of acres of invasive exotic plants to be treated at the parks annually during the planning period of this plan are 8 infested acres. Each year the treatable acres may be influenced by flooding of low lying habitats, tropical systems or access to specialized equipment. Follow-up treatments depend on the invasive species and may include re-treatments in 2-4 weeks or 2-4 months. Or initial treatment may include foliar treatments on clear winter days, combined with basal bark treatment in hot summer months during follow-up. Each management zone is surveyed biennially for re-growth and new infestations. In addition, the adjacent right-of-way is surveyed for potential new infestations brought in by county mowing crews or debris from solid waste collection activities.

Tarkiln Bayou

Currently, there are 94.6 documented exotic infested acres at Tarkiln Bayou based on the most recent surveys. More than 1,400 gross acres have been treated since the last plan update, with 120 infested acres treated overall. Currently treatment occurs though FLCC (AmeriCorps), contractors or park staff. Based on the past 5 years, the overall effort has resulted treatment or retreatment of an average of 23.6 acres per year.

As the park is brought toward a maintenance condition, the targeted acreage may decrease. Retreatment of infested acreage will also likely be necessary. While some individuals may be regrown from previous treatments that have not yet been exhausted of their energy stores and so need to be reduced over time, most pest plants are those arising from propagules (seeds, spores, vegetative fragments) that have been transported from active infestations outside the park boundary on nearby parcels and roadsides. Thus, there will be a continual need to locate and treat exotic plants arriving from outside in the indefinite future in order to maintain the natural communities in good health.

There are 14 subdivisions adjacent to or embedded within Tarkiln Bayou. Many of these subdivisions are occupied by military families that rotate through in less than 5-year intervals. Given the ephemeral nature of the adjacent residents, the park will need to develop a rotating schedule, targeting 1-2 each year to educate residents and potential reduce exotic propagules entering the park.

Perdido Key

Every six months, all three management zones at Perdido Key are completely surveyed for exotic plant species. This is due to the relatively small size of the park, and low levels of current exotics. Areas of known cogongrass and torpedograss will be checked annually and treated with herbicides as necessary until the areas are in maintenance condition. Spot checks for individual Chinese tallow trees, lantana shrubs and wisteria vines will be conducted annually. Maintenance condition describes a formerly active infestation that has been treated to the extent that any plants remaining are manageable with existing staff and resources, total area is stable or declining, mature reproducing individuals are absent, and the species poses no significant threat to listed plants or animals. Thus, the actual treated zone may reduce in area over time though the entire extent would need to be inspected indefinitely. An important exception is an instance where the exotic plants are well mixed with native vegetation, which would require an accompanying restoration program to plant natives in the formerly infested area. The reason for this caveat is that in this situation herbicide application would likely result in significant non-target damage; the resulting area would be denuded of live vegetation and highly vulnerable to re-infestation by exotic plant species. Such removal of native vegetation may lead to the necessity of perpetual treatment and subsequent loss of native plant species from that area. A restoration effort to replant the area with native vegetation appropriate for that habitat following treatment would be intended to preempt potential exotic growth into the open space.

Objective B: Implement control measures on 4 exotic animal species in the parks.

Action 1	Develop exotic and nuisance animal management plan for the parks and update annually.
Action 2	Assess nutria population and habitat impacts at Tarkiln Bayou and develop a control program with the USDA as needed.

Action 3 Work with USDA to continually reduce coyote, feral cat, red fox and armadillo populations at Perdido Key State Park.

Action 4 Implement plan.

Impacts from nutria at the park are unknown at this time. They have the potential to reproduce quickly and decimate wetland habitat by destroying vegetation. Park staff should coordinate with district biologists to develop a monitoring protocol to assess population abundance and determine he extend of occupancy and impact. Following the monitoring effort, a removal program should be developed in coordination with the USDA.

With the assistance of District and park biologist, the park should develop an exotic and nuisance animal management plan that details issues, human-wildlife conflicts, need for outreach, coordination with USDA, etc. The plan should prioritize exotic species management to guide funding. The plan should outline what can be accomplished in exotic species management internally versus with external trappers.

The parks should continue a program of controlling coyotes, red foxes, feral cats, and armadillos. All of these species are threats to imperiled coastal species. In fact, Pruner et al. (2011) found that the more coyotes removed, the higher the probability of hatching success for shorebird nests. A tracking assessment of exotic animal predator species should be conducted prior to the start of the shorebird nesting season and during beach mice, shorebird and sea turtle monitoring to establish predator control needs. In addition, any documented predation event (e.g., shorebird nest, sea turtle nest) should be reported to the district office to coordinate predator removal efforts with the USDA. Coordinated efforts between the FWC, USFWS, and the DRP as part of the State Wildlife Grant program and funding associated with the BP oil spill will adequately fund the predator removal program with the USDA at this park until 2017.

Coyotes are present in fairly substantial numbers at the park and have become a nuisance issue with park visitors (i.e., observed regularly on the park roads, campground, dumpsters, ranger station, etc.). Management should include targeted removal of habituated individuals. Coyotes in and around use areas should be hazed or other avoidance measures taken.

Feral cats are often observed at the parks. Feral cats are very effective at hunting small mammals and birds. Cats may decimate the bird, reptiles, amphibians, and small mammals in a natural area as they forage, thus potentially causing trophic disturbance to a community's food web. In addition to feral cats, well-fed domesticated cats can range away from home. Feral cats have been present at the park for many years. Monitoring for the presence of feral cats should be integrated with other natural resource activities at the park. Trapping should be initiated when cat tracks are found. All cats removed from the park will be delivered to Escambia County Animal Control.

Armadillos may disturb the soil, consume small animal species, and damage herbaceous vegetation as they root through the substrate. Armadillos are much harder to trap than any other exotic animal. Because these animals cannot be easily drawn into a trap with bait, traps with wooded funnels can be used to guide the animal into the trap. Armadillos are not currently targeted for removal by USDA, but as the predator communities shift, they may become a main threat in the future.

Regular monitoring of sensitive habitat (such as wetlands) for signs of nine-banded armadillo or feral hog damage is needed. If damage is detected, efforts to control these species will be considered. If these exotic animal species are detected at the park, the exotic and nuisance animal management plan should be updated accordingly.

Objective C: Manage beaver population at Big Lagoon to reduce flooding of use areas.

Action 1 Assess beaver population, location of dams, etc. and develop management plan and update as needed.
Action 2 Implement plan.

The once extirpated beaver population is now responsible for flooding of the park campground and roads. Beaver dams essentially function as ditch stops and limit the stream flow. The beaver population likely needs to be controlled as needed. However, flow devices should be explored alongside population management as a more long-term solution. Park biologist should collaborate with district biologist and FWC to develop a beaver management plan.

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 (FDOS) 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 FDOS, 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 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 following is a summary of the FMSF inventory. In addition, this inventory contains the evaluation of significance.

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.

Big Lagoon

Big Lagoon State Park contains three known cultural sites recorded in the Florida Master Site File. Sites range from prehistoric to historic 19th and 20th Century occupation or visitation.

Throughout Florida there is evidence of prehistoric occupation. The impacts from prehistoric periods and the changing water levels in relation to glaciation patterns can be viewed at the park when viewing the natural community maps. In particular, the dune ridges found within the park, now coastal scrub and scrubby flatwoods, are relic dunes from a changing coastal shoreline. Although the park is not rich with cultural sites, the sites that are found depict indigenous groups that utilized the fertile waters and land associated with Perdido Bay and Big Lagoon. Based on evidence found at the park, there was Woodland and Mississippian period occupation. The Woodland period cultures spanned a period from roughly 800 BCE to 1000 AD and the Mississippian cultures that evolved from the earlier Woodland period lasted until European contact in the eastern part of North America. Given the presence of shell middens at the park, Native Americans utilized the maritime habitat, primarily hammocks and foraged on shell fish (e.g., oysters, scallop and conch, etc.).

Site 8ES1049, Big Lagoon #1, is an archaeological site that contains historic and prehistoric components. Fragments dating to the American 19th Century and a shell midden dating to the Woodland period were observed during the initial survey. However, at the time of its discovery in 1983, the site had already been disturbed by prior park development. It is likely that the site was destroyed from installation of pipes and a septic system. The site was tested in 2016 during an archaeological survey for the boat ramp expansion but no evidence of the site was identified (Mikell 2016). Based on this report the Division of Historical Resources determined the site was not eligible for listing on the National Register of Historic Places.

Site 8ES3510, Big Lagoon Shell Scatter, is a newly recorded prehistoric shell scatter of unknown cultural-temporal affiliation on the north shore of Big Lagoon. 8ES3510 was discovered in 2010 in association with coastal surveys in response to the Deepwater Horizon oil spill (Austin 2012). Lacking temporally diagnostic artifacts, 8ES3510 dates to an unknown prehistoric period. The site consists of a small scatter of oyster shell and other shellfood remains located in the tidal flat and adjacent upland scrub.

ES04285 or Miss Ivey was a 20th Century occupation/building that served as a snack and burger joint. Miss Ivey, who lived in the area, had maintained a single-wide mobile home and a wood built structure that served as a food establishment. When the business was open miss Ivey provided snacks and burgers to fishermen or visitors to the nearby beaches. However, the structures (stick built home and mobile home) were removed in the 1980s by park staff. Some items remain on site, including fence posts, a water well, etc.

Tarkiln Bayou

Currently, there are 11 confirmed cultural sites at Tarkiln Bayou that have corresponding Florida Master Site File documentation, and all are archaeological sites with origins during pre-Columbian, historic American, or containing elements from both times. Most of these sites are located along or close to the shoreline of the Perdido River or Tarkiln Bayou in the extreme western section of the park. The majority of these sites contain evidence of some degree of use by Americans going back to the 19th century as well as aboriginal people before European contact. The DuPont Point site (ES1048) covers an appreciable area on the riverside of the lower Tarkiln peninsula (primarily management zones TB-E and TB-H) and was determined to have variously supported a campsite, homestead, and village at various times during the middle-to-late Archaic, Weeden Island, 19th/20th century American periods; surface scatters of artifacts, building remains, and a shell midden were recovered. The Catfish Point site (ES2836) is located at the peninsula tip and is a very short distance to the DuPont site; also containing elements of history and prehistory, exposed ground inspection and two shovel screening tests recovered 160 artifacts of various types, but erosion has compromised the integrity of the site to resolve too much detail. The Bronson Field South site (ES1391) occurs along the northern park boundary with the Blue Angel Recreation Park adjacent to a tidal salt marsh fringing the Perdido River and contained elements of the Weeden Island as well as American culture from the Civil War through the 20th century; from the records, it appears that a portion of this site occurs on the Blue Angel property and was planned to be developed into a picnic area.

There are multiple sites with significant cultural evidence attributed to primarily America of the 19th or 20th centuries. One of the most interesting of these sites is the Tarkiln Bayou Wharf (ES2963) located on the eastern shoreline of the bayou itself. Evidence suggests that a wooden dock structure was constructed here early in the 20th century to facilitate transport to and from woodland being utilized for the naval stores industry. In the immediate vicinity, mature cat-faced pines (previously harvested for the resins using a cup and gutter system) still remain, and the site may have been a location where filled barrels were stacked before loading for export. A short distance south of the Bronson Field South site along the river, the DuPont Cove site (ES2962) just inland from tidal salt marsh habitat is believed to be a homestead with building remnants dating to the late 19th century; however, mapping and aerial photography done in 1919 and 1992, respectively, did not reveal notable features of this homestead. Two other sites located on the Tarkiln peninsula (Frankiln site [ES2961] and the Elizabeth site [2835]) were determined to be refuse dumps containing various artifacts primarily dating to the early 20th century.

The Weekley Bayou Homesite (ES1385) is distinctive in being one of the few sites discovered so far in the eastern interior section of the park, though this could be a function of the greater isolation from the transportation and resources associated with the waterways and the latter date that this property was acquired by the park. Dating to about 1900, artifacts were recovered from the site though standing structures are no longer present; a narrow trench and a small square brick and

mortar lined pit were observed. Two other cultural sites dating to the 20th century include an aircraft wreckage site (ES3722; probably from the World War II era) in management zone TB-D and a cattle dipping vat (ES3723; excavated feature intended for cattle to pass through and get immersed in chemicals for various veterinary purposes) in management zone TB-R. Only one documented site (Black Jack Hammock site [ES2964]) was not found to contain significant cultural evidence from the historical America period; oyster shell deposits, aboriginal ceramics, and charcoal remnants dated to the Weeden Island II period and the site is believed to have been a habitation site or resource exploitation camp.

The Institute of West Florida Archaeology (University of West Florida; Little et al. 1988) conducted an initial archaeological survey of the Perdido drainage system within Escambia County in 1988. This project was intended to investigate the archaeology in an area that had up to that time not received significant expert attention. This project involved literature reviews, informant interviews, and field reconnaissance of selected sites. Ultimately, the team formally described 44 cultural sites across the county, including several receiving initial investigations at the park. Nine years later, an archaeological Phase I investigation of the park property was conducted by the Pensacola Archaeology Lab (Curren et al. 1997a). This project was able to locate three new cultural sites (Black Jack Hammock, Catfish Point, and DuPont Cove) and provided important information about earlier inhabitants of this area and for the FMSF documents. That same year, the Pensacola Archaeology Lab also published a report of their investigation of the Blue Angel Recreation Park adjacent to and north of management zones TB-B, TB-D, and TB-E (Curren et al. 1997b); this report included an analysis of the Bronson Field South site, situated on the boundary of the two properties. The next year, the Pensacola Archaeology Lab published a report that continued with their Phase I study of park property west of Bauer Road that focused on a smaller study area along the Perdido River and south of Tarkiln Bayou (Curren et al. 1998). In 2000, Vojnovski et al. released an inventory and assessment of cultural resources for the property originally purchased with the Conservation and Recreational Lands (CARL) program funding, including all management zones west of Bauer Road except for TB-KK. In 2012, Southeastern Archaeological Research, Inc. conducted a shoreline survey of cultural sites to assess for any contamination from the Deepwater Horizon oil spill off from the Gulf shore (Austin, principal investigator); the report visited four of the coastal cultural sites and determined that no significant contamination was observed.

Collins et al. (2012) completed an archaeological resource sensitivity model for all Florida state parks, including Tarkiln Bayou State Park, that seeks to provide a predictive model for property likely to contain unknown cultural resources. Their analysis used geographically-explicit data describing the landscape and determined that about 14 and 6% of park property has a high or medium probability, respectively, of supporting cultural sites. The western Tarkiln peninsula was the largest area considered “highly sensitive” (where most sites are already clustered) with smaller elongated patches occurring along the significant watercourses draining the park interior east of Bauer Road.

Perdido Key

A review of the Florida Master Site File (FMSF) revealed one site at Perdido Key State Park – ES02241. Being a barrier island exposed to high wave energy climates, it is possible if not probable that other sites historically located here have been lost to natural erosion as the island's location shifted over time. This recorded site has not been evaluated for NRHP eligibility.

West Florida was inhabited by many different groups of Native Americans, but most notably the Penzacola and Creek tribes would have utilized the fertile waters and land associated with Perdido Key. In 1693 the Spanish cartographer Carlos de Sigüenza y Góngora discovered the area and named it Perdido Key, meaning "Lost Key." The name was given because Carlos had a difficult time finding deep water access to Perdido Bay during a storm and needed the assistance of a Native American tribe camping on the island to find the naturally occurring inlet.
The ES02241 – Leeser Site, named after the park manager at the time Phillip Leeser, was documented with FMSF in 1994. A shell midden with unspecified cultural and temporal context, six feet in diameter and two feet deep, was recorded as being located in management zone PK-3 within the scrub natural community. Recent visits revealed no artifacts visible on the ground surface, and only a minimal amount of shells scattered within the documented location. It is possible that recent tropical storms have dispersed the remaining shell components of this site away from the FMSF location, making it difficult to identify it as a shell midden. Another theory circling this shell midden is that it is not an archeological site at all.

Recently, archaeologists suggest the age of Leeser Site may be recent, potentially from pre-1963 when the local oyster population died out due to industrial pollution. This mound of shells may have originated from when the land was a military baseor used as a college campus prior to state acquisition. For now, the site is categorized as an archeological site until a Phase I survey is conducted. A total of four previous cultural resource surveys have been completed partially or fully within the park boundaries.

A predictive model was conducted at Perdido Key State Park in 2011, and researchers were able to ground-truth Leeser Site. The site was located, but as mentioned before only scattered shells were observed. While at the park, the team searched for new sites but none were found. The predictive model took in factors such as elevation, soil types, distance to water, etc., and predicted that 25.4 acres or 8.4% of the uplands area are considered to have high archaeological sensitivity. A large portion of the park, 207.6 acres (68.6%) was considered to have medium sensitivity, and 69.8 acres or 23% of the uplands were considered to have low sensitivity. The information gleaned from this study will assist park staff in identifying areas potentially sensitive to ground disruption, and should help guide where new developments (if any) should be placed.

Condition Assessment: Sites at Big Lagoon are in poor condition due to previous disturbance of sites, removal of structures, or erosion and park construction activities.

Due to the maritime conditions of the park, erosion by tides, boat wakes, storm surges and wind is the primary impact to site 8ES3510, located along the shoreline. The rate of deterioration and the amount of each site destroyed is currently unknown. Erosion has probably impacted this site via the loss of site components (typically shell midden) located on the water's edge. For example, shell material is often removed from its original context, scattered and then redeposited elsewhere on and or offshore.

According to record, ES04285 has been mostly destroyed through the removal of the primary structures decades ago. What remains at the historic landscape is secondary structures, a well, a septic tank lid, fence posts, etc. and these items are degraded. Similarly, 8ES1049 was disturbed and likely destroyed in terms of original context due to past construction.

The cultural sites at Tarkiln Bayou are generally in fair to poor condition for various reasons. Sites lying along or close to the Perdido River and Tarkiln Bayou are potentially subject to damage from erosion (progressive as well as storm surge related) and greater exposure to high winds during tropical storms. As these are undeveloped natural coastlines, park staff would be rather limited in what practical remedies could be implemented. Evaluated on a case by case basis, significant elements within the cultural sites could be reinforced against wave damage if loss is imminent and potential fixes are cost-effective. In the FMSFs, cultural experts described vandalism as having damaged sites likely decades ago, especially before the park was established. Looting and vandalism are not currently observed in the field to be significant threats, but there is always potential for them to occur. Specific locations of most cultural sites are not widely publicized in order to contain threat from looting.

As mentioned before, the Leeser Site at Perdido Key is a shell midden that has been impacted by naturally occurring tropical storm events. Being located on a barrier island, it is expected that a shell midden would eventually become worn and scattered over time. While the site does not display a typical midden structure, it shows no signs of looting, plant intrusion, or direct erosion. Therefore, this midden is in good condition and should be preserved in its present state for as long as it remains. The main threat to this site is storm surge associated with storm events, and changes in local sea levels.

General Management Measures: 8ES3510 is the only site where stabilization might be feasible. Given the maritime habitat and associated coastal erosion, stabilization techniques may be utilized in the future depending on the outcomes of surveys to determine context and significance. Stabilization techniques might include the use of protective vegetation, use of filter cloth or other methods to prevent erosion, removal of large trees or burial of the site.

ES04285 does not appear to be significant, according to park staff, and it is recommended that the site be properly assessed and documented, followed by the removal of remaining structures and subsequent restoration of the natural community. However, this site has not been formally evaluated by the State

Historic Preservation Officer. Park and district staff must coordinate with DHR for a formal evaluation of the site before any further action is taken.

Park staff periodically monitor the cultural sites at Tarkiln Bayou either in the course of other duties in the vicinity or occasionally as part of a more formal surveillance effort. Erosion to the sites and vulnerability to storm damage along the river and bayou is the most significant threat and specific actions to remedy them can be difficult given the undeveloped coastline in this location, ongoing natural forces in operations along this corridor, and the cost involved in erosion control. Threats to specific, notable features can potentially be addressed on a case by case basis. Prescribed fire operations should take measures as necessary to protect the integrity of cultural sites.

Management for the Leeser site at Perdido Key requires very little effort. The shell midden should be monitored yearly to confirm it remains in good condition. This site will continue to be in good condition as long as it is not identified to the visitors, impacted by resource management, or completely lost during the next tropical storm. This site will be preserved by keeping its location hidden to the public and making sure park staff avoids ground disturbance around the FMSF documented area.

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: An informal collection of slides and documents now exist and are housed in a climate controlled office at the park. Additional items were added to the collection in 2010 and are housed at the same location. These items consist of tools made from shell and turtle carapace. In fact, some of the shell tools may have been used for eating or gathering of food items. Collections items possessed by the park staff consist of various paper documents concerning its cultural history, including copies of newspaper articles, legal and property documents (e.g. land surveys and individual land purchase records), and various reports on the park's resources. These records are stored in a file cabinet within the park biologist's office at the shop complex, which is a climate-controlled environment that protects the documents from deterioration. Artifacts recovered during cultural surveys over the years would have been submitted to the Division of Historical Resources (DHR) for their cataloguing and long-term storage.

Condition Assessment: The items currently in the park's collection are in good condition and are housed in a climate controlled room in the park shop. While all the collection items are helpful in communicating the park's cultural and natural heritage to the public, the collection items do not possess a monetary value significant to warrant the purchase of insurance; nor do they require formal curation or preservation.

Table 5 contains the name, reference number, culture or period, and brief description of all the cultural sites within the parks 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 below.

Significance
NRL – National Register listed
NR – National Register eligible
NE – Not evaluated
NS – Not significant

Condition
G – Good
F – Fair
P – Poor
NA – Not accessible
NE – Not evaluated

Recommended Treatment
RS – Restoration
RH – Rehabilitation
ST – Stabilization
P – Preservation
R – Removal
N/A – Not applicable

Table 5. Cultural Sites Listed in the Florida Master Site File

Site Name and FMSF #	Culture/Period	Description	Significance	Condition	Treatment
BIG LAGOON STATE PARK					
8ES1049 Big Lagoon #1	Woodland, Historic, Mississippian	Archaeological Site	NS	P	N/A
ES03510 Big Lagoon Shell Scatter	Prehistoric/Unspecified	Archaeological Site	NE	P	ST
ES04285 Miss Ivey	Historic/20th Century	Archaeological Site	NE	F	R
TARKILN BAYOU PRESERVE STATE PARK					
8ES1048 Dupont Point Site	Prehistoric / historic American	Archaeological Site	NE	F	P
8ES1385 Weekley Bayou Homesite	Historic American	Archaeological Site	NE	F	P
ES1391 Bronson Field South	Weeden Island / historic American	Archaeological Site	NE	F	P
ES2835 Elizabeth site	Early 20th century American	Archaeological Site	NE	F	P
ES2836 Catfish Point	Late / Middle Archaic; historic American	Archaeological Site	NE	P	P
ES2961 Frankiln site	Historic American	Archaeological Site	NE	P	P
ES2962 DuPont Cove site	Historic American	Archaeological Site	NE	P	P

Table 5. Cultural Sites Listed in the Florida Master Site File					
Site Name and FMSF #	**Culture/Period**	**Description**	**Significance**	**Condition**	**Treatment**
ES2963 Tarkiln Bayou Wharf	Late 19th / early 20th century American	Archaeological Site	NE	P	P
ES2964 Black Jack Hammock site	Weeden Island	Archaeological Site	NE	F	P
ES3722 Aircraft wreckage	20th century American	Archaeological Site	NE	F	P
ES3723 Cattle Dip Vat	Historic American	Archaeological Site	NE	F	P
PERDIDO KEY STATE PARK					
ES02241 Leeser Site	Prehistoric/Unspecified	Shell midden/ Archaeological Site	NE	G	P

Cultural Resource Management Goals, Objectives, Action Items

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

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

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 must be submitted to the FDOS, Division of Historical Resources (DHR) for review and comment prior 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 the DHR for consultation and the 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 the DHR.

Objective A: Assess and evaluate 14 of 15 recorded cultural resources in the parks.

Action 1 Complete 14 assessments/evaluations of archaeological sites.

Big Lagoon

The park will assess 2 of the 3 known sites within Big Lagoon every other year. The site condition will be evaluated and any threats examined. Assessments will include 8ES1049 and ES03510.

The assessments will include examination of each site with discussion of any threats to site conditions, such as natural erosion; vehicular damage; pedestrian damage; looting; construction, including damage from fire break construction; animal damage; plant or root damage or other factors which might cause deterioration of the site. Staff will set up and use photo points at each site to evaluate changes of the site from previous assessments. Management measures will be prioritized after assessments to determine management needs for each site.

In the event of a large storm event, park staff will not be required to take any action prior to a storm regarding the cultural sites at the park. Staff should evaluate the sites post storm to document any artifacts that may have emerged, midden loss, etc.

Tarkiln Bayou

Park staff will assessment and evaluate all eleven cultural sites at Tarkiln Bayou listed in the FMSF over the next planning cycle. Erosion and potential storm damage to cultural sites occurring along the Perdido River or Tarkiln Bayou is the most significant threat to the integrity of the sites. Staffers should also be sure to check for any signs of looting or vandalism at the sites as these activities can substantially damage the structure and potential knowledge to be gained from formal investigation. Since these site locations are not likely to be broadly known by the public, risk of looting by artifact scavengers should be relatively low. FMSF documents for the Cattle Vat site and the Aircraft Wreckage were mainly intended in this initial step to formally record the existence and coordinates of these features. These sites still need to be analyzed in more detail for the record.

Perdido Key

Only one cultural site is currently recorded at Perdido Key State Park. This site, which is believed to be a shell midden, was discovered by a previous park manager in 1994. This site should be visited yearly to reconfirm the GPS location of the site, and to evaluate the site condition. The last site condition assessment was

conducted in February of 2015, and the site was considered to be in a good, stable condition by district biologist. During these yearly assessments, potential threats to the resource, including erosion, disturbance, digging or visitor traffic, would be documented. Also, photographs of the shell midden should be taken facing south during every assessment to document changes to the site. That way, the original photograph taken when the site was discovery can be used to compare changes over time.

There are currently no needs to stabilize or restore this shell midden. Being located on a small barrier island, the only imminent danger to this site is storm surge from a hurricane. In the event of a large storm event, park staff will not be required to take any action prior to a storm regarding this site. Staff should evaluate the site post storm to document any artifacts that may have emerged, or midden loss.

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

Action 1	Ensure all known sites are recorded or updated in the Florida Master Site File.
Action 2	Locate unknown sites anecdotally reported to occur on the Tarkiln Peninsula and complete associated documents in the Florida Master Site File.
Action 3	Develop and adopt a Scope of Collections Statement.
Action 4	Conduct oral history interviews.
Action 5	Compile a park administrative history.
Action 6	Continue to search for documents that would improve knowledge about the parks' history.
Action 7	Conduct Phase 1 archaeological survey for priority areas identified by the completed predictive model.

<u>Big Lagoon</u>

Big Lagoon State Park was included in the 2011 Archaeological Resource Sensitivity Modeling conducted by the University of South Florida, Alliance for Integrated Spatial Technologies (Collins et al. 2012). These models are designed to be utilized as planning tools, or the understanding and visualization of archaeological sensitivity. No new archaeological sites were identified at the park during this study. Only 24% of the park was identified as having a high sensitivity for archaeological site locations, 22% had medium and 53% had a low sensitivity.

Park staff will update the park's data in the FMSF as new archaeological sites are discovered, or new information on currently recorded sites is revealed via assessments/evaluations or approved archaeological investigation.

Efforts should be made to interview those who originally discovered the cultural sites at the park, and staff who have worked or volunteered at the park for many years. These individuals may be able to provide accounts of the role and history of

the Florida Park Service at Big Lagoon State Park in addition to information on the identified cultural sites.

Currently, there is not a scope of collections and records are missing and/or unorganized. In cooperation with the Florida Bureau of Archaeological Research, the park should develop and adopt a procedure for accepting artifacts and other probable cultural materials recovered and turned over by visitors and for forwarding them to the Bureau.

Tarkiln Bayou

There remains a need to improve the categorization and description of elements from Tarkiln Bayou's past for both historic and prehistoric times. While all of the known cultural sites have been documented in the FMSF, anecdotal reports suggest that there are still interesting and significant features waiting to be discovered. For example, past observations indicate that a partial building foundation (possibly from a defunct fish camp) may still lie within the interior of the Tarkiln peninsula, management zone TB-G; there is also a report of a cemetery being located in management zone TB-E. Park staff have and will continue to search for these features, completing the FMSF documentation and arranging for further study when they are found. Also, the park staff should continue to search for people with knowledge of the property's history prior to its establishment as a state park for further information on unknown cultural sites, past land management practices, historical communities, and rare plant or animal species. According to the FMSF documents, local informants were a valuable resource for cultural experts researching at least two of the recorded cultural sites. Finally, park staff should continue to collect documents about the park's history from local community or governmental sources.

Perdido Key

The single recoded site at Perdido Key State Park, Leeser Site - ES02241, is recorded in the Florida Master Site File, and was recently updated during the 2011 visit by University of South Florida's Archaeological Resource Sensitivity Modeling team. The group visited Leeser Site and collected GPS point data and photos of the listed location. It was also noted that no artifacts were visible on the ground surface at this location and only minimal amounts of shell were evident. Also, no new cultural resources were identified during this park visit (Collins et al. 2013).

Based on the archaeological resource sensitivity model done for Perdido Key State Park, there are some locations identified with high sensitivity for archaeological resources (25.43 acres, or 8.4%). Most of the areas identified have a slightly higher topography, which would have allowed for more stable living areas during storms or high-water events. Although four other archaeological studies have already been completed with the park in the past, there are potentially other sites that have not yet been located. Being a highly stochastic environment, the probability of finding these historic or pre-historic sites within this parcel of barrier island is exceedingly low. Periodic large-scale hurricanes would have shifted the island's location and

wiped away any trace of previous human occupation.

There is currently no need for any oral history interviews or compilations of administration history. Also, Perdido Key currently has no collections. This is mainly due to the fact that there are no buildings to house collections, and no staff working out of the park to collect items. If any items were to be collected at Perdido Key or for this park, they would be transferred to Big Lagoon State Park.

Objective C: Maintain condition of cultural resources.

Action 1 Design and implement annual monitoring programs for the parks' cultural resources.

Park staff should create and implement an annual maintenance and monitoring program for the park's cultural resources, monitoring each site at least once annually. Maintenance of the cultural resources at the parks ranges from potentially clearing vegetation to monitoring for unauthorized collection. All sites should be monitored for damage from storms, human disturbance, vehicular traffic, heavy equipment use, unauthorized collection, and any other ground disturbance. Ground disturbance anywhere in the parks should be carefully examined for the presence of artifacts and features, and any new sites or site boundaries properly documented. Park staff should consult with DHR and BNCR for guidance, assessing, planning, and designs the management of these site with potential stabilization techniques.

Special Management Considerations

Timber Management Analysis

If the Division of Recreation and Parks (DRP) determines that timber management does not conflict with the primary management objectives of the land, on all parcels larger than 1,000 acres, Florida Statutes - Chapters 253 and 259 require:

1) An analysis of the multiple-use potential of the parcel. Such analysis shall include the potential of the parcel to generate revenues to enhance the management of the parcel.
2) An assessment of the feasibility of managing timber resources for conservation and revenue generation purposes through a stewardship ethic that embraces sustainable forest management practices in land management plans.

Tarkiln Bayou

The Tarklin Bayou Preserve is designated as a single-use park. The feasibility of harvesting timber at Tarkiln Bayou during the period covered by the UMP was considered pursuant to the DRP statutory responsibilities to analyze 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, except in those forest communities specifically managed as early successional. Timber management is utilized for the specific purpose of helping restore or improve current habitat conditions and enhance the overall integrity of the natural community. Revenue generation from timber management is not the goal but rather, a by-product of taking such actions to help restore/improve target conditions of specific natural communities. In all situations, timber management activities undertaken will adhere to the current Florida Silvicultural Best Management Practices and Florida Forestry Wildlife Best Management Practices for State Imperiled Species.

Many of the natural communities evaluated at TBPSP had overstory stocking levels at, or above, the upper limits for corresponding Florida Natural Areas Inventory (FNAI) Reference Sites. A subset of these stands has overstocked conditions in the preferred pine component while the remainder have overstocked conditions in the non-preferred pine or hardwood components. This overstocked condition makes overstory thins a potential management tool which should be considered. Activities related to stand improvement, including palmetto and midstory reduction, are needed in many areas.

The Timber Management Analysis found in Addendum 8 provides additional details. This analysis has been evaluated and found to be consistent with the recommendations found in the subject Resource Management Component (RMC).

Coastal/Beach Management

The DRP manages over 100 miles of sandy beach, which represents one-eighth of Florida's total sandy beach shoreline. Approximately one-quarter of Florida's state parks are beach-oriented parks and account for more than 60 percent of statewide park visitation. The management and maintenance of beaches and their associated systems and processes is complicated by the presence of inlets and various structures (jetties, groins, breakwaters) all along the coast. As a result, beach restoration and nourishment have become increasingly necessary and costly procedures for protecting valuable infrastructure. Beach and inlet management practices affect beaches for long distances on either side of a particular project. DRP staff needs to be aware of and participate in the planning, design and implementation of these projects to ensure that park resources and recreational use are adequately considered and protected.

Big Lagoon

Big Lagoon has approximately one mile of inland beach along the ICW. Erosion into the dredged channel of the ICW and accretion are a constant natural process for this highly changeable shoreline. Consideration may be given to approaching USACE for borrow materials in the nearshore waters where significant erosion has occurred on the coastline. The nearshore movement of sand appears to proceed from east to west. Prior to the storm season of 2004 the East beach use area and

Observation area beaches had USACE and FWC permitted buoys for protection of the surrounding submerged sea grass beds. Those buoys were lost and have not been re-established.

Propeller scars have damaged the sea grass beds in this area but are undergoing a NRDA restoration project where sandbags and plantlets have been added to the scars and these plantlets will be monitored over the next three years.

Management of 150 feet of the nearshore waters is appropriate in order to allow park management to restore and maintain the aforementioned buoy system and to extend management actions to the nearshore waters for recreational activities and other issues that impact our coastline and sea grass beds. This area of Big Lagoon has had a history of barge and tug boat dredge impacts from groundings and releases of jet fuels from barges in transit along the ICW. This is also an illegal ingress point for the adjacent subdivision property owners and their pets.

Perdido Key

Perdido Key State Park includes over 8,700 linear feet, or 1.65 miles of sandy shoreline on the Gulf of Mexico. The sugar white sand associated with the high-energy beach is outstanding; it is also the focal point of the recreation activities at this park. The beach provides safe swimming conditions and has been a popular area with local residents and tourists for many years. The north side of the property includes approximately 10,000 linear feet, or 1.89 miles of shoreline on the Old River. Currently, no public access is available to this shoreline which is dominated by marsh grass.

The beach dune community is by far the most important and sensitive wildlife habitat at the park. The dunes are the main habitat of the Perdido Key beach mouse, which is listed as an Endangered Species by the U.S. Fish and Wildlife Service due to its rarity and extreme vulnerability to human impacts. Unfortunately, this habitat has been impacted in the past by numerous unauthorized trails over many years, which resulted in erosion and habitat fragmentation. Fencing and signage has been installed to block these trails, and since then, the beach dune habitat has vastly improved in quality.

The beach habitat at the park is protected under the Coastal Barrier Resources Act (CBRA). The CBRA helps ensure that the coastal habitat remains intact by minimizing the likelihood of development on this sensitive and dynamic habitat. The boundary protected under CBRA was updated in 2006 to no longer include the privately-owned outparcels and Perdido Key Area Chamber of Commerce located within the park.

The entire shoreline facing the Gulf of Mexico is considered critically eroding by DEP's Bureau of Beaches and Coastal Systems (2014). As identified in the Resource Management Program, dune restoration may be needed after tropical storms, and dunes should be assessed after each storm to determine the need. In 2006, over 506,000 sea oats and other dune species were initially planted along the foredune

area to restore the dunes that were eroded from tropical storm damage in 2004 and 2005. A follow up planting of 356,000 sea oats and 11,841 other dune plants from the Northwest Florida Aquatic Preserve greenhouse was conducted in 2008. Some of the plantings have accelerated foredune growth, thus protecting larger more stable back dunes. Survival of sea oats plantings after six months was 89% percent.

Debris removal techniques ranged from hand removal to heavy machinery, as large pieces of boardwalk and dune cross overs were strewn throughout the park after hurricane Ivan, Georges and Ike. While some large debris still currently exists within the park, biologists believe more damage would be done to the natural communities trying to remove the remaining pieces. Park staff work to remove smaller pieces by hand during every visit, and annually during community wide coastal cleanup events.

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). Management of Perdido Key State Park includes certain management activities within the buffer zone of sovereign submerged land along the entire shoreline, beginning at the mean high water or ordinary high water line, or from the edge of emergent vegetation and extending waterward for 400 feet. This area comprises the marine unconsolidated substrates of the park. The submerged resources within the buffer zone significantly increase the species diversity within the park and offers additional recreational opportunities for park visitors. Visitors are able to access this community either from the beach or from a boat. Management actions occurring within the buffer zone include patrolling for boats and watercraft too close to the park's beaches, removal of trash, litter, and other debris, public safety activities, and resource inventories and monitoring. Extension of the park's boundary into sovereign submerged land, 150 feet beyond the Gulf of Mexico and Old River shoreline is needed to manage and protect the park's coastal communities, including the listed species that occur there (including but not limited to rare plants, sea turtles, shorebirds and beach mice).

Another beach management concern on Perdido Key is the issue of beach erosion. Escambia County is proposing to conduct beach nourishment over approximately 6.5 miles of beach on Perdido Key. This project would add an additional 1.5 to 2 million cubic yards of sediment to the shoreline on this barrier island. Park and district staff have discussed methods of beach nourishment that would not directly impact the state park, but more discussion is needed prior to the project moving forward. Wanting to maintain the natural geographic setting on Perdido Key, park representatives have agreed to not allow fill material to be directly placed at the park, but rather the material would be "fanned in" from either side. Over the course of one to two years, the equilibrium of the beach would be reached, and the state park would naturally accrete sediment from nearby nourished areas. By conducting the nourishment this way, there will be less disturbance to the endangered beach mice, and less impact to beach nesting sea turtles and shorebirds. As this project moves forward, every effort should be made to limit beach driving, and the placement of dredging equipment on the state park's property.

As part of the effort to implement our goal to restore and maintain the natural communities and habitats of the state park, the following special management objectives for coastal systems are recommended.

Objective: Continue to assist federal, state and local agencies with active monitoring of erosion and accretion cycles and assessment of beach and shoreline conditions following natural disasters.

USACE regular schedule maintenance of the ICW and park input is important due to the sloughing of park coastline in the months/years following the dredging and due to potential impacts caused by staging of dredge equipment. Establishment of photo points to document current shoreline conditions both pre and post storm events should be established every quarter mile of coastline and recorded annually.

Objective: Continue to partner with federal, state and local agencies to fund, design, permit, improve and maintain coastal and beach management programs consistent with the mission of the Division.

Due to the local impacts from ICW maintenance dredging park staff should endeavor to improve erosional controls such as living shorelines or limited dredge spoil material placement in areas of the coast lost to sloughing.

Objective: Continue to assist federal, state and local agencies with monitoring and assessment of natural community responses following coastal projects.

A NRDA project is in the beginning stages to widen the one lane boat ramp into a 2-lane ramp, increase boat trailer parking and removal and replacement of one loading/landing pier.

Arthropod Control Plan

All DRP lands are designated as “environmentally sensitive and biologically highly productive” in accordance with Ch. 388 and Ch. 388.4111 Florida Statutes. If a local mosquito control district proposes a treatment plan, the DRP works with the local mosquito control district to achieve consensus. By policy of DEP since 1987, aerial adulticiding is not allowed, but larviciding and ground adulticiding (truck spraying in public use areas) is typically allowed. The DRP 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.

Escambia County does not have an arthropod control plan.

Sea Level Rise

Potential sea level rise is now under study and will be addressed by Florida’s residents and governments in the future. The DRP will stay current on existing

research and predictive models, in coordination with other DEP programs and federal, state, and local agencies. The DRP will continue to observe and document the changes that occur to the park's shorelines, natural features, imperiled species populations, and cultural resources. This ongoing data collection and analysis will inform the Division's adaptive management response to future conditions, including the effects of sea level rise, as they develop.

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 considered recommendations of the land management review team and updated this plan accordingly.

Tarkiln Bayou was subject to a land management review on November 11, 2017 (see Addendum 9). The review team made the following determinations:

- The land is being managed for the purpose for which it was acquired.
- 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 that culminates in the actual design and construction of park facilities. Input to the plan is provided by experts in environmental sciences, cultural resources, park operation and management. Additional input is received through public workshops, and through environmental and recreational-user groups. With this approach, the DRP objective is to provide quality development for resource-based recreation throughout the state with a high level of sensitivity to the natural and cultural resources at each park.

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

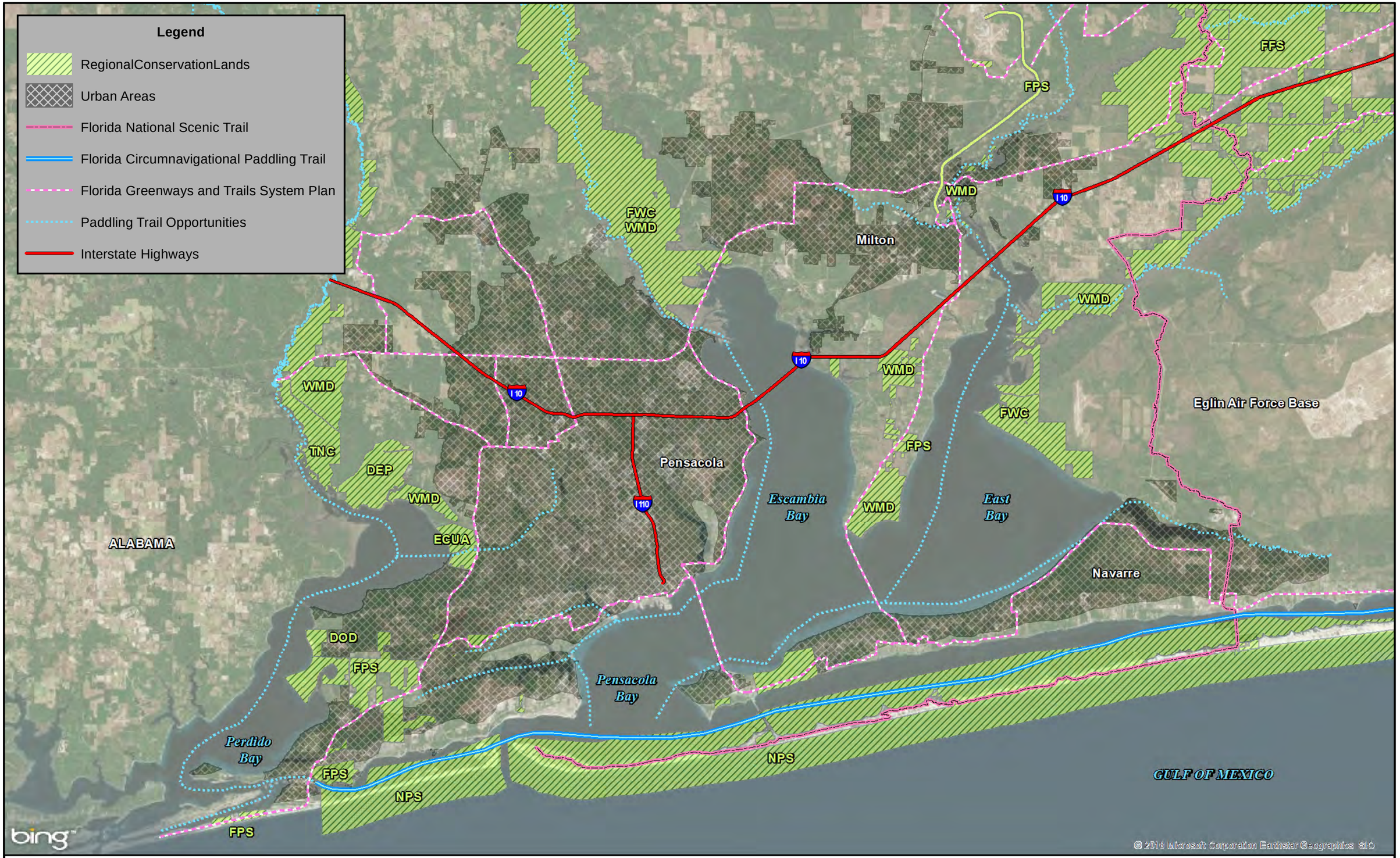
External Conditions

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 parks are located within Escambia County, about 10 miles southwest of the City of Pensacola in the northwest portion of the state, near the Florida-Alabama state boundary. Approximately 350,000 people live within 30 miles of the parks (U.S. Census 2010). According to the U.S. Census Data (2015), approximately 31% of residents in Escambia County identify as black, Hispanic or Latino, or another minority group. 63% of residents are considered to be of working age, which is defined as being between 16 and 65 years old (U.S. Census 2010). Escambia County ranked 28th statewide in per capita personal income at $36,632, below the state average of $42,737 (US Bureau of Economic Analysis 2015).

The table below identifies significant resource-based recreation opportunities within the region (see Conservation and Recreation Lands map).

Table 6. Regional Resource-Based Recreational Opportunities									
Name	**Biking**	**Hiking**	**Swimming / Beach Access**	**Boating / Paddling**	**Fishing**	**Wildlife Viewing**	**Camping**	**Hunting**	**Equestrian**
Florida Fish and Wildlife Conservation Commission (FWC)									
Lower Escambia River Wildlife Management Area				✓	✓	✓		✓	
Escribano Point Wildlife Management Area		✓		✓	✓	✓	✓	✓	
Northwest Florida Water Management District (WMD)									
Perdido River Water Management Area		✓		✓	✓	✓	✓	✓	✓
Escambia River Water Management Area		✓		✓	✓	✓	✓	✓	
Yellow River Water Management Area		✓		✓	✓	✓	✓	✓	
Garcon Point Water Management Area		✓				✓			
Blackwater River Water Management Area		✓		✓	✓	✓			
Florida Forest Service (FFS)									
Blackwater River State Forest	✓	✓		✓	✓	✓	✓	✓	✓
Florida Park Service (FPS)									
Blackwater Heritage State Trail	✓	✓				✓			✓
Yellow River Marsh Preserve State Park		✓				✓			
Escambia County, City of Pensacola, City of Gulf Breeze (LG)									
Jones Swamp Wetland Preserve		✓				✓			
Escambia Bay Bluffs		✓		✓	✓	✓			
Shoreline Park South		✓	✓	✓	✓				
Department of Defense (DOD), National Park Service (NPS)									
Blue Angels Recreation Park	✓	✓	✓	✓	✓		✓		
Gulf Islands National Seashore	✓	✓	✓	✓	✓	✓	✓		
The Nature Conservancy (TNC)									
Betty and Crawford Rainwater Perdido River Nature Preserve		✓		✓		✓			
Emerald Coast Utilities Authority (ECUA)									
Bayou Marcus Wetland		✓				✓			



BIG LAGOON
TARKILN BAYOU PRESERVE
PERDIDO KEY
STATE PARKS

N

0 2 4 8 Miles

Florida Department of Environmental Protection
Division of Recreation and Parks
Date of aerial; 2011

REGIONAL CONSERVATION AND RECREATION MAP

The parks are located in the Northwest Vacation Region, which includes Escambia, Santa Rosa, Okaloosa, Walton, Holmes, Bay, Washington, Calhoun, Jackson, Liberty, Gulf, and Franklin counties (Visit Florida 2014). According to the 2014 Florida Visitor Survey, approximately 10.1% of domestic visitors to Florida visited this region. Roughly 95% visitors to the region traveled to the Northwest for leisure purposes. The top activities for domestic visitors were beach or waterfront activities and culinary and dining experiences. Summer was the most popular travel season with nearly half of the visitors arriving between June and August. Most visitors traveled by non-air (94%), reporting an average of 4.2 nights and spending an average of $131 per person per day including transportation (Visit Florida 2014).

Florida's Statewide Comprehensive Outdoor Recreation Plan (SCORP) indicates that participation rates in this region for saltwater beach activities, freshwater beach activities, saltwater boat fishing, saltwater non-boat fishing, saltwater boat-ramp use, freshwater boat-ramp use, nature study, hiking, tent camping, off-highway vehicle riding, and hunting are higher than the state average with demand for additional facilities increasing through 2020 (FDEP 2013).

Existing Use of Adjacent Lands

The primary existing land uses surrounding Big Lagoon to the west, north, and east are commercial and residential. Big Lagoon and the Intracoastal Waterway bound the park to the south. Commercial uses are concentrated at the northwestern corner of BLSP, at the intersection of Gulf Beach Highway and Sorrento Road (State Road 292). Residential land uses vary from low-density residential adjacent to the park's eastern boundary, medium residential at the northeast corner, and high density residential north of the park entrance. A strip of land adjacent to the north side of Gulf Beach Highway is zoned as heavy commercial and light industrial and is currently used for activities associated with automotive repair.

Land uses to the south and west of Tarkiln Bayou include medium-density single-family residential and small area of low density residential. The park's easternmost boundary is formed by Blue Angel Parkway, which provides access to large retail developments associated with the adjacent residential subdivisions. Other associated amenities adjacent to the park boundary include a church and elementary school. High density residential units are also located along Blue Angel Parkway. Bauer and Sorrento roads separate the park into three distinct portions. Development along these roads is medium-density residential. The northwest boundary of the park is bounded by Blue Angels Recreation Park and Bronson Field U.S. Naval Reservation. The Southwest Escambia Sports Complex is adjacent to the northernmost portion of TBPSP.

The existing land uses to the east and west of Perdido Key include resort condominiums and associated commercial businesses such as restaurants. To the east of the park at the intersection of Perdido Key Drive (State Road 292) and River Road, a public beach access point owned by Escambia County is

about 500 feet from the easternmost boundary of the park. Medium density residential units and the Perdido Key Area Chamber of Commerce civic building inhabit the outparcel adjacent to the park, north of Perdido Key Drive. The Old River, which is adjacent to the northern boundary of the park, is the physical manifestation of the Alabama-Florida state line. On the north side of the Old River in Alabama, waterfront neighborhoods are considered medium to high-density residential subdivisions.

Planned Use of Adjacent Lands

The table below (Table 7) identifies the zoning and future land use designations for parcels in Escambia County that are in the area around the parks. Along with clustered patches of commercial future land use designations at major intersections, a majority of the land around Big Lagoon and Tarkiln Bayou is classified as Mixed-Use Suburban. This future land use classification is intended to encourage infill development in low density residential neighborhoods. The mix of land uses depends on the distance from arterial roadways or transit corridors, where new development within 0.25 miles should have larger percentages of non-residential land uses and new development taking place beyond 0.25 miles should prioritize residential land uses (Escambia County 2017).

According to the Escambia County 2030 Comprehensive Plan (2017), all of the privately-owned parcels on Perdido Key are within the Mixed-Use Perdido Key (MU-PK) future land use designation. This mixed-use district is meant encourage development that includes medium-density residential and commercial for local residents, along with the development of resorts, condominiums, and restaurants that cater to tourists. Within the MU-PK future land use designation, the maximum density is 25 dwelling units per acre (Escambia County 2017).

As a means to catalyze development, Escambia County partnered with an urban design firm to create a master plan for Perdido Key. This master plan, completed in March 2016 and adopted in June 2016, created a town center overlay on the key (DPZ Partners 2016). Several locations on Perdido Key and town center designs were considered, all with the vision of developing approximately 80,000 square feet of commercial uses and a balanced mix of other uses that create an urban form that will allow Perdido Key to become more pedestrian and bicycle-friendly. Given that the locations considered by the master plan are under private ownership, the appropriate stakeholders such as the county and property owners will need to collaborate to realize the vision of the master plan.

Table 7. Zoning and Future Land Use Designations Escambia County*				
Future Land Use Designation	**Allowable Uses**	**Maximum Density (Dwelling Units per Acre)**	**Maximum Intensity (Floor Area Ratio)****	**Other Noteworthy Considerations**
Conservation (CON)	Passive parks and trails, preservation lands, educational uses for public benefit	None	None	Intended for conservation of important nature resources. No new residential development is allowed
Commercial (C)	Retail and services, professional office, light industrial, public and civic facilities	25 du/acre	1.0 FAR	Residential development only permitted if secondary to primary commercial activity
Recreation (REC)	Active and passive recreational amenities	None	0.5 FAR	No new residential development is allowed
Industrial (I)	Light to intensive industrial, retail, office	None	1.0 FAR	No new residential development is allowed
Mixed-Use Urban (MU-U)	Residential, retail and services, professional office, light industrial, public and civic	25 du/acre	2.0 FAR	The intended mix of land uses for new development is determined by the proximity of arterial roadways and transit corridors
Mixed-Use Suburban (MU-S)	Residential, retail and services, professional office, light industrial, public and civic	25 du/acre	1.0 FAR	The intended mix of land uses for new development is determined by the proximity of arterial roadways and transit corridors

Table 7. Zoning and Future Land Use Designations Escambia County*				
Future Land Use Designation	**Allowable Uses**	**Maximum Density (Dwelling Units per Acre)**	**Maximum Intensity (Floor Area Ratio)****	**Other Noteworthy Considerations**
Mixed-Use Perdido Key (MU-PK)	Residential, condominiums, hotels, commercial, recreation, public space	25 du/acre	6.0 FAR	Commercial development must consider environmental sensitivity and density transfers may not be applied south of Perdido Key Drive

*Escambia County. 2017. Escambia County Comprehensive Plan 2017. Escambia County, Florida
** FAR = Floor area / lot (parcel) area

Florida Greenways and Trails System (FGTS)

The Florida Greenways and Trails System (FGTS) is made up of existing, planned and conceptual non-motorized trails and ecological greenways that form a connected, integrated statewide network. The FGTS serves as a green infrastructure plan for Florida, tying together the greenways and trails plans and planning activities of communities, agencies and non-profit organizations throughout Florida. Trails include paddling, hiking, biking, multi-use and equestrian trails. The Office of Greenways and Trails maintains a priority trails map and gap analysis for the FGTS to focus attention and resources on closing key gaps in the system.

In some cases, existing or planned priority trails run through or are adjacent to state parks, or they may be in close proximity and can be connected by a spur trail. State parks can often serve as trailheads, points-of-interest, and offer amenities such as camping, showers and laundry, providing valuable services for trail users while increasing state park visitation.

Escambia County has begun efforts to create a 12-mile walkable greenway at the Jones Swamp Wetland Preserve and Southwest Greenway. This greenway provides hiking, wildlife viewing, nature photography, and interpretive opportunities to urban and suburban residents in southwestern Pensacola. Existing development of the greenway is confined to the area between South Old Corry Road at Lexington Park and South Fairfield Drive. The western and yet-to-be developed portion of the greenway is approximately 2 miles from the eastern boundary of Tarkiln Bayou and would traverse through this property before eventually connecting with Big Lagoon and Perdido Key. The Jones Swamp Wetland Preserve and Southwest Greenway represents an opportunity

for the DRP to establish trail connections with local community parks and complement natural community restoration efforts.

Perdido Key Drive/State Road 292 has been identified as a priority corridor by the Florida Greenways and Trails System Plan. This plan informs the Florida Department of Transportation's Shared Use Nonmotorized (SUN) Trail Program, and in 2016, the SUN Trail Program allocated approximately $1.1 million to design a multi-use trail on Perdido Key Drive (Escambia County 2016). The trail will assist the county with its vision of creating a more pedestrian and bicycle-friendly built environment on Perdido Key. Along the north side of Perdido Key Drive, the 10-foot multi-use trail will be physically separated from the road and will run from Gongora Drive to the Alabama state line. These funds scheduled by FDOT were allocated for design purposes only, and the DRP should monitor the project to determine if the trail will directly impact Perdido Key's park boundary once construction is slated to begin.

The Florida Circumnavigational Saltwater Paddling Trail, or the CT, spans 1,515 miles along Florida's coast, from Big Lagoon State Park in Pensacola to Fort Clinch State Park in Jacksonville. Segment 1, known as the Pensacola/Fort Pickens segment, is a 35-mile segment of the CT that links Big Lagoon State Park and the Navarre Beach Bridge, flowing along the Intracoastal Waterway. Big Lagoon offers paddlers a sandy padding launch to access the CT and is considered the trail's starting point. A kayak monument celebrates the CT at Big Lagoon, and a log book is provided to sign as paddlers begin their journey.

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.

Recreational Resource Elements

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

Land Area

Big Lagoon contains approximately 684 upland acres and 48 submerged acres of natural landscapes. The park's general topography is relatively flat. The

upland natural communities of this park include scrub, scrubby flatwoods, and mesic flatwoods. The wetland communities include wet flatwoods, basin swamp, Baygall and estuarine tidal marsh. The uplands are suitable for picnicking, camping, and hiking.

Tarkiln Bayou is nearly 4,000 acres of wet flatwoods, wet prairie, mesic flatwoods, sandhill, xeric hammock, baygall, seepage stream, estuarine tidal marsh, estuarine unconsolidated substrate, and maritime hammock communities. The majority of the property is classified as wetlands, making public access difficult. Several state-listed species are found on the property including large-leaved jointweed, white-topped pitcher plant, and Parrot pitcher plant.

Perdido Key is located on the Perdido Key barrier island, east of Pensacola in the westernmost portion of the state. The park is 247 acres of pristine beach dunes and white sand beaches in between resort condominiums and country clubs. Leisurely beach activities and picnicking draw visitors to the shores of the Gulf of Mexico.

Water Area

Big Lagoon contains three lakes within its boundaries. Grand Lagoon Lake, a saltmarsh lake on the southeast side; Long Pond, a flooded borrow pit located west of Grand Lagoon and south of the camping area; and another small man-made lake located near the southwestern boundary. Grand Lagoon Lake is relatively scenic in character, with extensive marsh vegetation and associated wildlife. A tidal creek connects this lagoon to Big Lagoon itself. Long Pond has a very regular shape, steeply sloping banks, and dark, tannin-stained water. Grand Lagoon Lake is attractive for paddling.

The water resources at Tarkiln Bayou Preserve west of Bauer Road include Perdido Bay and Tarkiln Bayou. This parcel is a peninsula, with Perdido Bay along its western and southern shoreline and the bayou within the center of the property. The bayou is one of the last remaining undeveloped bayous in Florida and can serve as an excellent resource for wildlife viewing. The bay can provide boating opportunities, as well as scenic locations for picnicking and tent camping activities. The property east of Bauer Road is poorly drained wet flatwoods, mesic flatwoods, wet prairies, and baygall natural communities where standing water is present much of the year. Much of this property is drained by three seepage streams that empty into Perdido Bay.

The emerald green waters of the Gulf of Mexico form the southern boundary of Perdido Key. These waters are ideal for shoreline fishing, swimming, surfing, and snorkeling. The Old River, along the northern boundary of the park, creates a physical barrier between Alabama and Florida. This waterway represents an area readymade for paddling opportunities.

Shoreline

Big Lagoon's primary recreational resources are its shorelines and access to the Intracoastal Waterway. The shoreline length of the park amounts to approximately 3.5 miles combined, two miles on Big Lagoon, and the remainder on Grand Lagoon Lake and Long Pond. Approximately half of the park's shorelines is sandy beach. The beach use areas are separated by marsh or pine scrub vegetation. The beach itself is a narrow, flat sandy shelf that provides safe swimming conditions. Pines and scrub oaks located nearby provide shaded rest areas. On the western side, approximately 150 feet off the boating area, lies the Intracoastal Waterway channel. When peak recreational use coincides with heavy barge traffic, the threat of hazardous conditions exists.

There are approximately five miles of shoreline within the boundary of Tarkiln Bayou. About two miles of shoreline along Perdido Bay are accessible to the boating public for beach recreation activities. Approximately 2.6 miles of shoreline along Tarkiln Bayou are within the state property's boundary. An additional 0.6 miles of bayou shoreline is outside the state boundary, but is within the Florida Forever project boundary. The acquisition of the remaining undeveloped land around the bayou is important to the protection of water quality in the bayou and in the surrounding critical habitat.

With some of the most picturesque beaches in the country, the Emerald Coast is frequented by both domestic and international visitors. Perdido Key State Park has over a mile and a half of shoreline for the enjoyment of beachgoers. The shoreline is the perfect setting for an idyllic day of picnicking with family or an afternoon of sunbathing.

Natural Scenery

Big Lagoon's visual resources are the views of the Big Lagoon from the beach use areas, and the views of the tidal marsh from the East Beach Use Area. When viewed from the north shoreline, Grand Lagoon also has some scenic qualities. In general, views from the shoreline have been negatively affected by barge traffic on the Intracoastal Waterway, and development on Perdido Key and along State Road 292.

The aesthetic qualities of the diverse natural communities at Tarkiln Bayou are outstanding. With the implementation of the Division's prescribed fire management program, the visual resources of the property will increase as the wet prairie and wet flatwood communities expand. Perdido Bay, Tarkiln Bayou, and the mosaic of sandhills, flatwoods and interspersed wetland communities provide dramatic vistas from several points in the park. In the spring, the beautiful wildflower displays in the wet prairie community will be an extraordinary visitor attraction. Scenery appreciation and opportunities for nature photography will be popular at this park in the future.

Significant Habitat

Piping plover habitat is located in and around the East Beach Use Area at Big Lagoon. This area is signed to reduce human-induced stress on the birds.

The entirety of Tarkiln Bayou should be considered significant wildlife habitat. The wet prairie communities support pitcher plants and other carnivorous plants, while the sandhill communities support gopher tortoise, rattlesnakes, and numerous other species. Dolphins, bald eagles, and ospreys can be seen hunting for food on the nearshore waters of Perdido Bay.

While the beach dunes and white sand beaches at Perdido Key attract visitors for recreational purposes, these natural communities are also vital habitat for imperiled species. Rising as tall as 25 feet, the beach dunes at Perdido Key State Park are invaluable nesting grounds and habitat for several shorebird and sea turtle imperiled species, as well as the endangered Perdido Key beach mouse.

Natural Features

Big Lagoon's significant natural features include both hydrological and vegetative elements. The most important natural feature, Big Lagoon, is also the park's primary visual resource. The upland natural communities, especially scrub, are of utmost regional importance, since the park is one of the few remaining areas in the region where these communities remain.

The most notable natural feature of Tarkiln Bayou is the wet prairie community, a vanishing example of one of the most diverse plant communities in the southeast. With its population of unique carnivorous plants, this community will serve as an excellent environmental education resource.

Archaeological and Historical Features

Big Lagoon contains 3 known cultural sites recorded in the Florida Master Site File. Sites range from prehistoric to historic 19th and 20th Century occupation or visitation. One of them is an artifact scatter/shell midden site that indicates at least a Woodland occupation of the area. The remaining cultural sites are non-significant and provide no recreational resources to the park.

Eleven cultural sites have been recorded at Tarkiln Bayou. These sites include evidence of prehistoric occupations and remains from old home sites and sites related to the naval stores industry. The probability of encountering additional unrecorded sites on the property is considered high. These cultural resources provide abundant opportunities for interpreting the rich history of this park and the surrounding region.

Perdido Key has been historically inhabited by different groups of Native Americans given its proximity to ecologically productive waters, and Spanish

explores came to the area in the 1600s. Although the area is steeped in the history of its earliest peoples, the park itself does not protect any known noteworthy archaeological resources.

Assessment of Use

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

Past Uses

Big Lagoon was purchased from the U.S. Army Corp of Engineers (ACOE) in the late 1970s. The ACOE constructed a series of ditches to manipulate the hydrology and drainage on the property presumably in conjunction with management of the adjacent Intracoastal Waterway. Sand was harvested from the property for a nearby bridge construction project on State Road 292.

Tarkiln Bayou Preserve derives its name from the Tarkiln Bayou, which empties into Perdido Bay. During the 1800s, the land that is now Tarkiln Bayou Preserve State Park was used to produce tar. Tar kilns were located on the adjacent peninsula to process the tar removed from southern yellow pines. Pine tar was an important resource for the maritime industry, and it was also used in the production of soaps and animal medicines. The property west of Bauer Road was previously planned as a residential subdivision but no development activities were completed prior to the purchase of the property by the State of Florida in April 1998.

Prior to state acquisition in 1978, Perdido Key was owned by the Department of Defense, and a portion of the park was once used as a Navy gunnery range. This property has also been used for beach and other shoreline activities.

Future Land Use and Zoning

The 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.

The parks fall into two future land use designations: Recreation and Conservation (Escambia County 2017). The Recreation designation includes public and private parks that provide active and passive recreation activities and amenities. Only residences and structures that are part of regular park maintenance and operations are allowed. The intent and purpose of the Conservation designation is for the conservation of important natural resources such as wetlands, marshes, and significant wildlife habitats. Non-conservation uses are severely limited to ensure the conservation of district resources and provisions of appropriate areas for public recreation. Non-residential uses within

the conservation district are limited to the activities that will have minimal impacts and where the educational benefits of the uses are determined to outweigh potential impacts. These designations are compatible with the mission of the DRP and will allow the continued use of the park for the conservation of natural resources and resource-based recreation opportunities.

Current Recreational Use and Visitor Programs

Big Lagoon offers swimming, fishing, picnicking, camping, hiking, bicycle riding, canoeing, kayaking and nature study. Two beach use areas and a boat launching area are available along Big Lagoon. The boat ramp provides access to the Intracoastal Waterway. The Governor's Pavilion and the amphitheater are available to the public by reservation and can accommodate large groups. Overnight accommodations include a 75-site camping area and a primitive group camping area.

Tarkiln Bayou is used for recreational activities such as picnicking, hiking, birding, fishing, and wildlife viewing. Among the most popular amenities is a boardwalk that runs from the trailhead to an observation deck at the shores of Tarkiln Bayou. This elevated boardwalk meanders through prairie, cypress, and titi forest. The Perdido Bay trail and the accessible Tarkiln Bayou trail are responsible for attracting many hikers and bikers to the park. Nature photography is very popular during the spring and fall wildflower displays. A small parking area, composting toilet and picnic shelter with an informational kiosk provides visitors a starting place to enjoy the park. Guided walks are offered seasonally and upon special request for groups. The First Day Hike is an annual event held at Tarkiln Bayou. It is intended to promote starting the year off with healthy habits. Staff lead the hike and share their knowledge of native plants found in the park.

The scenic beach dunes, white sand beaches, and emerald green waters of the Gulf of Mexico entice visitors to the shores of Perdido Key from the surrounding area and beyond. The park's proximity to Pensacola and the area's popularity with tourists are ingredients that make Perdido Key ripe for recreational use, especially uses related to beach activities. The park offers active and leisurely beach activities such as swimming, surfing, sunbathing, shoreline fishing, and wildlife viewing. In addition to beach-related recreation, covered picnic pavilions are provided for small group gatherings and a short hiking trail north of Perdido Key Drive meanders through the beach dunes.

In fiscal year (FY) 2016/2017, the parks recorded 308,659 visitors and contributed nearly $29.5 million in direct economic impact to the region, which is estimated to be the equivalent of adding 471 jobs to the local economy (FDEP 2017). The average campground occupancy rate for FY 16/17 at Big Lagoon was 71%, with upwards of 85% occupancy occurring in July, February, March, and April. The table (Table 8) below shows total visitors per year at each park between FY 07/08 to FY 16/17.

Table 8: Total Visitor Attendance FY 2007/2008 – FY 2016/2017			
Fiscal Year	**Big Lagoon**	**Tarkiln Bayou**	**Perdido Key**
2007/2008	184,727	5,669	38,484
2008/2009	191,773	5,557	34,508
2009/2010	176,124	4,068	31,133
2010/2011	153,149	3,684	25,337
2011/2012	167,664	5,765	26,511
2012/2013	205,099	7,480	25,413
2013/2014	209,761	7,647	28,619
2014/2015	164,616	8,335	31,005
2015/2016	150,204	22,246	31,208
2016/2017	156,452	49,555	102,652

Other Uses

A Gulf Power Company powerline easement traverses the western portion Big Lagoon, along State Road 292. A utilities corridor runs from the upper northeast corner of Tarkiln Bayou down to the central portion of the property along Sorrento Road. This utility corridor is also owned and managed by Gulf Power Company. Perdido Key contains a waterline easement and an underground powerline easement. The disturbance caused by both easements is confined to a narrow path that does not significantly detract from the natural conditions of the site. The Perdido Bay residential community, located north of State Road 292 from the gulf shoreline, owns a beach access easement through the park property. A boardwalk has been constructed in an effort to reduce trails through the beach dunes.

Protected Zones

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

At the parks, all wetlands and floodplain as well as known imperiled species habitat have been designated as protected zones. The park's current protected zone is delineated on the Conceptual Land Use Plan.

Existing Facilities

Big Lagoon

Picnicking facilities at Big Lagoon are available at the East Beach and West Beach Use Areas. A boat ramp is available for boating access to the Intracoastal Waterway. A paddling launch provides access to Big Lagoon for canoers, kayakers, and paddleboarders. An amphitheater provides a venue for interpretive programs and large functions. Camping is available in the family camping area and at a primitive group camp. Support facilities include the ranger station, shop area, staff residences, the park drive, and service roads (see Big Lagoon Base Map).

Tarkiln Bayou

Tarkiln Bayou Preserve currently consists of relatively few recreational facilities. A trailhead on the west side of Bauer Road provides a parking area that can accommodate roughly ten cars. The trailhead area also has a small picnic pavilion with two first-come, first-serve picnic tables and a composting restroom. The park's three existing trails can be accessed from the trailhead, with the Perdido Bay and Tarkiln Bayou trail to the west of Bauer Road and the Wet Prairie trail to the east. A paved, ADA-compliant walkway leads the Tarkiln Bayou trail to a boardwalk ending with an observation platform overlooking the scenic Tarkiln Bayou. The Perdido Bay trail takes visitors around the Tarkiln peninsula and showcases the park's sandhill and mesic flatwoods natural communities. There are currently no support facilities at TBPSP (see Tarkiln Bayou Base Map).

Perdido Key

On the north side of Perdido Key Drive, Perdido Key State Park offers a one-mile hiking trail that leads visitors between Old River to the north and beach dunes to the south. On the Gulf side of the park, several facilities are available for beachgoers at the park's two main day use areas: Perdido Key East and Perdido Key West. Between these two use areas, two boardwalks lead from Perdido Key Drive down to the beach. At Perdido Key East and West, park recreational facilities include two restrooms, two sets of boardwalks, and eight covered picnic pavilions. Additionally, each use area has a dedicated entrance station and parking area (see Perdido Key Base Map).

BIG LAGOON STATE PARK

N

0 250 500 1,000 Feet

Florida Department of Environmental Protection
Division of Recreation and Parks
Date of aerial: 2010

BASE MAP

TARKILN BAYOU PRESERVE STATE PARK

N

0 0.25 0.5 1 Mile

Florida Department of Environmental Protection
Division of Recreation and Parks
Date of aerial; 2010

BASE MAP

PERDIDO KEY STATE PARK

N

0 500 1,000 2,000 Feet

Florida Department of Environmental Protection
Division of Recreation and Parks
Date of aerial; 2010

BASE MAP

Big Lagoon Recreation Facilities

East Beach Use Area
Large picnic shelters (2)
Observation Tower
Boardwalk
Restroom
Parking (100 vehicles)

West Beach Use Area
Medium picnic shelters (4)
Playground
Governor's Pavilion
Restroom w/outside showers (1)
Parking (50 vehicles)

Boating Area
Boat ramp (2 lanes)
Medium picnic shelters (4)
Restroom
Parking (40 vehicles w/trailers)

Amphitheater Area
Amphitheater/Nature Center/Meeting Room
Small picnic shelters (4)
Restroom
Parking (100 vehicles)

Camping Area
Standard campsites w/ water (26)
Standard campsites w/electrical and water hook-ups (49)
Group Camp
Playgrounds (2)
Bathhouses (4)

Trails
Hiking/Nature Trails (5 mi.)
Trail shelters (3)

Big Lagoon Support Facilities

Park Entrance
Entrance station/Administrative office
Temporary office building
Ranger residence (3)

Parkwide
Park road (2.6 mi.)
Service roads (3 mi.)
Staff residences (5)

Shop Area
3-bay equipment shelter
Shop building
Equipment shed
Flammable storage

Tarkiln Bayou Recreation Facilities

Trailhead
Picnic Pavilion (Small)
Composting Restroom
Stabilized Parking Area

Trails
Hiking/Biking (7 miles)
Boardwalk (1,575 feet)
Observation Platform

Perdio Key Recreation Facilities

Perdido Key East Day Use Are
Picnic Pavilion – Small (4)
Restroom
Shower (2)

Perdido Key West Day Use Area
Picnic Pavilion – Small (4)
Restroom
Shower (2)

Trails
Hiking (1 mile)
Boardwalk (3,200 feet)

Perdido Key Support Facilities

Perdido Key East Day Use Area
Entrance Station
Parking Area (50 spaces)

Perdido Key West Day Use Area
Entrance Station
Parking Area (50 spaces)

Conceptual Land Use Plan

The following narrative represents the current conceptual land use proposals for the parks. The conceptual land use plan is the long-term, optimal development plan for the parks, based on current conditions and knowledge of the parks' resources, landscape and social setting (see Conceptual Land Use Plan). The conceptual land use plan is modified or amended, as new information becomes available regarding the park's natural and cultural resources or trends in recreational uses, in order to adapt to changing conditions. Additionally, the acquisition of new parkland may provide opportunities for alternative or expanded land uses. The DRP develops a detailed development plan for the park and a site plan for specific facilities based on this conceptual land use plan, as funding becomes available.

During the development of the conceptual land use plan, the DRP assessed the potential impact of proposed uses or development on the park resources and applied that analysis to determine the future physical plan of the park as well as the scale and character of proposed development. Potential resource impacts are also 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 investigated in greater detail.

Municipal sewer connections, advanced wastewater treatment or best available technology systems are applied for on-site sewage disposal. Creation of impervious surfaces is minimized to the greatest extent feasible in order to limit the need for stormwater management systems, and all facilities are designed and constructed using best management practices to limit and avoid resource impacts. Federal, state and local permit and regulatory requirements are addressed during facility development. 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, 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 parks.

The existing recreational activities and programs of this state park are appropriate to the natural and cultural resources contained in the park and should be continued. New and improved activities and programs are also recommended and discussed below.

Objective: Maintain Big Lagoon's current recreational carrying capacity of 3,486 users per day.

The existing recreational opportunities at Big Lagoon will continue to be maintained to accommodate the current level of visitation to the park. These recreational activities include camping, hiking and biking, paddling, wildlife viewing, nature study, picnicking, boating, and swimming. Necessary repairs and renovations will be made to ensure a high-quality recreational experience.

Objective: Maintain Tarkiln Bayou's current recreational carrying capacity of 296 users per day.

The park will continue to provide the recreational opportunities currently available to visitors. The seven miles of hiking and biking trails will continue to be maintained, along with the boardwalk and observation platform that is popular for wilding viewing and nature study. Visitors will continue to be able to picnic at the designated picnic pavilion or along the shoreline in the western portion of the Tarkiln peninsula.

Objective: Maintain Perdido Key's current recreational carrying capacity of 840 users per day.

As stated above, most of the park's recreational use revolves around beach activities. Along with other activities such as hiking, picnicking, and wildlife viewing, Perdido Key State Park will continue to offer recreational activities that capitalize on the natural resources of the iconic Gulf Coast and the white sand beaches that draw domestic and international visitors to Perdido Key. The facilities that are used to provide these recreational services will be repaired and improved, if necessary.

Objective: Expand Big Lagoon's recreational carrying capacity by 220 users per day.

Two areas of the park will be enhanced in order to allow for additional recreational opportunities. The boat ramp area will be expanded with a second boat ramp and additional parking. In addition to the boat ramp expansion, a fishing platform should be developed at the picnic area adjacent to the boat ramp. The second area that will be enhanced is the campground area. A large screened pavilion will be constructed in the group camp area of the campground. This addition will allow for large groups to utilize this portion of the family campground area.

Objective: Expand Tarkiln Bayou's recreational carrying capacity by 302 users per day.

In order to expand recreational opportunities at the park, new use areas will be created to incorporate activities not currently available at TBPSP. Two camping areas should be developed: one near the beach area in the western portion of the Tarkiln peninsula and another in a portion of the park adjacent to Sorrento Road. The camping area on the Tarkiln peninsula will consist of tent-only, primitive campsites, while the Sorrento Road camping area will be a primitive group camping area. In addition to these overnight use areas, the park's trail network should be expanded and additional picnicking facilities should be considered.

Objective: Expand Perdido Key's recreational carrying capacity by 68 users per day.

An additional recreational facility will be added to the northern portion of the park in order to expand the park's recreational carrying capacity. This facility will be located near the existing service entrance, north of the Perdido Key Chamber of Commerce and fire station, and will provide access for paddling and fishing on the Old River.

Objective: Continue to provide the current repertoire of 19 interpretive, educational, and recreational programs on a regular basis at the parks.

Big Lagoon will continue to offer interpretive, education, and recreational programs that highlight the unique aspects of Big Lagoon State Park. Programs include interpretive panels and kiosks, as well as park staff-led educational tours and special events. These interpretive panels and kiosks display park-specific information on topics such as imperiled species, habitat composition, prescribed fire resource management, and recreational activities.

Interpretive programs at Tarkiln Bayou currently include interpretive panels and kiosks displaying information on birding and wildlife viewing opportunities, along with the several imperiled species that utilize park property as crucial habitat. Interpretive information on the park's rare pitcherplant populations and

the importance of prescribed burning for the park's ecosystem are also available for visitors. These interpretive programs will continue to be maintained at the park. Ranger-led tours of the park will also be provided upon request.

Currently, Perdido Key offers interpretive panels that are displayed at the restrooms as visitors make their way toward the beach on the boardwalks. These interpretive panels educate visitors on the imperiled species that utilize the park for critical habitat and inform beachgoers on the danger of strong rip currents. The DRP intends to continue to display this interpretive material and will update the panels, if necessary.

Objective: Develop new interpretive, educational and recreational programs.

As will be described in the next section, the development of a living shoreline to reduce shoreline erosion to the west of the boat ramp area is proposed at Big Lagoon. Along with this development, interpretive material and displays should be produced to describe the purpose and benefits associated with the establishment of a living shoreline. Although other locations will also be considered, it is suggested that this interpretive display should be placed in the picnic area to the east of the boat ramp.

This plan calls for the expansion of Tarkiln Bayou's trail network, and as such, interpretive material should be produced to map any new trails that are developed. Trail pamphlets or an interpretive display at the park's trailhead should be made available for hikers and bikers. The development of camping opportunities is also being suggested. With these new overnight use areas, interpretive information on "pack in, pack out" principles and other camper responsibilities should be displayed in the camping areas.

Two new interpretive displays to be developed at Perdido Key State Park. The interpretive displays should be located at the entrance to the two middle boardwalks that extend from Perdido Key Drive to the Gulf shoreline. Interpretive material to be included should explain the "lights out" concept and the detrimental impact of light pollution on nesting sea turtles. Other material encouraging visitors to keep the beach clean and displaying the beach's fishing rules should also be included.

Proposed Facilities

Capital Facilities and Infrastructure

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

Development projects at Big Lagoon are largely geared toward renovating and repairing existing facilities, as well as supplementing the support facilities for park staff. The most notable of the projects will be the redevelopment of the

boat ramp area. This redevelopment will include the expansion of the boat ramp and the improvement of traffic circulation and parking. Projects that are proposed for the boat ramp, campground, and support areas will be described below.

According to the 2013 SCORP report, there is a demand for tent camping facilities in the Northwest region. Given the natural community types at the park and the proximity to RV camping facilities at Big Lagoon State Park, Tarkiln Bayou is an excellent candidate for primitive tent camping facilities. In addition to providing tent camping opportunities, a primitive group camp area that can be reserved for extracurricular groups or family gatherings should also be considered. The vision for the park also includes expanding the trail network in order to encourage connectivity with Escambia County's trail efforts and provide recreational opportunities in the underutilized eastern portion of TBPSP. Lastly, the development of additional recreational facilities and the intensive resource management that takes place at the park warrants the construction of a support area for park staff to adequately address visitor services and resource management needs.

Given the sensitive natural communities found at Perdido Key, the development concept for the park mainly focuses on improving and renovating existing facilities, while also incorporating one new use area. The beach-related facilities on the Gulf side of the park are subject to damaging impacts from saltwater and sand. As such, the facilities in the Perdido Key East and West day use areas are in need of repairs and/or renovations that go beyond normal maintenance. Bicycle facilities in these areas will also help realize Escambia County's vision of developing Perdido Key in a pedestrian and bicycle-friendly manner. Lastly, a new use area north of the Perdido Key Chamber of Commerce will provide access to Old River for fishing and paddling.

The existing facilities of these state parks 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, to improve the protection of park resources, and to streamline the efficiency of park operations. The following is a summary of improved and new facilities needed to implement the conceptual land use plan for each park:

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

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 3 existing facilities and 3 miles of road at Big Lagoon.

Major repair projects for park facilities may be accomplished within the ten-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).

Boat Ramp Area

Expansion and improvement of the boat ramp area at Big Lagoon State Park is the main land use project associated with this 10-year planning update. The development concept for the boat ramp is to add a second boat ramp, expand parking, and improve traffic circulation. Approximately 100 boat and trailer spaces will be added, as well as 20 traditional car parking spaces. In order to mitigate stormwater runoff from the increased impervious surface, stormwater ponds and swales will be included in the design of the new boat ramp area. A new restroom will be constructed, and ADA parking spaces will be available adjacent to this structure.

Along with this redevelopment, two additional projects in the areas adjacent to the boat ramp will be considered. On the western side of the boat ramp, the establishment of a living shoreline is proposed. A living shoreline is a shoreline stabilization technique that is intended to dampen incoming wave energy and thereby reduce shoreline erosion. As opposed to traditional techniques that utilize concrete or other impervious surfaces, living shorelines are developed using native vegetation and soft materials that are meant to absorb rather than deflect energy. In addition to the benefits associated with reduced shoreline erosion, living shorelines also provide additional habitat for wildlife.

On the eastern side of the boat ramp in the picnic area, the construction of a fishing platform is proposed. The inclusion of a fish cleaning station should also be considered. Given that there is no proposed public access on the western side of the boat ramp, an interpretive panel or kiosk describing the concept of living shorelines should be developed near the fishing platform. This interpretive information should describe the reasoning behind the need for living shorelines, as well as the associated benefits for the park and wildlife.

Campground

The existing campground currently accommodates 75 electric campsites in 4 loops. In order to improve traffic circulation and safety in the campground, the layout of the campground should be redesigned. A study of the area will need to be conducted to determine potential alternative campground layouts. Some campsites, particularly those in the southeast corner of the campground, are subject to flooding. As such, safe traffic circulation and flooding alleviation should be the main priorities for the campground redesign. In addition to this redesign, the electrical systems at the campsites should be upgraded and increasing the vegetative buffer between sites should be explored.

In loop 4 of the campground, two projects are proposed. First, the addition of a large screened pavilion should be considered. This loop is mostly used for group

camping, and the addition of a screened pavilion will provide a covered recreational asset for group activities and shelter in the event of inclement weather. The other project in this area of the park is to construct an emergency exit road on the north side of loop 4 that will connect with main park road. A non-stabilized path currently exists, and it is suggested that this path be paved to allow for cars and RVs to exit here, in case of emergency, instead of having to drive around the entire campground loop.

Support Areas

The park manager and staff that manage Big Lagoon State Park also manage Tarkiln Bayou Preserve State Park and Perdido Key State Park. Among these three parks, Big Lagoon is the headquarters and houses all of the resource management equipment for the parks. As such, the shop area at Big Lagoon State Park is in need of additional storage and work facilities. For this area, a four-bay storage facility and flammable storage are proposed for construction during the 10-year planning cycle, and the existing pole barn will need to be replaced. Other buildings, such as the shop and residences, should be renovated given the structures' age and deteriorating conditions.

Another support area that will need attention during this planning cycle is the park entrance. The entrance road frequently experiences flooding events and measures should be taken to alleviate this issue. An engineering study should be conducted to determine the best possible alternative, and the installation of box culverts should be considered. In order to protect the facility from flooding, the entrance station should be moved to another location or the building itself should be elevated. These redesign and redevelopment efforts will be contingent upon the recommendations provided by the engineering study.

Lastly, a bridge will need to be constructed in the southwestern corner of the park. This area is accessed by a stabilized, park staff-only road and contains the assistant park manager residence and a storage facility. Extending from the basin swamp north of this area, a canal flows south into Big Lagoon and cuts off the residence from the stabilized park road. This forces park staff to have to go out the main park entrance and drive around the northern and western park boundary in order to access this area from the gate at the southwest corner of the property. As such, a bridge should be constructed to cross this canal, allowing park staff to access the residence and storage area without having to drive outside the park property.

Objective: Improve/repair 1 existing facility and 1 mile of road at Tarkiln Bayou.

Trailhead

The trailhead area at TBPSP currently has a parking area that can accommodate approximately ten cars. This parking area can be overcrowded, especially on the weekends. Given the expanded recreational opportunities that are proposed

in this plan, the parking area should be expanded to accommodate 20-25 cars. Additionally, bicycle facilities such as bike racks should also be added to the trailhead.

Northern Park Boundary

Along the northern boundary of the park, an unstabilized park road runs parallel to the Perdido Bay trail. This road frequently floods and becomes impassable. In order to allow maintenance, resource management, and emergency services, the road should be stabilized and low water crossings should be installed where it is deemed necessary.

Objective: Improve/repair 2 existing facilities at Perdido Key.

Major repair projects for park facilities may be accomplished within the ten-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 within the park.

Perdido Key East and West Day Use Areas

Each of the day use areas on the Gulf side of Perdido Key State Park consist of the same facilities, which have been subject to the same deteriorating impacts that beach environments can cause. The restrooms at Perdido Key East and West are considerably weathered and should be replaced with new restroom facilities. Boardwalk renovations should be a priority at the park, with ADA-compliance as a specific goal of renovation. In order to reduce the current footprint of the boardwalks, the outside arms can be removed and the creation of a single entrance point through the central boardwalk can be established. Finally, bike racks should be added to the parking areas to aid Escambia County in their efforts to make Perdido Key more pedestrian and bicycle-friendly.

Objective: Construct 4 new facilities, 5 miles of trail, and 1 mile of road at Tarkiln Bayou.

Beach Day Use Area

At the northwest corner of the park along Perdido Bay, a beach day use area should be established. The shoreline in this area is frequently used by boaters as a place to pull up and picnic along the shore. A small use area should be developed in this area to provide visitors with picnicking and interpretive opportunities. The beach day use area should include two small picnic pavilions, an interpretive kiosk, and two bike racks.

Primitive Tent-Camping Area

South of the proposed beach day use area, a primitive camping area is proposed to be located in the area on the interior of the Perdido Bay trail. This primitive camping area is meant to encourage a wilderness camping experience, and the campsites will be hike-in only. There should be up to 10 tent-only primitive campsites developed. A composting restroom should also be constructed in an area where the facility can also be utilized by visitors to the beach day use area.

Primitive Group Camp Area

Given the relatively few group campsites in the local area, it was determined that a primitive group camp area should be developed at TBPSP. The primitive group camping area would be able to be reserved and could be used by groups such as extracurricular youth groups, outdoor associations, or family gatherings. This camping area would be located in the portion of the park adjacent to Sorrento Road, east of the intersection with Bauer Road. Amenities that would accompany the development of a primitive group camp area should be a stabilized road from Sorrento Road, medium-sized screened pavilion, waterline, composting restroom, and fire circle.

Trails

This plan calls for expanding the hiking and biking trail network at the park by up to five miles. Trail expansion will create new recreational opportunities for visitors in the surrounding communities. In the event that the primitive group camp area is developed, the new trails will extend to this camping area to provide the campers with hiking and biking opportunities. Additionally, an expanded trail network with allow the park to create connectivity with local trail development efforts. To the east of the park property, the Jones Swamp Wetland Preserve and Southwest Greenway has been established by Escambia County. In addition to natural community restoration efforts, this greenway is intended to provide a 15-mile walkable trail upon completion. The DRP would like to work with Escambia County to create a recreational greenway that extends from its current location and travels through TBPSP onto Big Lagoon State Park and beyond. The acquisition of parcels identified in the optimum boundary below would allow for the greenway to be extended through the park property.

Support Area

Tarkiln Bayou Preserve State Park, Big Lagoon State Park, and Perdido Key State Park are all managed and maintained by the same park staff. At TBPSP, the proposed increase in recreational facilities and resource management needs warrant the development of a support area. This area should be located north of the existing trailhead and should include a ranger residence, shop, and storage facilities.

BIG LAGOON STATE PARK

N

0 250 500 1,000 Feet

Florida Department of Environmental Protection
Division of Recreation and Parks
Date of aerial; 2011

CONCEPTUAL LAND USE PLAN

Legend

- Park Boundary
- Existing Trails
- Existing Boardwalk
- Proposed Facilities
- Protected Zone

Beach Day Use Area
Picnic Pavilion (2)
Interpretive Kiosk
Bike Rack (2)

Primitive Camping Area
Tent-only Campsites (up to 10)
Composting Restroom

Northern Boundary
Stabilized Park Road
Low Water Crossings

Entrance Area
Expand Parking
Small Restroom
Ranger Residence
Shop
Storage

Trails
Hiking/Biking (Up to 5 miles)

Primitive Group Camp Area
Screened Pavilion (Medium)
Composting Restroom
Fire Circle
Waterline

Tarkiln Bayou

Perdido Bay

Tarkiln Bay

bing™

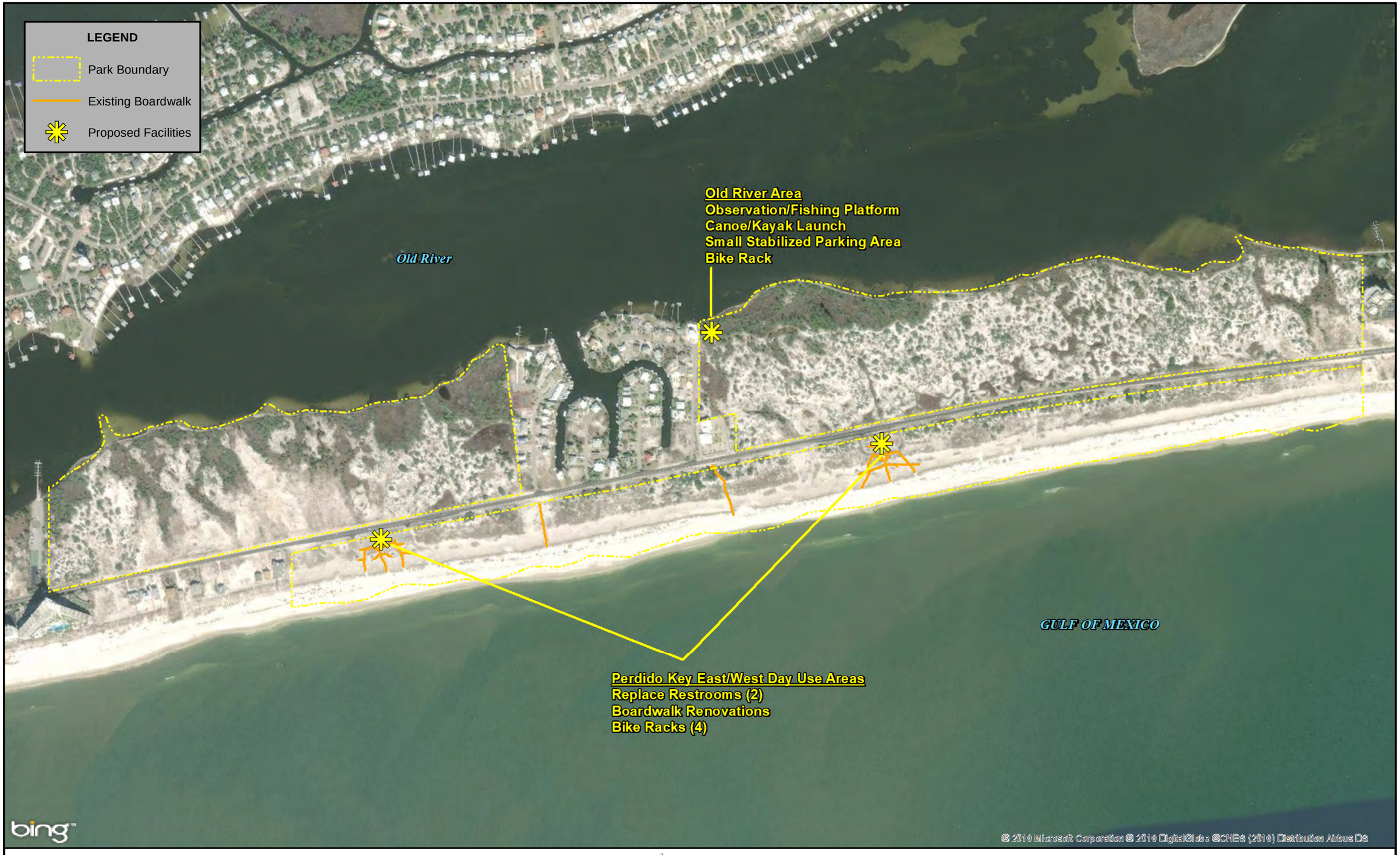
TARKILN BAYOU PRESERVE STATE PARK

N

0 0.25 0.5 1 Miles

Florida Department of Environmental Protection
Division of Recreation and Parks
Date of aerial; 2011

CONCEPTUAL LAND USE PLAN



PERDIDO KEY STATE PARK

N

0 500 1,000 2,000 Feet

Florida Department of Environmental Protection
Division of Recreation and Parks
Date of aerial; 2011

CONCEPTUAL LAND USE PLAN

Objective: Construct 1 new facility at Perdido Key.

Old River Area

The area of the park north of Perdido Key Drive is relatively underutilized, with a one-mile nature trail as the only recreational facility. In an effort to provide access to the Old River, a new use area should be created in the portion of the park due north of the Perdido Key Chamber of Commerce. The newly created use area should include a canoe and kayak launch, as well as an ADA-accessible observation platform that doubles as a fishing platform. Along the park boundary, a small stabilized parking area should be developed to accommodate 2-3 cars.

Facilities Development

Preliminary cost estimates for these recommended facilities and improvements are provided in the Ten-Year Implementation Schedule and Cost Estimates (Table 10) located 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:

Big Lagoon Proposed Recreation Facilities

Boat Ramp Area
Add second boat ramp
Expand parking
Improve traffic circulation
New restroom
Add fishing platform
Develop living shoreline

Campground
Redesign campground layout
Upgrade campsites
Add screened pavilion
Construct emergency exit road

Big Lagoon Proposed Support Facilities

Park Entrance
Re-engineer entrance road
Install box culverts
Elevate entrance station

Residence Area
Construct bridge

Shop Area
Add four-bay storage
Renovate shop building
Replace pole barn
Add flammable storage
Renovate residences

Tarkiln Bayou Proposed Recreation Facilities

Trailhead
Expand Parking Area
Bike Rack (2)

Primitive Tent-Camping Area
Tent-only Campsites (up to 10)
Composting Restroom

Trails
Hiking/Biking (up to 5 miles)

Beach Day Use Area
Picnic Pavilion (2)
Interpretive Kiosk
Bike Rack (2)

Primitive Group Camp Area
Screened Pavilion (Medium)
Composting Restroom
Fire Circle
Waterline

Tarkiln Bayou Proposed Support Facilities

Support Area
Ranger Residence
Shop
Storage

Northern Park Boundary
Stabilized Park Road
Low Water Crossings

Perdido Key Proposed Recreation Facilities

Perdido Key East Day Use Area
Replace Restroom
Boardwalk Renovations
Bike Rack (2)

Perdido Key West Day Use Area
Replace Restroom
Boardwalk Renovations
Bike Rack (2)

Old River Area
Observation/Fishing Platform
Canoe/Kayak Launch
Small Stabilized Parking Area
Bike Rack

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 9). When developed, the proposed new facilities would approximately increase the unit's carrying capacity as shown in Table 9. DRP’s recreational carrying capacity guidelines can be found in addendum 10.

Table 9 - Recreational Carrying Capacity						
	Existing Capacity*		Proposed Additional Capacity		Estimated Recreational Capacity	
Activity / Facility	One Time	Daily	One Time	Daily	One Time	Daily
Big Lagoon State Park						
Camping						
Standard	600	600			600	600
Group	60	60			60	60
Picnicking						
Governor's Pavilion	250	250			250	250
West Beach	32	128			32	128
East Beach	48	192			48	192
Boat Ramp	40	160			40	160
Amphitheater	64	256			64	256
Swimming						
West Beach	240	480			240	480
East Beach	300	600			300	600
Boating	200	200	200	200	400	400
Hiking	40	160			40	160
Fishing	40	80	10	20	50	100
Canoe / Kayaking	10	20			10	20
Amphitheater	300	300			300	300
TOTAL	**2,224**	**3,486**	**210**	**220**	**2,434**	**3,706**
Tarkiln Bayou Preserve State Park						
Trails						
Hiking/Biking	70	280	50	200	120	480
Picnicking	8	16	16	32	24	48
Camping						
Primitive (Tent-only)			40	40	40	40
Group Camp			30	30	30	30
TOTAL	**78**	**296**	**136**	**302**	**214**	**598**
Perdido Key State Park						
Beach / Swimming	400	800			400	800
Trails						
Hiking	10	40			10	40
Boating						
Canoe/Kayak			30	60	30	60
Fishing			4	8	4	8
TOTAL	**410**	**840**	**34**	**68**	**444**	**908**

*Existing capacity revised from approved plan according to DRP guidelines

Optimum Boundary

The optimum boundary map reflects lands considered desirable for direct management by the DRP as part of the state park. These parcels may include public or privately owned land that would 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. Parklands that are potentially surplus to the management needs of DRP are also identified. As additional needs are identified through park use, development, and research, and as land use changes on adjacent property, 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.

Big Lagoon

At Big Lagoon, one parcel has been identified on the optimum boundary map for potential acquisition. This parcel is adjacent to the southwest corner of the Big Lagoon State Park, in between the park boundary and State Road 292. This portion of the park is where the assistance park manager residence is located, and acquisition of this parcel would allow park staff to access the park without having to go through the main entrance. In addition, this access point could act as an additional exit in case of emergency.

Tarkiln Bayou

There are several parcels, totaling over 2,000 acres, that have been identified for the optimum boundary of Tarkiln Bayou. The parcels that have been identified for potential acquisition will help park staff achieve resource management goals, improve habitat connectivity, and create connections with other managed conservation lands. The acquisition of outparcels in the eastern portions of the park would ensure habitat connectivity and provide park staff with additional points of access for resource management purposes. Furthermore, the parcels identified to the northeast of TBPSP would allow the DRP to work with Escambia County to complete a 15-mile greenway extending from the highly urbanized fringes of the City of Pensacola through TBPSP and then onto Big Lagoon State Park and Perdido Key State Park.

Perdido Key

There are two parcels that have been identified on the optimum boundary for Perdido Key. These parcels are adjacent to the eastern boundary of the park and total approximately 8 acres, with 3 acres on the north side of Perdido Key Drive and 5 acres to the south along the Gulf of Mexico. The parcel to the south of Perdido Key Drive currently has concrete driveways with no structures on the lot, and adding this parcel to the park property would allow the DRP to restore the land to its original natural communities. Acquiring the parcel to the north would extend the park boundary to the intersection of Perdido Key Drive and River Road and assist in the protection of the park's existing natural communities.

There are no lands at any of the parks that are considered surplus to the parks' management needs

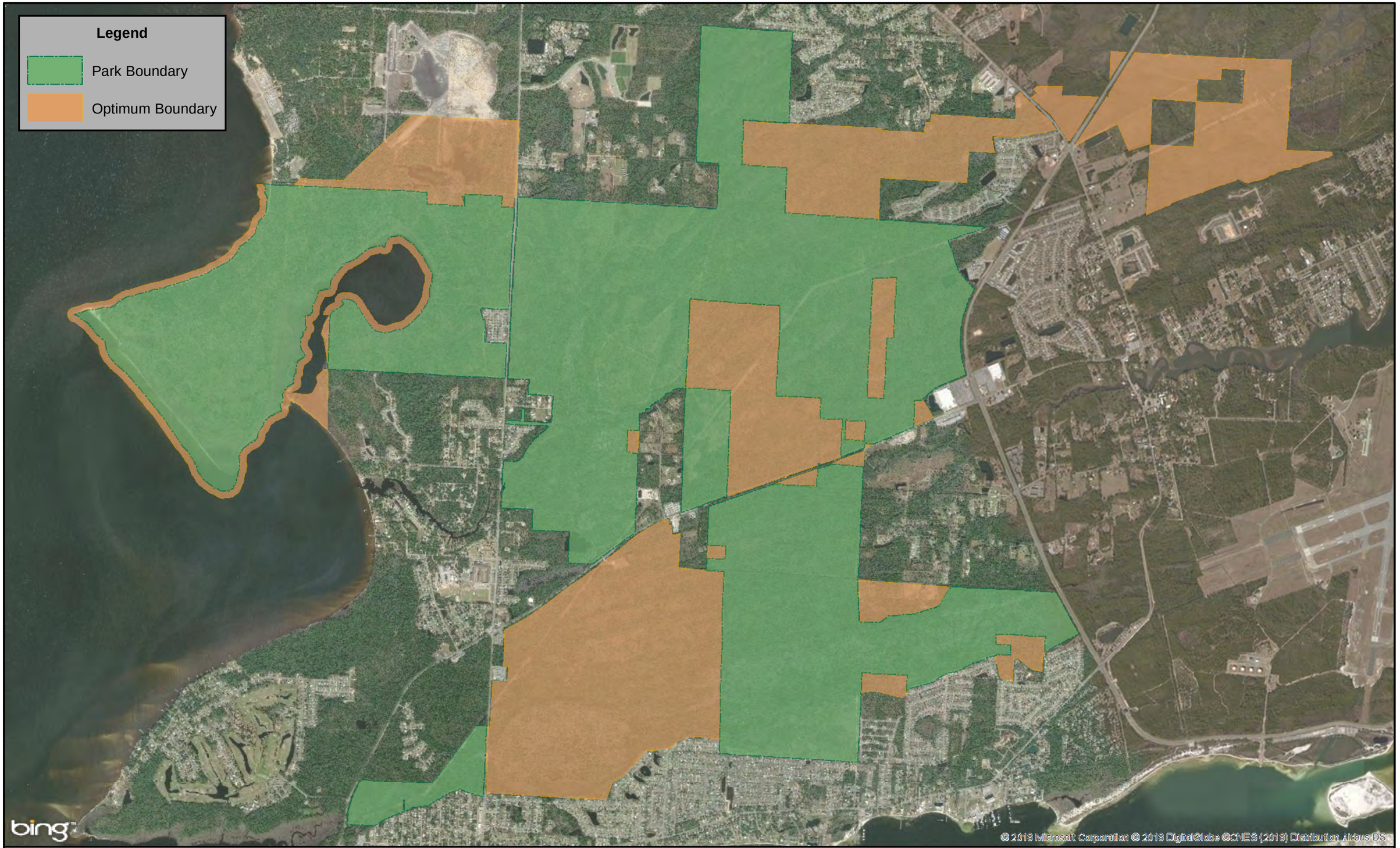
BIG LAGOON STATE PARK

N

0 250 500 1,000 Feet

Florida Department of Environmental Protection
Division of Recreation and Parks
Date of aerial; 2010

OPTIMUM BOUNDARY MAP



TARKILN BAYOU PRESERVE STATE PARK

N

0 0.25 0.5 1 Mile

Florida Department of Environmental Protection
Division of Recreation and Parks
Date of aerial; 2011

OPTIMUM BOUNDARY MAP

PERDIDO KEY STATE PARK

N

0 500 1,000 2,000 Feet

Florida Department of Environmental Protection
Division of Recreation and Parks
Date of aerial; 2010

OPTIMUM BOUNDARY MAP

183IMPLEMENTATION COMPONENT

The resource management and land use components of this management plan provide a thorough inventory of the parks' natural, cultural and recreational resources. They outline the parks' 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 parks 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 the parks. 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 plans for Big Lagoon State Park, Tarkiln Bayou Preserve State Park, and Perdido Key State Park in 2006, significant work has been accomplished and progress made towards meeting the DRP's management objectives for the park. These accomplishments fall within categories that encompass the mission of the park and the DRP.

BIG LAGOON STATE PARK

Park Administration and Operations

- During the last ten years, park volunteers contributed over 93,000 hours of volunteer service.
- The park's Citizen Support Organization (CSO), Friends of Pensacola State Parks, has provided the park with:
    - A UTV and ATV for prescribed fire operations.
    - Designed and purchased interpretive signs.
    - Provided materials and tools to rebuild a boardwalk in the campground.

Resource Management

Natural Resources

Prescribed Fire Accomplishments (Acres Burned)

FY2016-2017: 128 acres	FY2011-2012: 41 acres
FY2015-2016: 145 acres	FY2010-2011: 95 acres
FY2014-2015: 69 acres	FY2009-2010: 61 acres
FY2013-2014: 145 acres	FY2008-2009: 68 acres
FY2012-2013: 79 acres	FY2007-2008: 44 acres

Total acres burned since 2007: 875 acres

Exotic Plant Species Removal Since 2011 (Acres Removed)
70.23 acres

Recreation and Visitor Services

- Installed electric gates
- New TV in camper registration area for weather reports and interpretive opportunities
- Improved signage to and from interior trails – mile markers, directional signs, trail heads
- New dump station septic system
- Enlarged and releveled selected campsites
- Poured concrete pads for selected campsites
- Added information displays on all campground restroom buildings
- Rebuilt the interpretive kiosk in campground loop 1
- Added oversized grill for group campers
- Installed flagpole in youth camp
- Installed new clothes line posts in campsites
- Added a summer concerts series
- Updated the outdoor showers for day use areas at East and West Beaches
- Removed old car park stops and replaced with new stops in approximately 100 spaces
- Painted numerous buildings and state residences
- Installed new lights for Governor's Pavilion after hours rentals
- Upgraded park electrical systems from 100-amp fuses to breaker panels
- Installed/replaced ADA faucet and handles in restrooms
- Cleared and replaced park boundary fencing along the new neighborhoods
- Repaired/replaced the Governor's Pavilion grill
- Replaced the outdoor stage at Amphitheater
- Installed new signage - Florida Circumnavigation Saltwater Paddling Trail
- Reworked the kayak launch area at East Beach
- Installed new shorebird signage at East Beach
- Installed new birding trail signage
- Remodeled the roof and shingled the addition for the camper registration lobby area
- Created new educational outreach programs (puppet shows)

Park Facilities

- Repaved the entrance road
- Graveled the office parking lot
- Installed solar-powered camp restrooms
- Upgraded camp restroom interiors in campground loop 1 and 2
- Upgraded ADA interior and exterior access to campground loop 1 and 3
- Re-decked ADA access in campground loop 1
- New septic systems in campground loop 2 and 4
- Rebuilt the Long Pond trail boardwalk

- Built boardwalk extension for the West Beach day use area
- Replaced worn-out and broken pilings for bridges at East Beach
- Re-roofed Park Manager residence
- Installed new energy efficient windows in state residences

TARKILN BAYOU PRESERVE STATE PARK

Acquisition

- 26 acres transferred management authority from State Lands.

Park Administration and Operations

- The park's Citizen Support Organization (CSO), Friends of Pensacola State Parks, has provided the park with:
    - A UTV and ATV for prescribed fire operations.
    - Designed and purchased interpretive signs.

Resource Management

Natural Resources

- 1,434 acres treated for exotic plants.
- TARP funds provided through FFS for widening WUI firelines of 6.5 miles by 40 – 80 feet.
- Two bat boxes installed per guidance of FWC and have been maintained.
- Provided protection for park by placing 1.39 miles of fencing along perimeter sections east of Bauer.
- Protected shoreline from oiling during 2010 Macondo oil spill with Escambia county.
- Applied for multiple grants for NRDA and RESTORE act funding totaling $1.681 million by partnering with CSO and GCPEP/Longleaf Alliance, LLC.

Cultural Resources

- There are two new cultural sites recorded.
- All sites surveyed and evaluated in 2010 by NRDA funded contractor.

Recreation and Visitor Services

- Extended ADA accessible sidewalk 0.6 miles from Starter Kit to existing Tarkiln Bayou overlook boardwalk system.

Park Facilities

- The southwest boundary line was widened and stabilized for 4,800 feet.

PERDIDO KEY STATE PARK

Park Administration and Operations

- The park's Citizen Support Organization (CSO), Friends of Pensacola State Parks, has provided the park with:
    - Help during beach cleanup events
    - Designed and purchased interpretive signs
    - Assisted on the rebuilding of boardwalks
- The CSO has also helped with sea turtle and shore bird monitoring

Resource Management

Natural Resources

- 22.7 acres treated for exotic plants
- 207 exotic animals were removed from the park, including feral cat, fox and coyote
- Monitoring on the Perdido Key Beach Mouse was increased and showed an increase in total numbers
- Obtained "Dark Sky" lighting survey within 1000 feet of park boundary
- Obtained funding through NRDA to retrofit lighting
- Worked with Escambia County on lighting retrofits for county-run properties

Cultural Resources

- Worked with the Department of Defense on bomblet disposal

Recreation and Visitor Services

- Designed and purchased two signs for bathhouse for natural and historical interpretation
- Worked with Escambia County to prepare for future multi-use trail on Perdido Key Drive.

Park Facilities

- Eight new pavilions were built
- Two new restrooms were built
- Two new toll buildings were built
- Road repairs/repaving
- All new boardwalks were built
- Traffic counters were replaced

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 10) summarizes 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, several 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 the 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 the 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 the DRP's annual legislative budget requests. When preparing these annual requests, the 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, the DRP pursues supplemental sources of funds and staff resources wherever possible, including grants, volunteers and partnerships with other entities. The 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 10 may need to be adjusted during the ten-year management planning cycle.

Table 10
Big Lagoon State Park, Tarkiln Bayou Preserve State Park, Perdido Key State Park
Ten-Year Implementation Schedule and Cost Estimates
Page 183

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	**$187,100**
Objective B	**Expand administrative support as new lands are acquired, new facilities are developed, or as other needs arise.**	Administrative support expanded	C	**$13,250**
Goal II: Protect water quality and quantity in the parks, 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 assessments of the parks' hydrological restoration needs.**	Assessment conducted	LT	**$106,000**
Objective B	**Restore natural hydrological conditions and function to approximately 1.5 acres of basin swamp at Big Lagoon.**	# Acres restored or with restoration underway	UFN	**$57,000**
Objective C	**Restore natural hydrological conditions and function to approximately 155 acres of shrub bog, wet flatwoods, and wet prairie at Tarkiln Bayou.**	# Acres restored or with restoration underway	UFN	**$689,800**
Objective D	**Restore natural hydrological conditions and function to approximately 3.1 acres of coastal interdunal swale at Perdido Key.**	# Acres restored or with restoration underway	UFN	**$5,000**
Goal III: Restore and maintain the natural communities/habitats of the parks.		**Measure**	**Planning Period**	**Estimated Manpower and Expense Cost* (10-years)**
Objective A	**Within 10 years, have 3,980 acres of Big Lagoon and Tarkiln Bayou maintained within optimal fire return interval.**	# Acres within fire return interval target	LT	**$1,249,800**
Objective B	**Conduct habitat/natural community restoration activities on variable acres of spoil area at Big Lagoon.**	# Acres improved or with improvements underway	LT	**$12,000**
Objective C	**Conduct habitat/natural community restoration activities on 250 acres of shrub bog and wet prairie natural communities at Tarkiln Bayou.**	# Acres restored or with restoration underway	LT	**$3,006,400**
Objective D	**Conduct habitat/natural community restoration activities on up to 59.2 acres of beach dune natural community after major impacts from tropical storms at Perdido Key, as needed.**	# Acres restored or with restoration underway	LT	**$65,000**
Objective E	**Restore motor exclusion area by reestablishing buoy markers at Big Lagoon**	# Acres improved or with project underway	LT	**$57,600**
Objective F	**Prevent the use and creation of unauthorized trails from SR 292 to the beach at Perdido Key.**	# Acres improved or with improvements underway	C	**$2,000**

* 2018 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 10
Big Lagoon State Park, Tarkiln Bayou Preserve State Park, Perdido Key State Park
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 IV: Maintain, improve or restore imperiled species populations and habitats in the parks.		Measure	Planning Period	Estimated Manpower and Expense Cost* (10-years)
Objective A	**Update baseline imperiled species occurrence inventory lists for plants and animals, as needed.**	Updated List	C	**$33,400**
Objective B	**Monitor and document 18 selected imperiled animal species in the parks.**	# Species monitored	C	**$147,400**
Objective C	**Monitor and document 13 selected imperiled plant species in the parks.**	# Species monitored	C	**$33,400**
Objective D	**Reintroduce the Flatwoods Salamander at Tarkiln Bayou.**	# of individuals introduced	LT	**$42,000**
Objective E	**Work with local agencies to prevent light pollution from impacting nesting sea turtles, nesting shorebirds, and the Perdido Key beach mouse.**	Project-specific quantity, eg. # of next boxes, # of individuals introduced or translocated, etc.	C	**$10,000**
Objective E	**Work with USFWS and FWC to augment the population of the Perdido Key beach mouse within the park, or translocated individuals out of the park to sustain the species.**	Project-specific quantity, eg. # of next boxes, # of individuals introduced or translocated, etc.	C	**$25,000**
Goal V: Remove exotic and invasive plants and animals from the parks and conduct needed maintenance-control.		**Measure**	**Planning Period**	**Estimated Manpower and Expense Cost* (10-years)**
Objective A	**Annually treat 34 acres of exotic plant species in the parks.**	# Acres treated	C	**$120,160**
Objective B	**Implement control measures on 4 exotic animal species in the parks.**	# Species for which control measures implemented	C	**$103,400**
Objective C	**Manage beaver population at Big Lagoon to reduce flooding of use areas.**	Periodic monitoring	C	**$49,000**

* 2018 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 10
Big Lagoon State Park, Tarkiln Bayou Preserve State Park, Perdido Key State Park
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 VI: Protect, preserve and maintain the cultural resources of the parks.		Measure	Planning Period	Estimated Manpower and Expense Cost* (10-years)
Objective A	**Assess and evaluate 14 of 15 recorded cultural resources in the parks.**	Documentation complete	LT	**$20,000**
Objective B	**Compile reliable documentation for all recorded historic and archaeological sites.**	Documentation complete	LT	**$38,200**
Objective C	**Maintain condition of cultural resources.**	# Sites in good condition	LT	**$5,000**
Goal VII: Provide public access and recreational opportunities in the parks.		**Measure**	**Planning Period**	**Estimated Manpower and Expense Cost* (10-years)**
Objective A	**Maintain Big Lagoon's current recreational carrying capacity of 3,486 users per day.**	# Recreation/visitor opportunities per day	C	**$4,048,000**
Objective B	**Maintain Tarkiln Bayou's current recreational carrying capacity of 296 users per day.**	# Recreation/visitor opportunities per day	C	**$5,500**
Objective C	**Maintain Perdido Key's current recreational carrying capacity of 840 users per day.**	# Recreation/visitor opportunities per day	C	**$104,000**
Objective D	**Expand Big Lagoon's recreational carrying capacity by 220 users per day.**	# Recreation/visitor opportunities per day	LT	**$255,500**
Objective E	**Expand Tarkiln Bayou's recreational carrying capacity by 302 users per day.**	# Recreation/visitor opportunities per day	LT	**$5,600**
Objective F	**Expand Perdido Key's recreational carrying capacity by 68 users per day.**	# Recreation/visitor opportunities per day	LT	**$8,500**
Objective G	**Continue to provide the current repertoire of interpretive, educational and recreational programs on a regular basis.**	# Interpretive/education programs	C	**$55,000**
Objective H	**Develop new interpretive, educational and recreational programs.**	# Interpretive/education programs	ST, LT	**$30,000**

* 2018 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 10
Big Lagoon State Park, Tarkiln Bayou Preserve State Park, Perdido Key State Park
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 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	**$1,079,500**
Objective B	**Continue to implement the parks' transition plan to ensure facilities are accessible in accordance with the American with Disabilities Act of 1990.**	Plan implemented	LT	**$55,000**
Objective C	**Improve/repair 3 existing facilities and 3 miles of road at Big Lagoon.**	# Facilities/Miles of Trail/Miles of Road	LT	**$3,176,870**
Objective D	**Improve/repair 1 existing facility and 1 mile of road at Tarkiln Bayou.**	# Facilities/Miles of Trail/Miles of Road	LT	**$333,000**
Objective E	**Improve/repair 2 existing facilities at Perdido Key.**	# Facilities/Miles of Trail/Miles of Road	LT	**$966,700**
Objective F	**Construct 4 new facilites, 5 miles of trail, and 1 mile of road at Tarkiln Bayou.**	# Facilities/Miles of Trail/Miles of Road	LT	**$3,234,000**
Objective G	**Construct 1 new facility at Perdido Key.**	# Facilities/Miles of Trail/Miles of Road	LT	**$380,000**
Objective H	**Expand maintenance activities as existing facilities are improved and new facilities are developed.**	Facilities maintained	C	**$90,000**

Summary of Estimated Costs		
Management Categories		**Total Estimated Manpower and Expense Cost* (10-years)**
Resource Management		**$5,877,560**
Administration and Support		**$200,350**
Capital Improvements		**$4,512,100**
Recreation Visitor Services		**$9,315,070**
Law Enforcement Activities	Note: Law enforcement activities in Florida State Parks are conducted by the FWC Division of Law Enforcement and by local law enforcement agencies.	

* 2018 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