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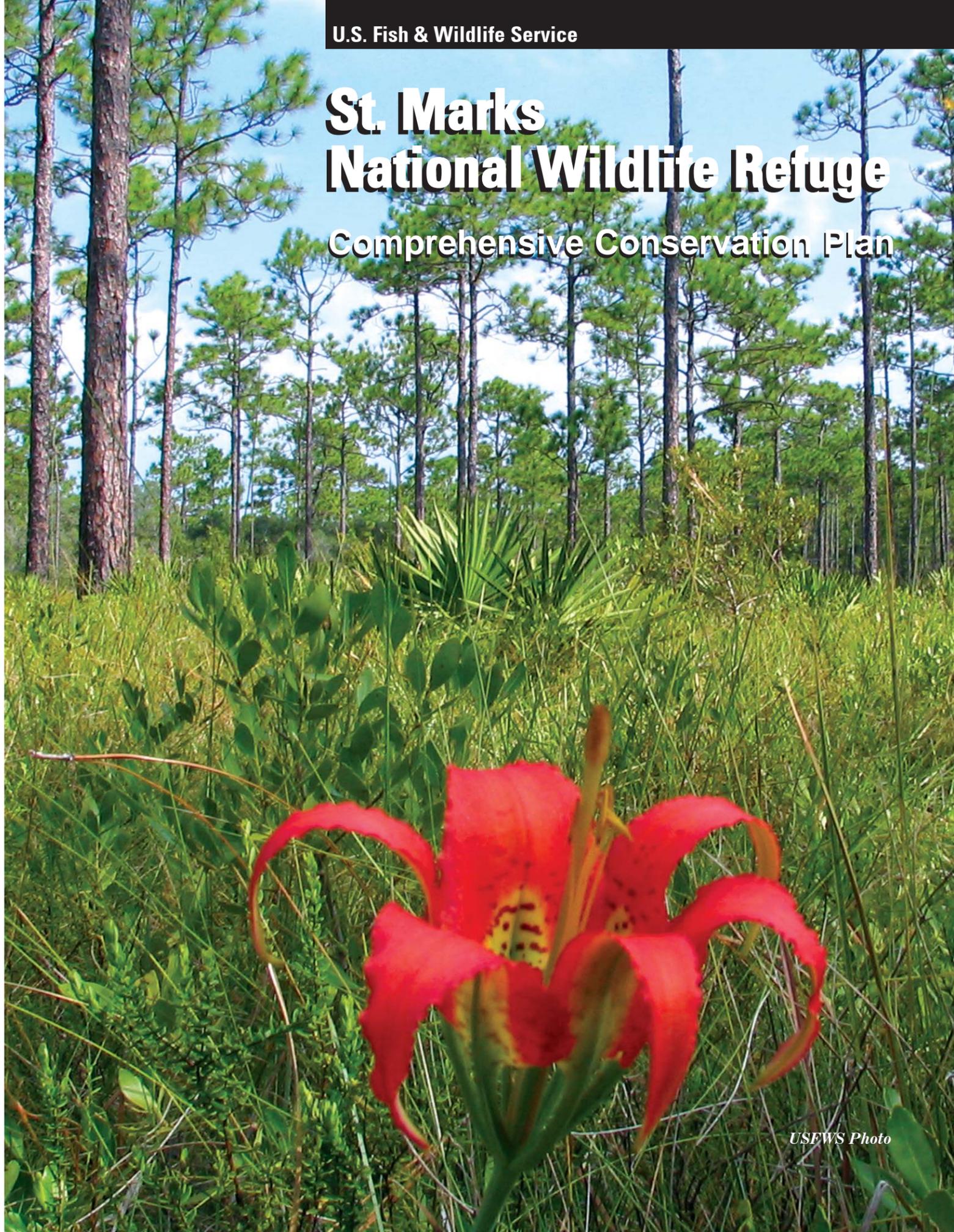


St. Marks National Wildlife Refuge
Comprehensive Conservation Plan

U.S. Fish & Wildlife Service

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Comprehensive Conservation Plan



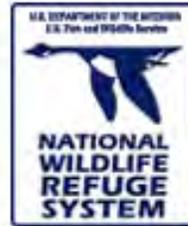
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Comprehensive Conservation Plans provide long-term guidance for management decisions; set forth goals, objectives, and strategies needed to accomplish refuge purposes; and identify the Fish and Wildlife Service's best estimate of future needs. These plans detail program planning levels that are sometimes substantially above current budget allocations and, as such, are primarily for Service strategic planning and program prioritization purposes. The plans do not constitute a commitment for staffing increases, operational and maintenance increases, or funding for future land acquisition.

St. Marks National Wildlife Refuge

Comprehensive Conservation Plan



**U.S. Department of the Interior
Fish and Wildlife Service
Southeast Region**

October 2006

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COMPREHENSIVE CONSERVATION PLAN

ST. MARKS NATIONAL WILDLIFE REFUGE

Wakulla, Taylor, and Jefferson Counties, Florida

U.S. Department of the Interior
Fish and Wildlife Service
Southeast Region

October 2006

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ST. MARKS NATIONAL WILDLIFE REFUGE VISION STATEMENT

The St. Marks National Wildlife Refuge will be a model for conserving the natural diversity of plants and animals, preserving cultural resources, and providing opportunities for research, environmental education, and quality outdoor recreation. The refuge will link other north Florida wild lands with vital habitat for threatened and endangered species, migratory birds, and resident wildlife, and it will protect the rich resources of Apalachee Bay. Conservation of the natural health and beauty of the refuge is our promise to the community and future generations.

SECTION A. COMPREHENSIVE CONSERVATION PLAN

I. Background

INTRODUCTION

The U.S. Fish and Wildlife Service developed this Comprehensive Conservation Plan for St. Marks National Wildlife Refuge, located in the Big Bend region of Florida, to guide refuge management and resource conservation over the next 15 years. This plan contains background information on the refuge, a description of the planning process, the desired future conditions, and the refuge's vision, goals, and management actions necessary to achieve these goals and conditions.

Guiding the development of the plan is Part 602 (National Wildlife Refuge System Planning) of the Fish and Wildlife Service Manual and the National Wildlife Refuge System Improvement Act of 1997. An overriding consideration reflected in this plan is that fish and wildlife conservation has first priority in refuge management. All public use of refuges must be compatible with the purposes for which the refuge was established. The Act specifies six priority wildlife-dependent uses: hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation.

The major issues addressed in the plan include wildlife habitat protection, monitoring, and restoration; management of forests, fire, and impoundments; exotic species control; water quality and quantity; land conservation; wildlife-dependent recreation opportunities and impacts; environmental education; resource protection/law enforcement; and partnerships. Based on these issues, three alternatives were identified for managing the refuge. From these alternatives, the Service selected a preferred alternative, which is described in Chapter IV, Management Direction.

PURPOSE AND NEED FOR THE PLAN

The purpose of the plan is to identify the role the refuge will play in support of the mission of the National Wildlife Refuge System and to provide guidance in refuge management and public use activities. The plan describes the Service's management direction (goals, objectives, and strategies) for the next 15 years.

The plan is needed to:

- Provide a clear statement regarding management of the refuge;
- Provide refuge neighbors, visitors, and government officials with an understanding of the Service's management actions on and around the refuge;
- Ensure that refuge management actions are consistent with the purposes of the refuge and the mandates of the National Wildlife Refuge System;
- Provide long-term guidance and continuity for refuge management; and
- Provide a basis for the development of budget requests relative to the refuge's operational, maintenance, and capital improvement needs.

U.S. FISH AND WILDLIFE SERVICE

The U.S. Fish and Wildlife Service is the primary federal agency responsible for conserving, protecting, and enhancing the Nation's fish and wildlife populations and their habitats. Although the

Service shares this responsibility with other federal, state, tribal, local, and private entities, it has specific trustee responsibilities for migratory birds, federally listed threatened and endangered species, anadromous fish, certain marine mammals, and the lands and waters administered by the Service for the management and protection of these resources.

NATIONAL WILDLIFE REFUGE SYSTEM

As part of its mission, the Service operates 544 national wildlife refuges covering over 100 million acres. These areas comprise the National Wildlife Refuge System, the world's largest collection of lands specifically managed for fish and wildlife. Most of these lands are in Alaska, with only about 20 percent spread across the other 49 states and several island territories. The Service manages 28 national wildlife refuges in Florida (Figure 1) that comprise approximately 964,992 land and water acres (Florida Natural Areas Inventory 2005).

The mission of the National Wildlife Refuge System, as defined by the National Wildlife Refuge System Improvement Act of 1997, is "to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans." The Act establishes wildlife conservation as the primary mission of the National Wildlife Refuge System.

National wildlife refuges provide important habitat for native plants and many species of mammals, birds, fish, amphibians, reptiles, insects, and other invertebrates. They also play a vital role in conserving threatened and endangered species. Refuges offer a wide variety of wildlife-dependent recreational opportunities, and many have visitor centers, wildlife trails, and environmental education programs. In 1995, 25 million people visited national wildlife refuges to hunt, fish, observe and photograph wildlife, and participate in educational and interpretive activities, and contributed more than \$400 million to the local economies (U.S. Fish and Wildlife Service 1997).

Figure 1. National wildlife refuges of Florida



<ul style="list-style-type: none"> St. Marks National Wildlife Refuge Other National Wildlife Refuges Water Roads 	<h2>National Wildlife Refuges of Florida</h2>
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II. The Refuge

INTRODUCTION

St. Marks National Wildlife Refuge is located in Wakulla, Jefferson, and Taylor Counties along the Gulf Coast of northwest Florida, about 25 miles south of Tallahassee (Figure 2). It currently covers about 69,155 acres with an approved acquisition boundary of 74,469 acres. The refuge staff also manages 947 acres of state land and 334 acres of USDA Forest Service land within the approved acquisition boundary.

HISTORY OF REFUGE ESTABLISHMENT AND ACQUISITION

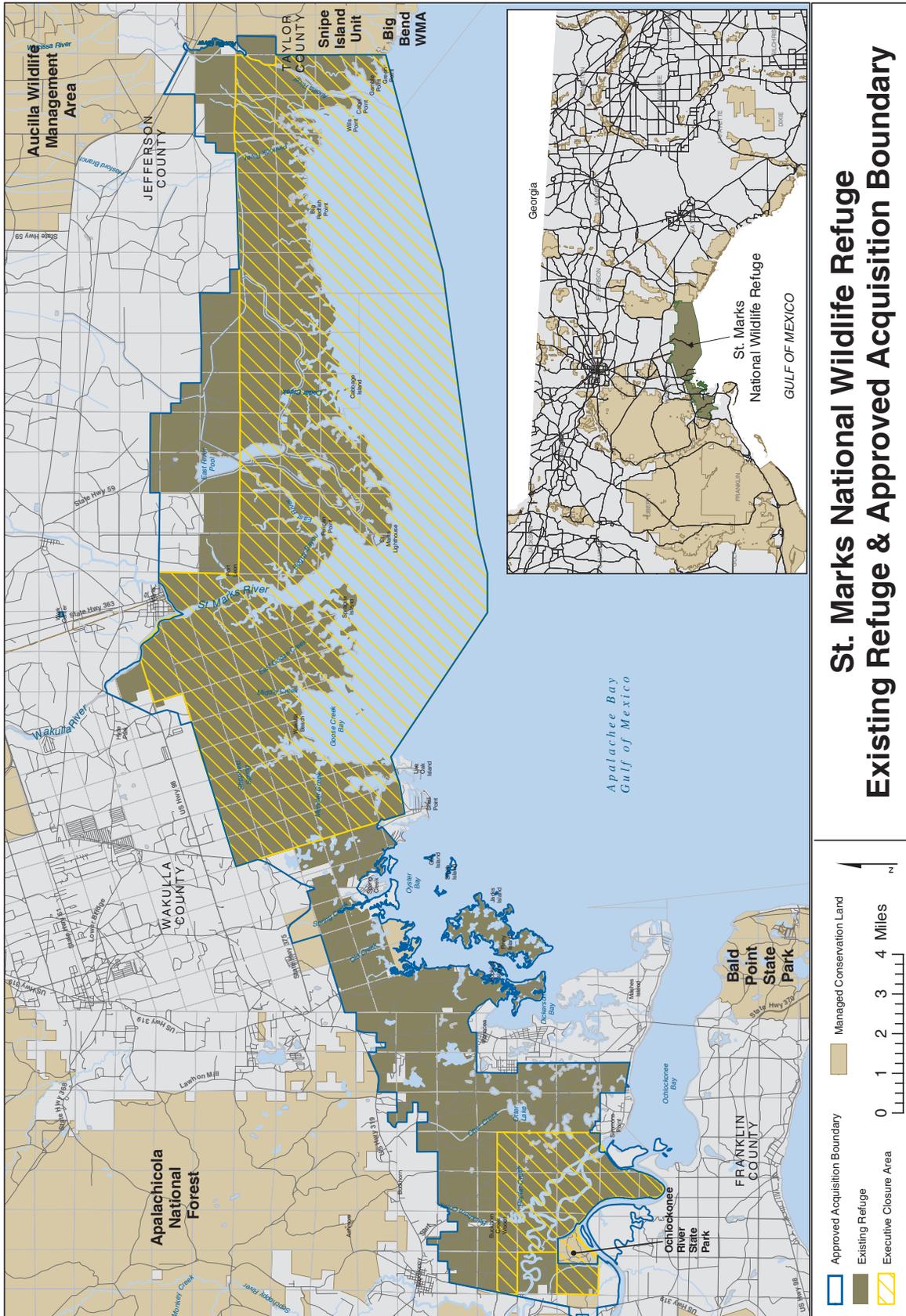
On October 31, 1931, during the time of the Great Depression, Executive Order 5740 established the St. Marks Migratory Bird Refuge under the U.S. Department of Agriculture, Bureau of Biological Survey. The first land set aside under the Migratory Bird Conservation Act and the Six Million Dollar Fund was the 53-acre Lighthouse Reservation. This is an area of salt marshes and grass flats at the mouth of the St. Marks River, adjacent to Apalachee Bay. At the time, it was important for migrating Canada geese. On December 24, 1931, President Herbert C. Hoover signed Presidential Proclamation 1982, which established an Executive Closure Area under the authorities of the Migratory Bird Treaty Act of 1918, and the Migratory Bird Conservation Act of 1929. This prohibited hunting of migratory waterfowl in Apalachee Bay between the St. Marks Lighthouse and the Aucilla River, as well as on private lands bordering the coastal marshes. These inland timber lands were primarily purchased from Phillips Turpentine Company in subsequent years and became the nucleus of what is now the St. Marks Unit of the refuge.

It was under President Franklin D. Roosevelt that the boundaries of today's refuge substantially took shape. Executive Order 7222, dated November 1, 1935, added approximately 10,108 acres which formed most of the current Wakulla Unit of the refuge. Executive Order 7749, dated November 22, 1937, further defined the boundaries of the St. Marks and Wakulla units, including approximately 31,445 acres. Executive Orders 7977 and 9119, dated September 19, 1938, and April 1, 1942, respectively, added approximately 22,040 acres to form what is now the Panacea Unit out of lands transferred from the Soil Conservation Service's Resettlement Administration. The original Executive Closure Order, which prohibited the taking of migratory waterfowl, was expanded by Roosevelt's Presidential Proclamation 2264 on December 13, 1937. With Presidential Proclamation 2416 on July 25, 1940, the St. Marks Migratory Bird Refuge became St. Marks National Wildlife Refuge. By 1960, the Executive Closure Order boundaries had a total of 67,563 acres.

In recent years the refuge has acquired some land through timber-for-land exchanges. The timber traded under this program was slated for removal in forest prescriptions to improve wildlife habitat. Rather than sell timber directly, the refuge traded timber for land that was either within the refuge acquisition boundary, as inholdings, or adjacent to the refuge.

Purchased by the Suwannee River Water Management District, 642 acres of land located along the Aucilla River are managed by the refuge under a Memorandum of Understanding signed in 2000. The refuge also manages the 305-acre Porter Tract according to a Memorandum of Understanding signed in 1999. It is owned by the State of Florida and administered by the Department of Environmental Protection, Office of Greenways and Trails. Similarly, a 334-acre portion of the Florida National

Figure 2. Existing refuge and approved acquisition boundary



Scenic Trail, located west of the Wakulla River, is managed by the refuge under a 2002 Memorandum of Understanding. This land was acquired by the USDA Forest Service. These jointly managed land areas are shown in Figure 3. The refuge also administers 16 conservation easements and one government-owned property totaling 1,517 acres in northern Florida and southern Georgia. The locations of these lands in relation to the refuge are shown in Figure 4. See Section B, Appendix VII, for the counties and fee or conservation acreages associated with these easements and properties.

PURPOSES OF THE REFUGE

Under Executive Order 5740, dated October 31, 1931, which established the refuge, the purpose of the acquisition was "...as a refuge and breeding ground for wild animals and birds." For lands acquired under the Migratory Bird Conservation Act of 1929 (16 U.S.C., Section 715d), the purpose of the acquisition was "...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." For lands acquired under the Refuge Recreation Act of 1962 (16 U.S.C., Section 460k-1), the purpose of the acquisition was "...for (1) incidental fish and wildlife-oriented recreational development; (2) the protection of natural resources; and (3) the conservation of endangered species or threatened species." Under the National Wildlife System Administration Act, refuges were established for "conservation, management, and restoration of the fish, wildlife, and plant resources and their habitats for the benefit of present and future generations of Americans (16 U.S.C. 668dd(a)(2)). The Wilderness Act of 1964, Public Law 92-363, dated January 3, 1975, also designated "...certain lands in the St. Marks Wildlife Refuge, Florida which comprise approximately seventeen thousand seven hundred and forty-six acres...as the St. Marks Wilderness." These purposes and the mission of the National Wildlife Refuge System are fundamental to determining the compatibility of proposed uses of the refuge. The compatibility of these uses is discussed in Section B, Appendix VI.

REGIONAL HABITAT MANAGEMENT PERSPECTIVE

The primary purpose of the refuge is wildlife habitat conservation. Unlike many present-day islands of conservation in the Southeast, the refuge is embedded within a matrix of over 1.46 million acres of nearly contiguous public lands on 55 properties (Figure 5 and Table 1). This does not include 106,046 acres of submerged lands within the Apalachicola National Estuarine Research Reserve and 945,412 acres of submerged lands in the Big Bend Seagrasses Aquatic Preserve. As shown in Table 2, much of the remaining privately owned land in the region is intensively managed industrial forest land, possessing both major conservation potential and the threat of future development.

North of the refuge lies the cultural and environmental resource of Wakulla Springs State Park. Wakulla Springs forms the headwaters of the Wakulla River and are protected within 10,320 acres of Wakulla Springs State Park and Wakulla State Forest. The Big Bend coastline extends east and south of the refuge, including 945,412 acres of submerged lands and navigable tributaries, which are administered as the Big Bend Seagrasses Aquatic Preserve by the State of Florida's Department of Environmental Protection. Approximately 453,097 acres of adjacent land to the east and southeast of the refuge (from the Aucilla to the Withlacoochee Rivers) are managed by the Department of Environmental Protection, Florida Fish and Wildlife Conservation Commission, Suwannee River Water Management District, and others.

NORTH AMERICAN AND ECOSYSTEM CONTEXT

The refuge has formed partnerships with other wildlife and habitat management programs and works cooperatively to advance many local, state, regional, national, and international plans and initiatives.

Figure 3. St. Marks National Wildlife Refuge jointly managed lands

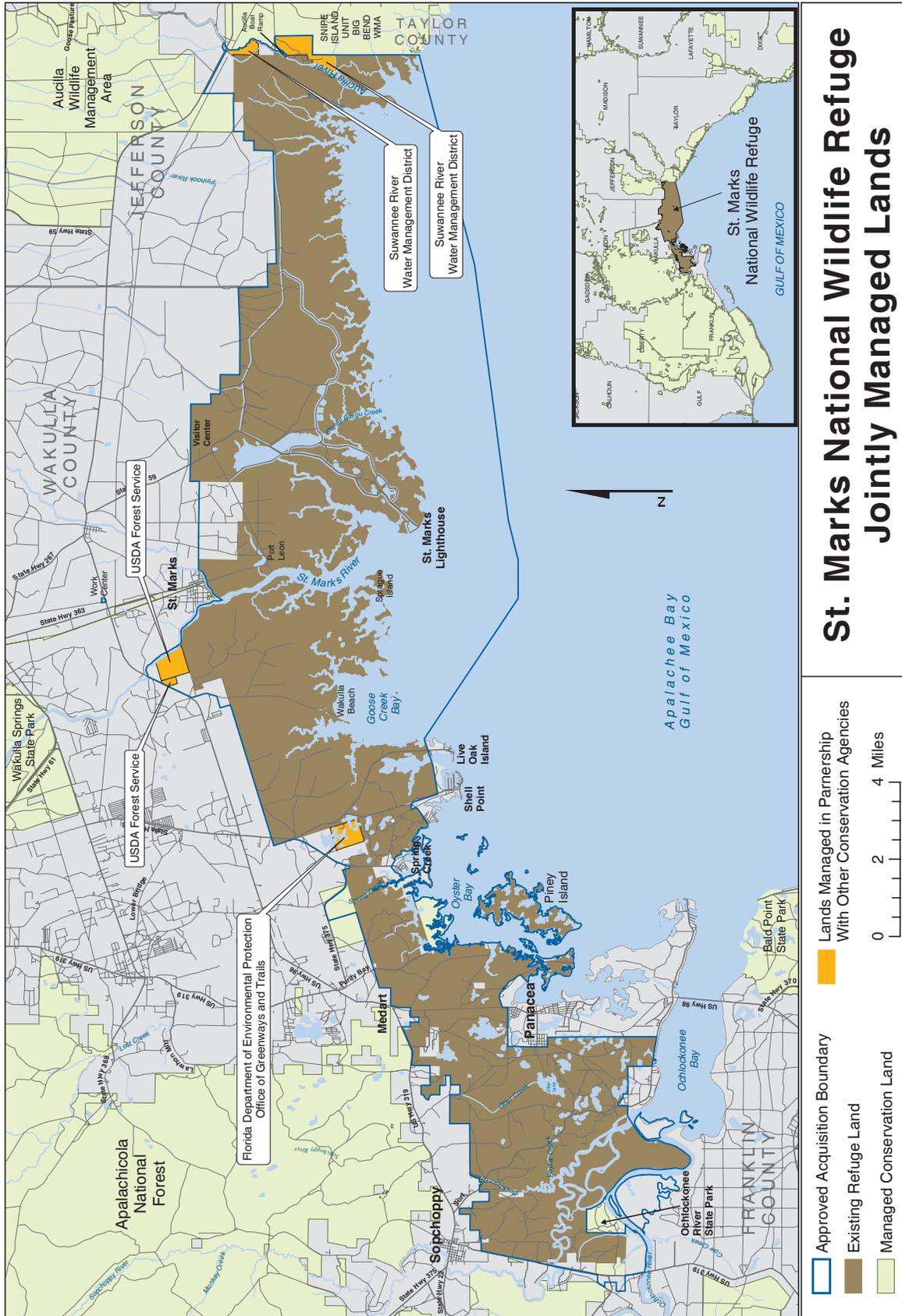


Figure 4. Wetland conservation easements administered by St. Marks National Wildlife Refuge

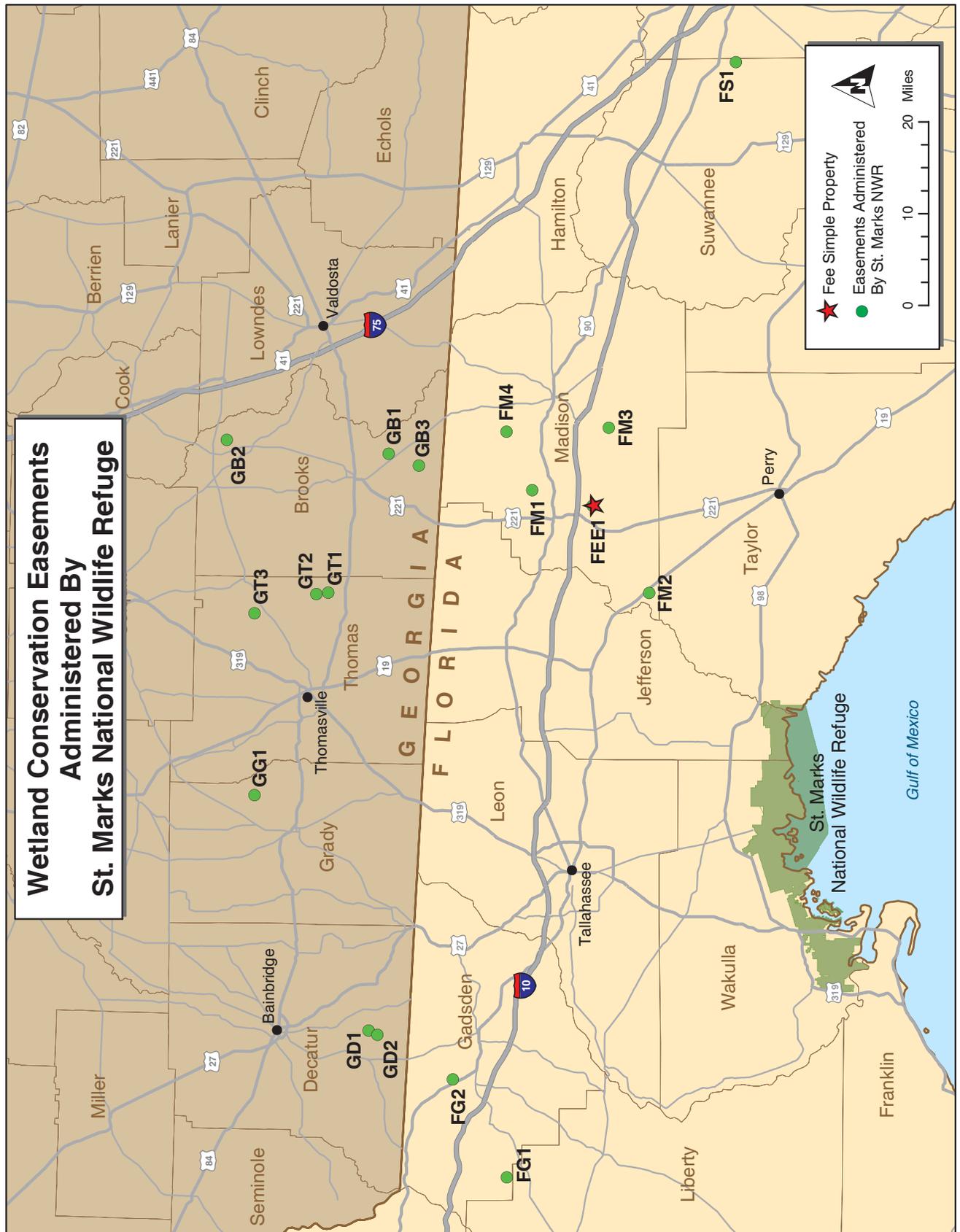


Table 1. Public and conservation lands near St. Marks National Wildlife Refuge

The properties listed below form a contiguous network with not more than 3 miles of nondeveloped lands separating the nearest points (with the exception of a 4.5-mile break in Taylor County between portions of the Big Bend Wildlife Management Area).

Property	County(ies)	Acreage
Apalachicola National Forest	Franklin, Leon, Liberty, Wakulla	576,673
Apalachicola River Water Management Area	Gulf, Liberty	36,035
Apalachicola River Wildlife and Environmental Area	Franklin, Gulf	64,395
Aucilla Wildlife Management Area	Jefferson, Taylor	42,505
Bald Point State Park	Franklin	4,878
Big Bend Wildlife Management Area	Dixie, Taylor	81,557
Cape Saint George State Reserve	Franklin	2,385
Carlton Farms Conservation Easement	Wakulla	63
Carpenter and Westmark Conservation Easement	Wakulla	363
Carroll Conservation Easement	Wakulla	374
Cedar Key Museum State Park	Levy	19
Cedar Key Scrub State Reserve	Levy	5,033
Cedar Key National Wildlife Refuge	Levy	843
Chassahowitzka National Wildlife Refuge	Citrus, Hernando	29,960
Chassahowitzka River and Coastal Swamps	Citrus, Hernando	5,675
Chassahowitzka Wildlife Management Area	Hernando	27,588
Constitution Convention Museum State Park	Gulf	13
Crystal River Archaeological State Park	Citrus	60
Crystal River State Buffer Preserve	Citrus	30,847
Cummer Sanctuary	Levy	817
Dead Lakes Park	Gulf	83
Dr. Julian G. Bruce St. George Island State Park	Franklin	2,024
Econfina Conservation Area	Taylor	8,488
Econfina River State Park	Taylor	4,529
Edward Ball Wakulla Springs State Park	Wakulla	6,036
Eglin Air Force Base Test Site	Gulf	779
Felburn Park	Citrus	137
Forest Systems Conservation Easement	Dixie	32,137
Joe Budd Wildlife Management Area	Gadsden	3,023
Lake Talquin State Forest	Gadsden, Leon, Liberty	18,992
Lake Talquin State Park	Leon	556
Lower Steinhatchee Conservation Area	Taylor	91
Lower Suwannee National Wildlife Refuge	Dixie, Levy	51,192

Property	County(ies)	Acreage
Middle Aucilla Conservation Area	Jefferson, Madison, Taylor	9,143
NATC Gulf Hammock Conservation Easement	Levy	21,406
NATC Suwannee Swamp Conservation Easement	Levy	12,798
Ochlockonee River State Park	Wakulla	541
Purify Creek Park, Trust for Public Lands	Wakulla	454
Salinas Park	Gulf	39
San Marcos de Apalache Historic State Park	Wakulla	17
Snipe Island Unit	Taylor	11,913
St. Joseph Bay State Buffer Preserve	Gulf	5,590
St. Vincent National Wildlife Refuge	Franklin, Gulf	12,242
Steinhatchee Conservation Area	Dixie, Lafayette, Taylor	26,234
Strickland Field Conservation Easement	Dixie	3,843
T. H. Stone Memorial St. Joseph Peninsula State Park	Gulf	2,716
Tallahassee - St. Marks Historic Railroad State Park	Leon, Wakulla	170
Tate's Hell State Forest and Wildlife Management Area	Franklin, Liberty	203,600
Thompson Gray Conservation Easement	Gadsden	322
Waccasassa Bay Reserve State Park	Levy	33,992
Wacissa Conservation Area	Jefferson	1,060
Wakulla State Forest	Wakulla	4,284
Weekiwatchee Preserve	Hernando, Pasco	10,839
Yellow Jacket Conservation Area	Dixie	506

Source: Florida Natural Areas Inventory, March 2005 Florida Managed Areas.

Table 2. Regional extent of intensive silviculture activity

County	Total Acres In County	Percent, per county, Intensive Silviculture on Private Lands
Franklin	354,180	07.7
Jefferson	391,734	21.8
Taylor	672,336	43.8
Wakulla	395,352	12.1

Source: Florida Land Use Classification and Cover System digital data, Suwannee River and Northwest Florida Water Management Districts, 1995, revised 2003.

Southwest and west of the refuge are the largest tracts of public conservation land in north Florida: Apalachicola National Forest at 576,673 acres and the adjacent Tate's Hell Wildlife Management Area/State Forest/Apalachicola River Wildlife and Environmental Area at 304,030 acres. The Apalachicola National Forest contains shared and close boundaries with the refuge in portions of the Panacea Unit, as does Ochlockonee River State Park. Tate's Hell State Forest's northeast boundary is approximately one mile west of the western boundary of the Panacea Unit. These important conservation lands, along with others listed in Table 1, form a contiguous landscape-scale network of wildlife habitat with exceptional ecological value. The refuge provides a critical east-west linkage of these lands, spanning more than 43 miles of coastal and near-coastal habitats.

This comprehensive conservation plan supports bird conservation efforts, several Endangered Species Act recovery plans, the Surface Water Improvement and Management Plans for the St. Marks and Aucilla Rivers, the National Fire Initiative, and other plans and initiatives as described below.

ROLE OF THE REFUGE IN BIRD CONSERVATION

The refuge supports five bird conservation plans: (1) the North American Waterfowl Management Plan; (2) the Partners in Flight Initiative; (3) the South Atlantic Coastal Plain Bird Conservation Plan; (4) the Southeastern Coastal Plain and Caribbean Region Shorebird Conservation Plan; and (5) the Southeastern Coastal Plain Colonial Waterbird Conservation Regional Plan.

Globally Important Bird Area

St. Marks National Wildlife Refuge is designated as a Globally Important Bird Area of the United States. Worldwide, there are 3,500 sites. The American Bird Conservancy identified the top 500 sites within the United States. The refuge meets the criteria of containing habitat necessary to support a major population of an endangered species, the red-cockaded woodpecker, and of containing large aggregations of breeding, migrating, or wintering birds, including waterfowl, seabirds, wading birds, raptors, or landbirds. The goal of the Globally Important Bird Area program is to create public awareness of these sites and to obtain resources to protect them.

North American Waterfowl Management Plan

Since the first European settlers arrived, more than 53 percent of the contiguous United States' original 221 million acres of wetlands have been destroyed, causing dramatic declines in waterfowl populations. Even so, waterfowl remain an economically important group of migratory birds in North America. According to the 2001 National Survey of Fishing, Hunting, and Wildlife Associated Recreation, approximately 3 million people spent \$1.4 billion to hunt ducks that year (U.S. Department of the Interior 2003).

Recognizing the importance of waterfowl and wetlands to North Americans and the need for international cooperation to help in the recovery of this shared resource, the United States and Canadian governments developed a strategy to restore waterfowl populations to levels of the 1970s through habitat protection, restoration, and enhancement. The strategy was documented in the North American Waterfowl Management Plan, signed in 1986 by the Secretary of the Interior and the Canadian Minister of the Environment. With an update in 1994, Mexico became a signatory to the plan.

The plan identified important waterfowl habitat areas and established habitat and population goals. It developed interstate/international partnerships called Joint Ventures to implement plan goals. In 1997, the Atlantic Coast Joint Venture added Florida as its 17th state partner. Midwinter data indicate that 17 to 26 percent of the Atlantic Flyway's January censused duck population spends the winter in north and central Florida, an incidence greater than in any other state in the flyway. St.

Marks National Wildlife Refuge currently meets several goals and objectives of the North American Waterfowl Management Plan by: (1) conserving seagrass beds and sanctuary areas for redhead and other diving ducks in Apalachee Bay; (2) managing impoundments for a complex of shallow and deep water habitats; (3) providing nesting and brooding habitats for wood ducks on the refuge; and (4) providing sanctuary sites and non-disturbance periods for migratory and pairing waterfowl.

Partners in Flight Initiative

The Partners in Flight Initiative was launched in 1990, in response to growing concerns about declines in the populations of many landbird species, particularly migratory passerines for which no coordinated management was in place. It addresses the conservation of birds not covered by other conservation programs, such as the North American Waterfowl Management Plan and the Western Shorebird Reserve Network Plan. The central premise of Partners in Flight is that the resources of public and private organizations in North and South America must be combined, coordinated, and increased in order to achieve success in conserving bird populations in this hemisphere. The Service is a member of the cooperative effort to promote research, land protection, and education about migratory birds. Other participants include federal, state, and local government agencies, philanthropic foundations, professional organizations, conservation groups, industry, the academic community, and private individuals.

Partners in Flight focuses on species that breed in the Nearctic (North America) and spend the winter in the Neotropics (Central and South America). These species are commonly known as neotropical migratory birds. Partners in Flight coordinates international conservation efforts for all neotropical migratory landbirds in the United States and the Western Hemisphere. The goal of the initiative is to keep common birds common. The annual Welcome Back Songbirds festival, which occurs each spring at Wakulla Springs State Park and the refuge, began in order to promote the Partners in Flight Initiative.

The refuge contains important habitats for 106 priority bird species identified in the Partners in Flight plans for the South Atlantic Coastal Plain and East Gulf Coastal Plain physiographic provinces. The refuge provides habitat for 315 avian species (Section B, Appendix IV). Thirty-six species are considered incidental. Of the 278 regularly occurring species, 110 are confirmed to breed on the refuge. Neotropical migratory birds are denoted on the bird list.

As noted in the South Atlantic Coastal Plain Bird Conservation Plan, the refuge is an important spring and fall migration stopover site along the Gulf coast. It provides important breeding and wintering sites. The refuge contains longleaf pine, bottomland hardwood, and hydric hardwood hammock habitats, which support numerous priority species.

Shorebird and Waterbird Habitat Protection and Management

The Southeastern Coastal Plain and Caribbean Region Shorebird Conservation Plan correlates roughly to the Partners in Flight, in that it identifies priority species, outlines potential and present threats to shorebirds and their habitats, reports gaps in knowledge relevant to shorebird conservation, and makes recommendations for addressing identified problems. General habitat goals for the region are to (1) provide optimal breeding habitat for priority species; (2) provide high-quality managed habitat to support requirements of species migrating through or spending winter in the region; and (3) maintain human disturbances at tolerable levels for shorebirds throughout the year.

The plan notes many sites within the refuge that provide breeding and wintering habitat and critical migratory stopovers for shorebirds. In particular, the refuge contributes to the goals of the plan by providing feeding, loafing, and roosting habitat in the impoundments. The refuge also provides nesting habitat on two islands (Palmetto and Piney) for American oystercatchers and willets.

Wilson's plovers nest on hard pan/open areas in high marsh and occasionally in impoundments. American oystercatchers and Wilson's plovers are in the highest regional priority category.

The Southeastern Coastal Plain Colonial Waterbird Conservation Regional Plan follows the same format as the previous two bird conservation plans, with a focus on herons, ibises, storks, seabirds, and their habitats. Through public use area closures and habitat protection, the refuge provides important breeding and wintering habitat for 15 candidate priority conservation species included in the plan. The refuge has regionally important habitats, such as coastal wetlands, islands, lakes, and impoundments.

ENDANGERED SPECIES ACT RECOVERY PLANS

Several species known or believed to occur on the refuge are listed under the federal Endangered Species Act as threatened or endangered (Section B, Appendix IV). To be endangered means that a species is in danger of extinction throughout all or a major portion of its range, while threatened means that a species is likely to become endangered within the foreseeable future. Under the Act, all federal agencies must use their authorities to conserve listed species and make sure that their actions do not jeopardize the continued existence of listed species. They must protect these species and conserve their habitats. Recovery plans are developed for each of the federally listed threatened or endangered species with the objective of restoring the species to a healthy population. The refuge's role in the recovery of species listed as endangered is briefly described below.

The Florida manatee, Gulf sturgeon, purple bankclimber, and the Kemp's ridley, green, and leatherback sea turtles inhabit the rivers and Gulf of Mexico within the Executive Order Closure portion of the refuge. The refuge's role in the recovery of these species is minimal. An additional species, the Ochlockonee moccasinshell, was not located in the Ochlockonee River below Lake Talquin dam; however, the purple bankclimber, a species listed as threatened, was documented in the river below the dam. A 2003 recovery plan addresses seven species of mussels. These include five that are endangered (the fat threeridge, shinyrayed pocketbook, Gulf and Ochlockonee moccasinshells, and oval pigtoe) and two threatened species (the Chipola slabshell and purple bankclimber).

The wood stork is known to feed and roost on the refuge, but no nesting sites have been observed. Drawing down water levels in the impoundments and providing feeding habitat for wood storks also benefits shorebirds and wading birds. No other special management efforts are currently being undertaken to encourage use by this species.

The refuge is actively involved in the recovery of the red-cockaded woodpecker. Under the Service's current Red-cockaded Woodpecker Recovery Plan (2003), the refuge hosts the Central Florida Panhandle Primary Core population, together with Apalachicola National Forest, Tate's Hell State Forest and Wildlife Management Area, and Ochlockonee River State Park. The Central Florida Panhandle Primary Care population is the largest population with 665 active clusters. The recovery plan has a panhandle population goal of 1,000 potential breeding groups, with a refuge goal of 71 active clusters. Active refuge management of the red-cockaded woodpecker population and habitat since 1980 has not only prevented extirpation, but also fostered population growth.

BLACK BEAR STRATEGIC HABITAT CONSERVATION AREAS

While the black bear is not a federally listed species, the State of Florida has listed it as a threatened species. The Florida Fish and Wildlife Conservation Commission has identified privately owned lands as strategic habitat conservation areas critical for ensuring the long-term viability of Florida's biodiversity (Cox et al. 1994). In May 2000, the Florida Natural Areas Inventory hosted a workshop to rank black bear habitats for potential acquisition under the Florida Forever Program. A total of 1.65 million acres of private lands was identified as necessary to support five viable populations of black bears. These lands center around five large blocks of public land and two landscape linkages of private land (Figure 6). The black bear population on and around Ocala National Forest is in greatest need of protection and at the highest risk of losing habitat due to development. The Apalachicola National Forest black bear population is expanding to the east. Habitat in the vicinity of the Aucilla River and south through the Big Bend region is important to this expanding population. Known as the Aucilla Gateway, this area has the potential to provide a link to the small and isolated Chassahowitzka population in Citrus and Hernando counties. It includes the refuge and private lands to the north and east. It is ranked as the third acquisition priority of the seven statewide strategic habitat conservation areas.

As part of the greater Apalachicola black bear population, which encompasses a land base of approximately 2.6 million acres, the refuge presently meets or exceeds the current habitat management guidelines set in 1995 by the Apalachicola Bear Management Committee, in terms of silviculture management, prescribed fire, set-aside areas, and road access.

GULF OF MEXICO PROGRAM

The U.S. Environmental Protection Agency initiated the Gulf of Mexico Program to protect and restore the health and productivity of the Gulf in an economically sound manner. The Agency funds research studies and restoration projects through partnerships with the five Gulf states, local governments, environmental and agricultural groups, regional businesses, and citizens. In 2003, the refuge was designated as a Gulf Ecological Management Site due to its unique habitats and ecological significance to the production of fish, wildlife, and other natural resources. It is now eligible for research and restoration projects.

COASTAL BARRIER RESOURCES ACT

The Coastal Resources Barrier Act of 1982 designated Piney Island (Unit P27A-Ochlockonee Complex) for inclusion within the John H. Chaffee Coastal Barrier Resources System. Areas so designated are not eligible for federal financial assistance that might support development. This law requires agencies that propose using federal expenditures within the Coastal Barrier Resources System to consult with the Ecological Services Office for consistency with the Coastal Barrier Resources Act.

NORTHEAST GULF COAST ECOSYSTEM TEAM

The Service is working to protect and restore the function, structure, and species composition of ecosystems based on watershed units. Interagency teams are assembled regionally for this purpose. The Northeast Gulf Coast Ecosystem Team is a coordinating group that focuses on the Northeast Gulf Watershed Unit. The unit extends from the Aucilla River watershed through the Perdido River watershed in northwest Florida, including southeast Alabama and western Georgia (Figure 7). It contains three major ecoregions and is a national focal point of species rarity and richness (The Nature Conservancy, *Precious Heritage: The Status of Biodiversity in the United States*, Rarity-Weighted Richness Index, by Stein et al. 2000, p. 172). Important biological resources include

extensive estuarine systems, warm- and cold-water fisheries, longleaf pine-wiregrass communities, bottomland hardwood swamp forests, and coastal dunes.

The ecological associations in the Northeast Gulf Watershed Unit have been reduced in either function or structure to the point that more than 30 species are federally listed as threatened or endangered. In addition, more than 300 species are potential candidates for federal listing. Other Service trust resources include anadromous fish, migratory birds, nongame waterbirds, waterfowl, and wetlands.

The team's vision for the watershed unit is to conserve natural animal and plant diversity through the perpetuation of dynamic, healthy ecosystems. This will be accomplished by working with partners and cooperators to protect, secure, and expand the remaining areas of ecological integrity, and by enhancing biodiversity. Many ongoing efforts, such as the Partners in Flight and the Gulf of Mexico Program, have already been effective in developing plans on an ecosystem scale. The team's efforts focus on working with these groups and others to identify key ecological associations and interrelationships and to conserve natural animal and plant diversity.

Issues addressed by the team include ecosystem dysfunction due to habitat degradation and reduction of natural diversity; resource exploitation; lack of adequate scientific information; and the need for a greater public understanding of ecological needs and biodiversity. Priority is placed on protecting existing ecologically important areas and preventing further degradation. In 2004, the landscape-level priorities included: (1) watershed restoration, with emphasis on improving water quality and water quantity; (2) nuisance species control; (3) native forest restoration, with emphasis on longleaf pine restoration; (4) an outreach position for the ecosystem team; (5) corridors and buffers that cross state lines, with a focus on coordination between adjacent states; (6) bay health; (7) watershed buffers and the use of Best Management Practices; and (8) improvements in managing reservoirs to benefit fish and wildlife.

SURFACE WATER IMPROVEMENT AND MANAGEMENT PLANS FOR THE AUCILLA AND ST. MARKS RIVERS

Florida's Surface Water Improvement and Management Act authorizes and directs creation of surface water and improvement management plans throughout the state and provides the basis for actions by state agencies to enhance the environmental and scenic value of surface waters. The Act states that because of point and nonpoint source pollution, as well as destruction of natural systems, many surface waters have become or are threatened to become degraded to the point where they no longer perform the functions they once performed. These functions include (1) providing aesthetic and recreational pleasure for the people of the state; (2) providing habitat for native plants, fish, and wildlife, including threatened and endangered species; (3) providing safe drinking water to the growing population of the state; and (4) attracting visitors and accruing other economic benefits.

The individual surface water improvement management plans recognize the importance of public conservation lands, such as the refuge, for watershed protection.

OUTSTANDING FLORIDA WATERS DESIGNATIONS

Section 403.061(27), Florida Statutes, grants the Department of Environmental Protection the power to "Establish rules which provide for a special category of water bodies within the state, to be referred as 'Outstanding Florida Waters,' which shall be worthy of special protection because of their natural attributes." The regulatory significance of this statute is to prevent the Department from issuing permits for direct or indirect pollutant discharges into Outstanding Florida Waters, which would lower

or degrade their existing water quality. Permits for new dredging and filling must clearly be in the public interest. Among other public conservation lands within the state, all waters in national wildlife refuges are designated as Outstanding Florida Waters. The Aucilla, Ochlockonee, and St. Marks Rivers have such a designation. The Wakulla River is designated as a “Special Water,” a subset of Outstanding Florida Waters for those waters of “exceptional recreational or ecological significance.”

BIG BEND SEAGRASSES AQUATIC PRESERVE

The Big Bend Seagrasses Aquatic Preserve is the largest aquatic preserve in the state. It comprises about 945,000 acres of sovereign submerged lands along 150 miles of coastline from the St. Marks River in Wakulla County to the Withlacoochee River in Levy and Citrus Counties. The boundaries (Figure 5) encompass all tidal lands, islands, seagrass beds, shallow banks, and submerged bottoms located 9 miles waterward into the Gulf of Mexico to which the state holds title, generally below the mean high water line. The preserve was designated as such in 1985 for the primary purpose of biological resource protection and to “ensure public recreational opportunities while assuring the continued propagation of fish, birds, manatees, and other wildlife resources” (Draft Management Plan 1992, unpublished). Management intent is defined in the Florida Aquatic Preserve Act of 1975 for such preserves possessing “...exceptional biological, aesthetic and scientific value...to be set aside forever as aquatic preserves or sanctuaries for the benefits of future generations” (Section 258.36, Florida Statutes). In 1986, the Florida Department of Environmental Regulation (now merged into the Department of Environmental Protection) designated the entire preserve as Outstanding Florida Waters.

The refuge currently plays a passive but important role in the protection of aquatic resources. The Big Bend region of Florida contains one of the largest continuous areas of seagrass beds in the United States (Figure 8). The seagrass beds located offshore from the Aucilla, St. Marks, and Ochlockonee Rivers appear to be in good health. Aerial surveys of seagrass resources located between Waccasassa Bay and the Suwannee River were acquired by the Suwannee River Water Management District in 2001. Field work began in the refuge area in 2004 (Rob Mattson, Suwannee River Water Management District, pers. comm.). As funding becomes available, the District has been interpreting and mapping that photography. In October 2003, the U.S. Geological Survey acquired the aerial photography to cover Apalachee Bay, but funding has not been secured to map the seagrasses from the photography.

NATIONAL FIRE INITIATIVE

Nearly a century of fire exclusion, along with land use practices and an increase of exotic species, has resulted in altered vegetation composition and structure on many public and private lands. These conditions contribute to higher fire intensities, rates of spread, and resistance to control. The result has been an increase in the number of large wildland fires over the last two decades. Another factor that has compounded this problem has been the growth of communities in the wildland-urban interface (i.e., the areas adjacent to public lands). These new developments put homes and other structures closer to public forests where larger wildland fires can occur. Several communities share borders with the refuge: Shell Point, St. Marks, Panacea, Medart, Sopchoppy, Otter Creek, Spring Creek, Live Oak Island, Ochlockonee Bay, and Oyster Bay.

Figure 6. Florida Forever Black Bear Work Group land acquisition priorities

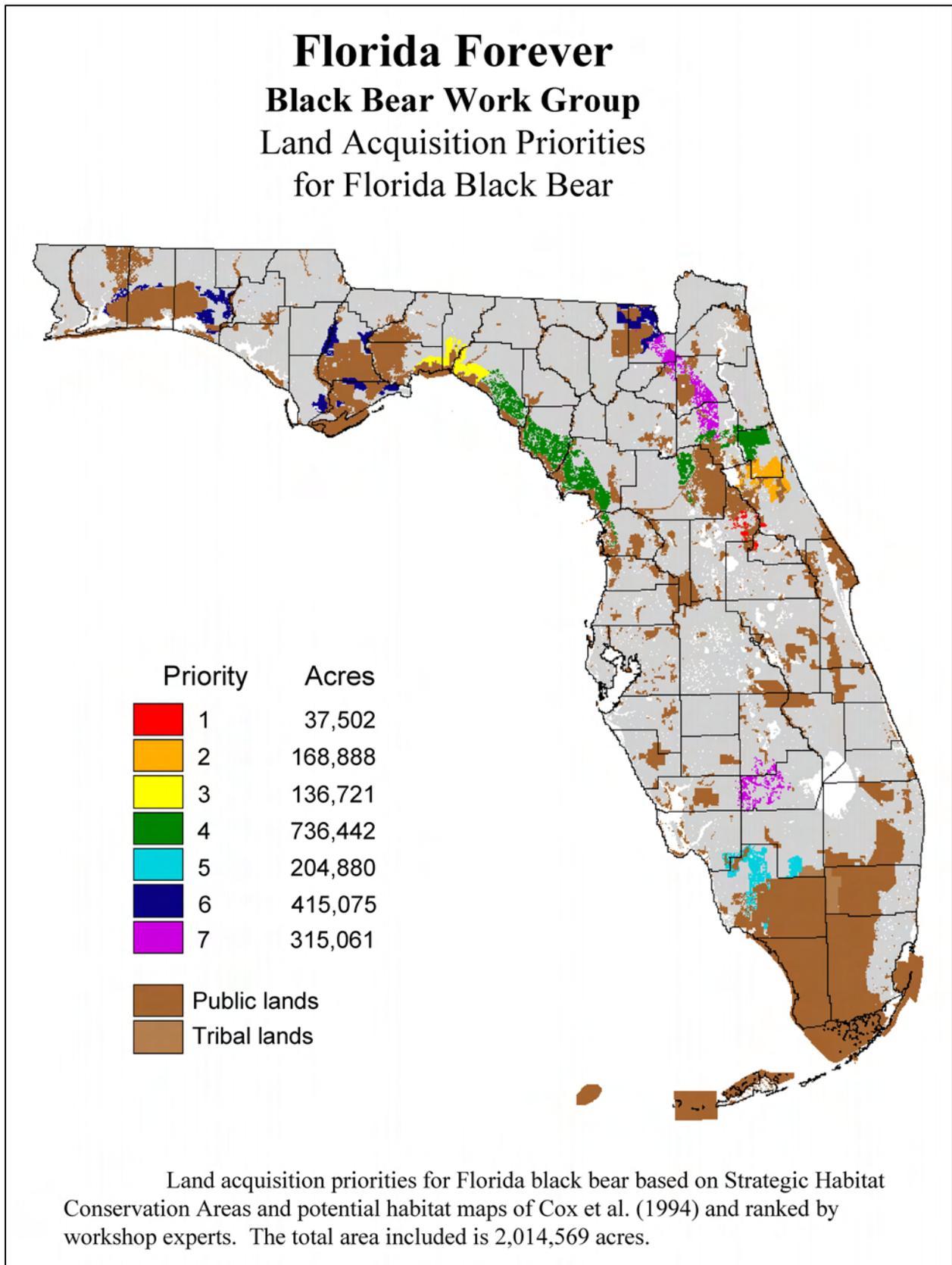


Figure 7. U.S. Fish and Wildlife Service ecoregions, Southeast Region

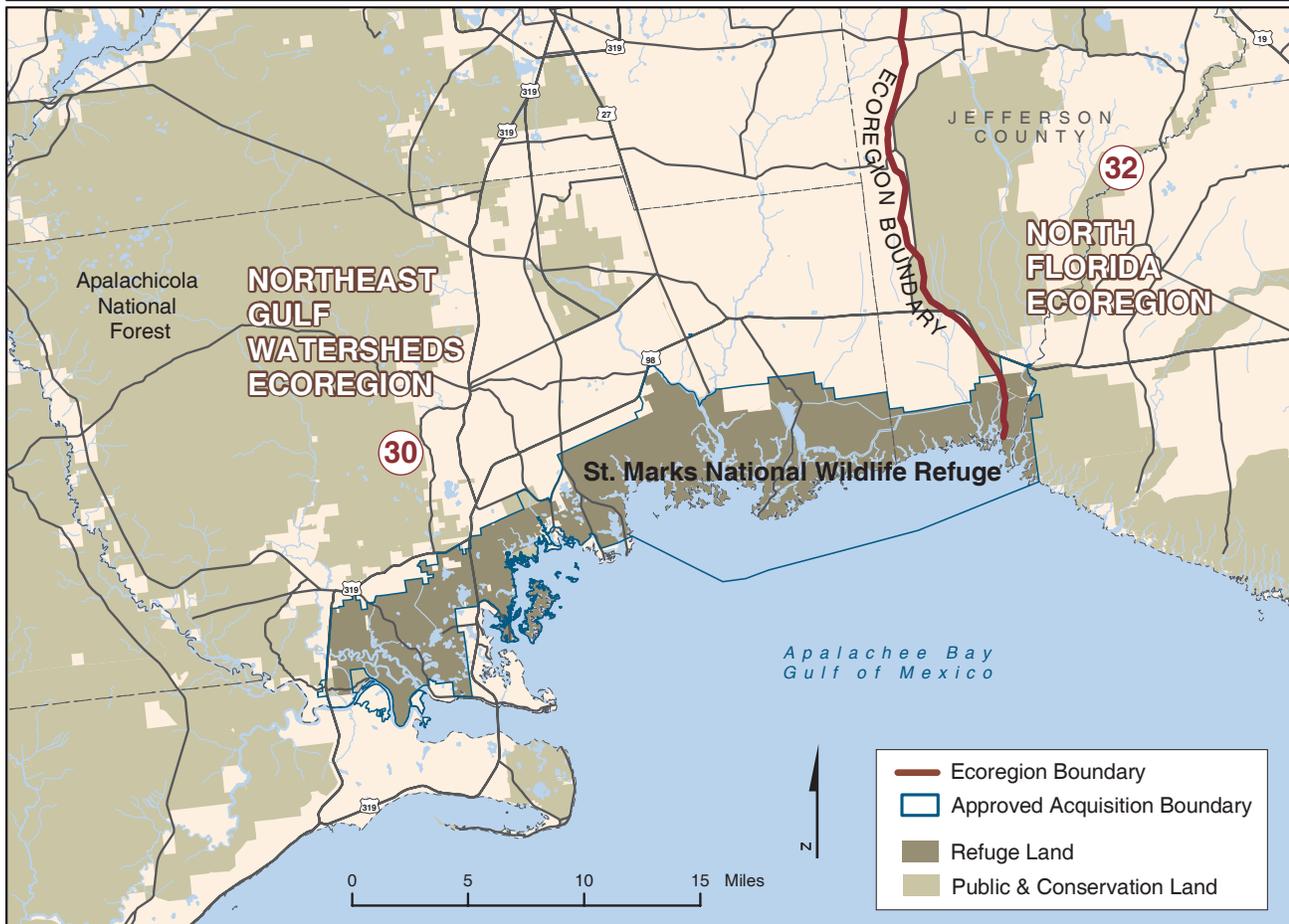
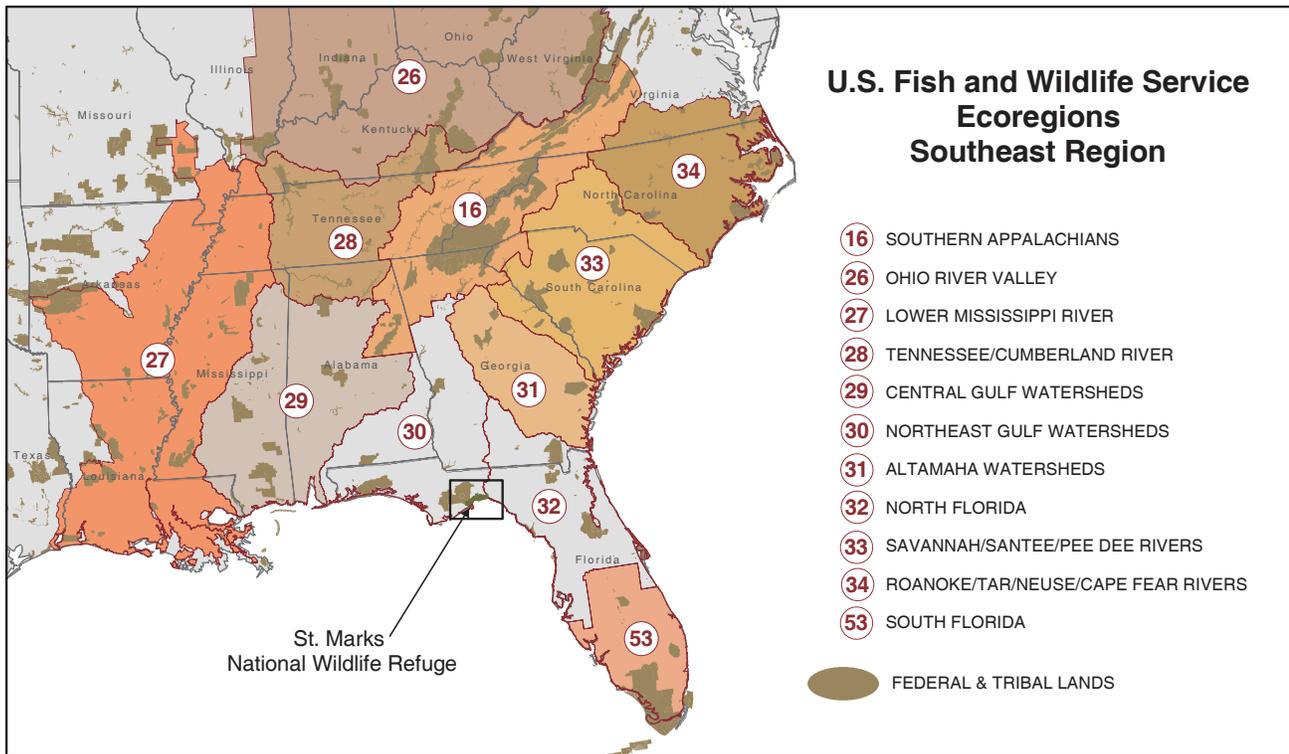
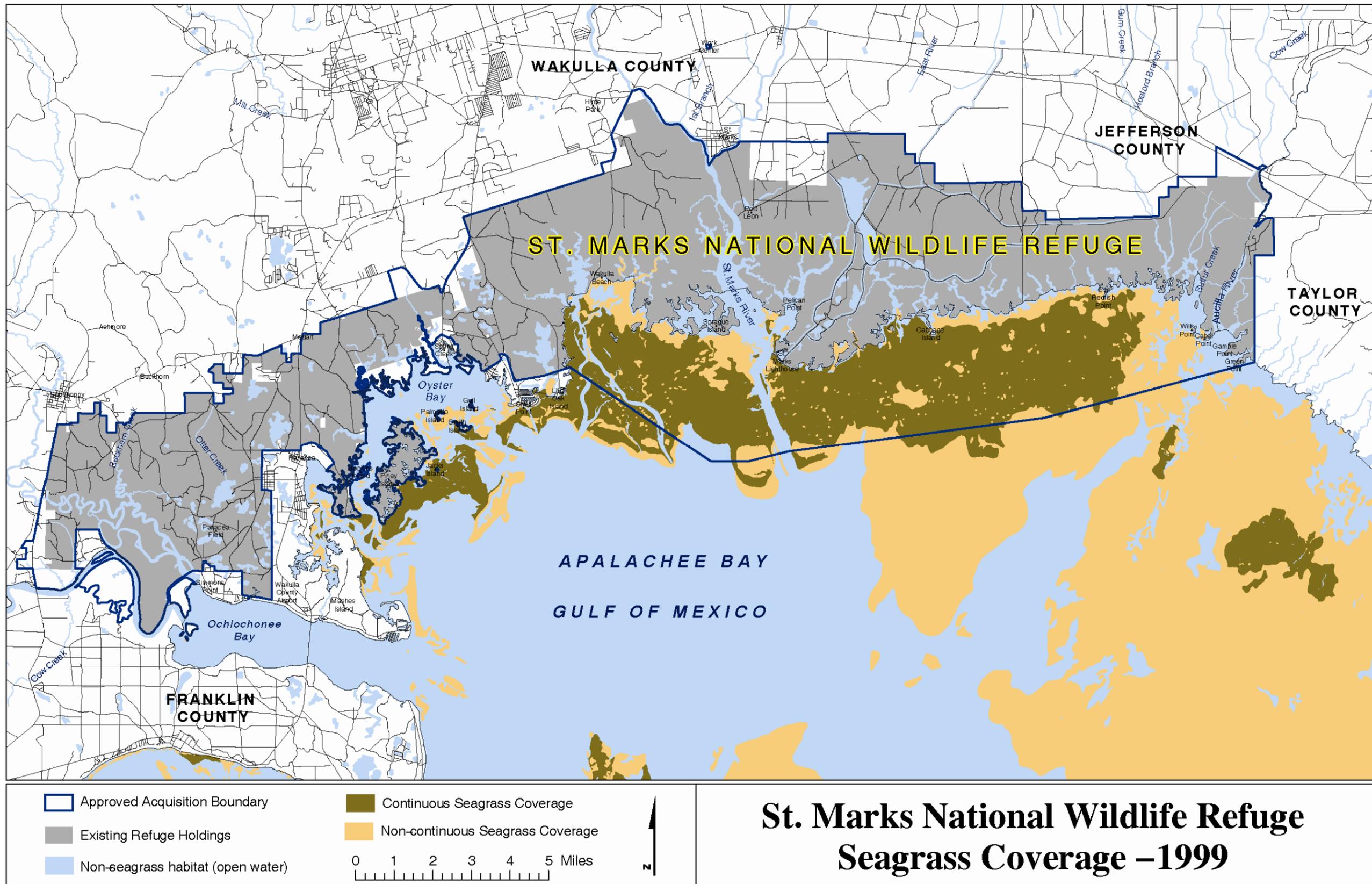


Figure 8. St. Marks National Wildlife Refuge seagrass coverage, 1999



In 2001, the National Fire Plan was developed in response to the severe wildfire season of 2000. Since fiscal year 2001, the National Fire Plan has included congressionally directed appropriations for wildland fire management. If implemented as written, the plan would ensure sufficient funds to support and improve firefighting resources, to restore ecosystems damaged by recent fires, to rebuild community economies, and to reduce wildfire risk by reducing fuel loads.

The federal government is developing a common planning and budgeting process for five federal wildland firefighting agencies called the Fire Program Analysis. A team of wildland fire staff members is working on an Initial Response module to guide the development of the new interagency fire program. This system will restructure fire programs to comply with directions from federal departments, Congress, and the Office of Management and Budget. The objectives of this effort are to identify cost-effective collaborative programs at the local level and to improve the formulation of wildland fire budget requests. This collaborative program may be extended to state and county fire equipment and personnel. Project completion is expected by the end of fiscal year 2008, with implementation by 2010.

LONGLEAF PINE/WIREGRASS HABITAT RESTORATION

Prior to extensive European settlement of the Southeast Coastal Plain and Piedmont in the 1700s, longleaf pine forests and savannahs were the dominant community types. It is estimated that these communities covered 92 million acres from southeast Virginia to eastern Texas across the Atlantic and Gulf Coastal Plains. Today, no more than 3 million acres remain, 8,800 of which are classified as old growth. North Florida still has the largest remaining acreage of longleaf pine ecosystem. The Apalachicola National Forest, which is adjacent to the refuge, nearby Eglin Air Force Base, and Blackwater State Forest contain the largest tracts of longleaf pine forests in the world.

Longleaf pine forests and savannahs include some of the most biologically diverse groundcover in the Northern Hemisphere. At the refuge, surveys indicate that there may be 100 to 250 understory plant species found on a given acre and at least 650 species across the refuge. Unfortunately, this once extensive ecosystem has been lost due to development, agricultural practices, and conversion to other forest types and the remaining longleaf pine has been degraded due to past management and fire suppression. In *Endangered Ecosystems of the United States: A Preliminary Assessment of Loss and Degradation* (Noss et al. 1995), the longleaf pine ecosystem is classified as “critically endangered.” The report states “... of all our natural biotic communities, the longleaf pine type may be the hardest to find in anything approaching its original condition.” The intent of management in refuge pinelands is to perpetuate the remaining longleaf pine communities and to restore converted sites to their historically rich floral and faunal diversities.

The process for restoring the longleaf pine ecosystem is still in its infancy. Information is available concerning the use of fire for longleaf habitat management, especially growing season fires, but there are many unknowns. Several types of information are needed for effective management and restoration, including those that:

- observe and document wildlife responses to the various management and restoration techniques;
- determine the best use and timing of fire and/or other management techniques; and
- evaluate the results, adverse impacts, and cost-effectiveness of the various techniques (e.g., fire, chemical treatments, mechanical site preparations, seeding, and planting) used to restore groundcover and longleaf pine in sandhills, mesic flatwoods, and hydric savannahs.

The refuge is centrally located within the historic range of the longleaf pine belt and contains a representative spectrum of longleaf pine ecotypes, ranging from xeric sandhills to mesic flatwoods and savannahs. Recent partnership projects with Apalachicola National Forest (on red-cockaded woodpecker recovery management and wiregrass seed collection) and The Nature Conservancy (on wiregrass restoration) underscore the refuge's commitment to longleaf pine ecosystem management and highlight the critical need for additional information and resources to implement projects on a landscape scale.

Twenty-seven federally listed species and 99 species proposed for federal listing are associated with the longleaf pine ecosystem in the southeast. The Nature Conservancy includes the Florida Panhandle on its national list of most biologically diverse, threatened regions in its report *Precious Heritage: The Status of Biodiversity in the United States* (Stein et al. 2000). It tracks more than 300 globally imperiled plant and animal taxa that are directly dependent upon longleaf pine habitats. Of those species, 155 are fire-adapted herbaceous perennial plants, now rare because of fire exclusion and habitat loss/fragmentation. Eighty-six bird species, excluding transients, use longleaf pine habitats, including 17 species at the refuge that are listed by Partners in Flight as priority species.

The refuge contains high-quality mesic flatwoods habitat that is home to several newly discovered breeding sites of the federally listed flatwoods salamander. The refuge also supports a portion of the world's largest functioning population of federally endangered red-cockaded woodpeckers. The State of Florida's "Closing the Gaps" program identified pine flatwoods and associated lowland habitats in the refuge and surrounding public lands as primary habitat for the largest Florida black bear population in the Southeast Coastal Plain, and as suitable potential habitat for Florida panther reintroduction. Rangewide, longleaf pine communities support 34 amphibian species and 38 reptile species, of which approximately one-third are longleaf pine habitat specialists. Notable among those, the refuge hosts populations of the federally threatened eastern indigo snake and of the gopher tortoise, a keystone species whose burrows provide habitat for more than 360 commensal species of vertebrates and invertebrates.

Since 1980, the refuge has worked with Tall Timbers Research Station to manage 34 season-of-fire research plots in two types of longleaf pine communities on the refuge. The plots are the oldest, most comprehensive, and continuous season-of-fire plots in existence. The research conducted at these plots has resulted in numerous scientific papers and has helped the refuge staff to understand the importance of using seasonal fires to shape longleaf pine communities. The plots remain a focal point of tours by visiting scientists and biologists.

In 1998, the refuge and the Joseph W. Jones Ecological Research Center established a series of longleaf pine restoration plots on the refuge and the Jones Center (Ichauway Plantation). The research is funded by the Service through the National Interagency Fire Center, with additional support from American Forests through their Global Releaf 2000 Program. These plots are designed to use adaptive management in restoring the longleaf pine community on sites previously converted to slash pine plantations.

In addition to the work by Tall Timbers, the Jones Center, and their collaborators, the refuge staff and outside researchers are currently conducting numerous ongoing studies, including work on flatwoods salamander distribution and habitat; red-cockaded woodpecker population dynamics; wiregrass seed collection and restoration; longleaf pine restoration and regeneration; and rare plant responses to management.

In 1999, the Service produced an internal planning and guidance document entitled “Fulfilling the Promise: The National Wildlife Refuge System, Visions for Wildlife, Habitat and Leadership.” It proposed a pilot program to establish Land Management Research and Demonstration Areas on selected refuges throughout the nation. The purposes are to showcase state-of-the-art management and to promote innovative research in important wildlife habitats. In conjunction with Carolina Sandhills National Wildlife Refuge, the St. Marks Refuge has been selected as such a site for the management of longleaf pine ecosystems. Fourth in the Service’s national priority, the site awaits funding.

PHYSICAL ENVIRONMENT

CLIMATE

Due to its latitude and position near the Gulf of Mexico, St. Marks National Wildlife Refuge has a mild, subtropical climate. Winters are generally mild. Summers are hot and humid; summer sea breezes can lower temperatures slightly along the coast. The region’s wind direction and circulation patterns are influenced by tropical air masses in the spring and summer, and by cold fronts pushing down the continent during the fall and winter. The mean summer temperature of nearby Tallahassee is 81 degrees Fahrenheit, with a mean winter temperature of 54 degrees Fahrenheit. Table 3 depicts the monthly average high and low temperatures for the 30-year period of 1961 through 1990. These data are from nearby Tallahassee. Actual temperatures on the refuge are moderated due to the coastal influence, which results in lower daytime highs and higher nighttime lows.

According to the U.S. Environmental Protection Agency, global temperature records show an average warming of one degree Fahrenheit over the past century, with the past two decades experiencing the most rapid warming. This is due to human activities, such as forest clearing and fossil fuel burning, the latter of which emits large amounts of greenhouse gases into the atmosphere. Scientists predict an average global warming of 2 to 6 degrees Fahrenheit by 2100 and greater warming thereafter.

The 40-year (1961-2000) normal, average rainfall at the Mounds station on the refuge is 55 inches per year (Table 3). Monthly rainfall amounts vary from 3 to 7 inches with October and November as the driest months. The summer months (June through September) are wettest. Late afternoon and evening thundershowers occur, on average, every other day. Florida also receives a major portion of its yearly rainfall from hurricanes and tropical storms, usually in the summer and early fall. Hurricanes occur in the area about once every 17 years, with lesser effects from non-direct landfall storms about once every 5 years.

Florida had the worst drought in its history between 1998 and 2000. Recreational use of lakes declined as water levels lowered. Wildfires were abundant. Crops were lost and water restrictions for domestic use were put into place.

Physiography

Table 4 shows the divisions of time within the Cenozoic Era when Florida’s lands formed.

During higher sea levels in ancient times, the rocks and sediments that comprise the coastal plains were formed. Most of the panhandle of Florida is an uneven platform of carbonate bedrock covered by one or more layers of clastic sediments. The bedrock is limestone; the overlying sediments are sand, silt, clay, shell marl, rock, fuller’s earth, and phosphatic matrix. Fossils, peat (e.g., dead vegetable matter), or petrified wood can also

Table 3. Climatological data for St. Marks National Wildlife Refuge

Month	2003 Rainfall - Mounds	40-year Normal Rainfall Total (inches) - Mounds	Monthly Avg. Temperature - Maximum (F)*	Monthly Avg. Temperature -Minimum (F)*
January	1.83	3.56	62.8	38.4
February	8.25	4.38	66.1	40.3
March	12.76	4.91	73.4	46.9
April	4.55	3.76	80.4	52.3
May	4.06	3.23	86.2	60.9
June	13.36	6.07	90.6	68.4
July	6.67	7.57	91.3	71.2
August	7.32	6.28	90.8	71.4
September	4.87	6.01	88.2	67.9
October	6.41	2.72	81.2	55.7
November	2.37	2.80	72.8	46.3
December	3.78	3.93	65.8	40.5
Total	76.23	55.22		

Source: Rainfall data from the refuge's Mounds weather station (1961-2000).

*Temperature data are for the 30-year period from 1961-1990. These data are from Tallahassee and reported by the Northwest Florida Water Management District's website: <http://www.state.fl.us/nwfwmd/rmd/temps/mthtemps.htm>.

Table 4. Geologic time chart - Cenozoic Era

Era	Period	Epochs	began (million years ago)	ended (million years ago)
Cenozoic Era	Quaternary Period	Holocene	.008	present
		Pleistocene	1.8	.008
	Tertiary Period	Pliocene	5.3	1.8
		Miocene	23.8	5.3
		Oligocene	33.7	23.8
		Eocene	55.5	33.7
		Paleocene	65	55.5

Source: United States Geologic Survey, http://vulcan.wr.usgs.gov/Glossary/geo_time_scale.html.

occur. The refuge lies within the Gulf Coastal Lowlands physiographic province (Figure 9), which extends from the Gulf of Mexico inland to the Northern Highlands or Tallahassee Hills. The separation between the two is the distinctive Cody Scarp, which rises noticeably in the predominantly flat landscape of Florida. The Cody Scarp is the northern extent of a Pleistocene Epoch sea level transgression that removed older Miocene and Pleistocene sediments and exposed the underlying limestone carbonates.

Within the Gulf Coast Lowlands, the refuge lies mostly within the Woodville Karst Plain. It consists of a thin layer of Plio-Pleistocene sands over limestone. The shallow sand deposits extend down no more than 30 feet and the limestone often outcrops along streams and near the coast. These limestone features are known as karst topography, which is porous land affected over millions of years by the solution of limestone by acidic rain or ground waters. Solution features include sinkholes, lakes, underground rivers, springs, and caverns. Notable karst features in the area include Wakulla Springs, Leon and River Sinks, Natural Bridge, and Spring Creek. The coastal portion of the Woodville Karst Plain is known as the Marsh Strip. Here the limestone is within 6 feet of the surface and covered by sand or peat.

During the Pleistocene, Florida was twice its current size and extended to the present-day Continental Shelf. The sea level rose during the Holocene to its present position about 4,500 years ago. Today, the low energy coastline of Apalachee Bay has little wave action. The low relief and low energy coastline provide the conditions necessary for extensive seagrass bed development.

HYDROLOGY - HISTORICAL CHANGES AND IMPACTS

Historically, the flat topography and low, wet nature of the eastern half of the refuge and adjoining lands to the north provided a slow steady release of water into the refuge and Apalachee Bay. In the 1930s and early 1940s, the Civilian Conservation Corps constructed dikes (levees) and developed impoundments for the benefit of wintering waterfowl. The Corps captured some of this runoff, particularly from East River (Figure 10) and Gum Swamp. These regular flows from the private lands north of the refuge changed considerably over time as these low, wet lands were impacted by road building (and their associated roadside ditches) and the bedding of the land for industrial forest production, especially in the late 1970s and early 1980s. Recent flows of water from north of the refuge into the impoundments have been much less consistent than those experienced historically, with heavy flows following major rain events and virtually no flow during dry periods. The altered hydroperiods have greatly decreased the refuge's capability to manage the impoundments for migratory birds (particularly shorebirds), wetland wildlife, and fish by limiting the ability to reliably re-flood the impoundments throughout the year.

SURFACE AND GROUND WATER QUALITY

Water quality data on the St. Marks Refuge are scant. There are no permanent stations on refuge land to monitor the quality of surface or ground water. Most of the refuge is contained within the St. Marks and Ochlockonee River Basins (Figure 11). The Ochlockonee River Basin originates in Georgia, extends through 11 counties and drains 2,416 square miles. It flows south 206 miles to Ochlockonee Bay. The St. Marks River Basin also originates in Georgia. It drains about 871 square miles and is 37 miles long. The spring-fed Wakulla River is the largest tributary and flows for 10 miles to its confluence with the St. Marks River. The St. Marks Basin is unique in that it contains 6 of Florida's 27 first magnitude springs, that is, springs with discharge rates greater than 100 cubic feet per second. The submarine Spring Creek springs, measured at 2,003 cubic feet per second in 1970, had the highest discharge of all Florida spring groups.

Figure 9. Geology of north central Florida and St. Marks National Wildlife Refuge

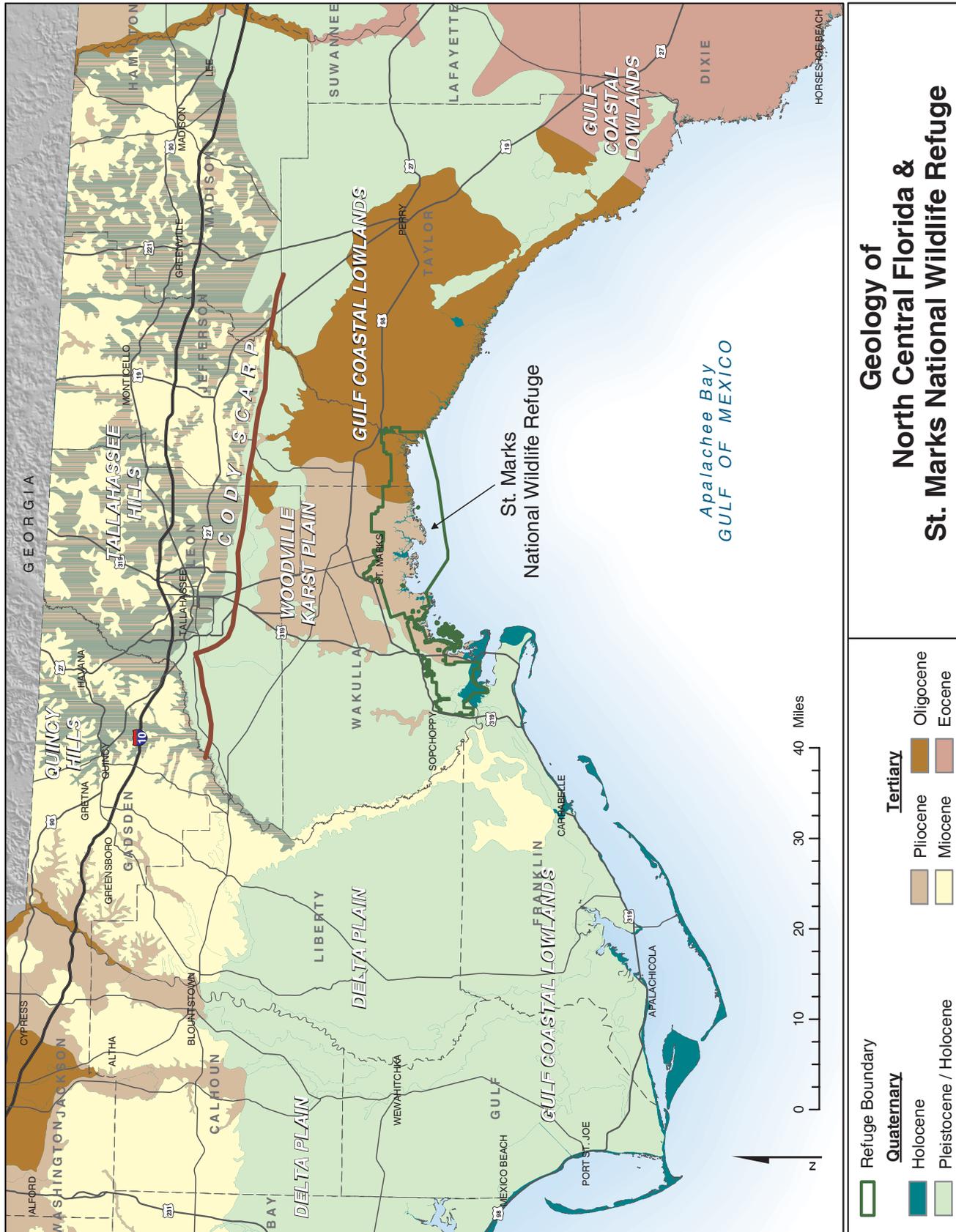


Figure 10. East River Watershed

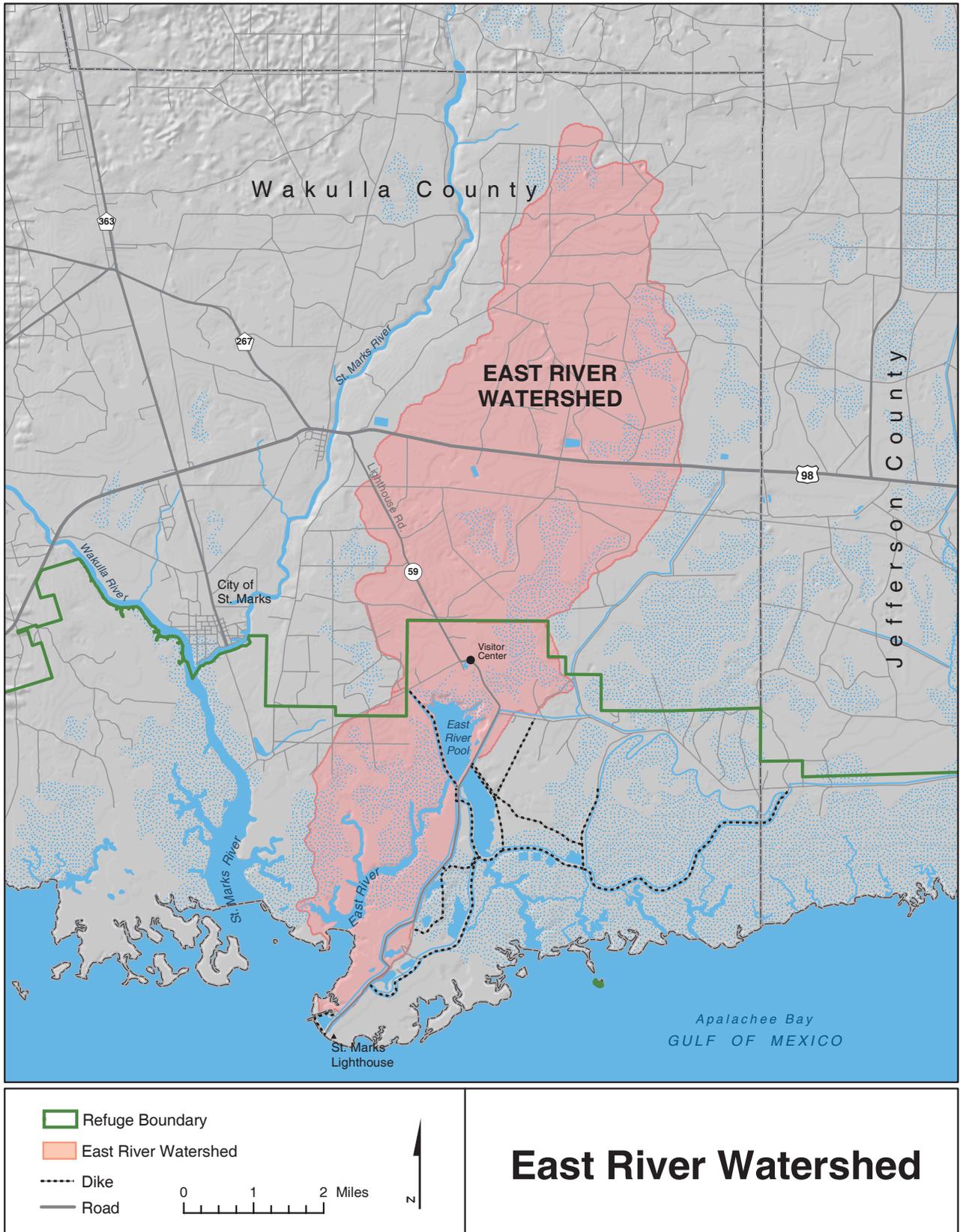
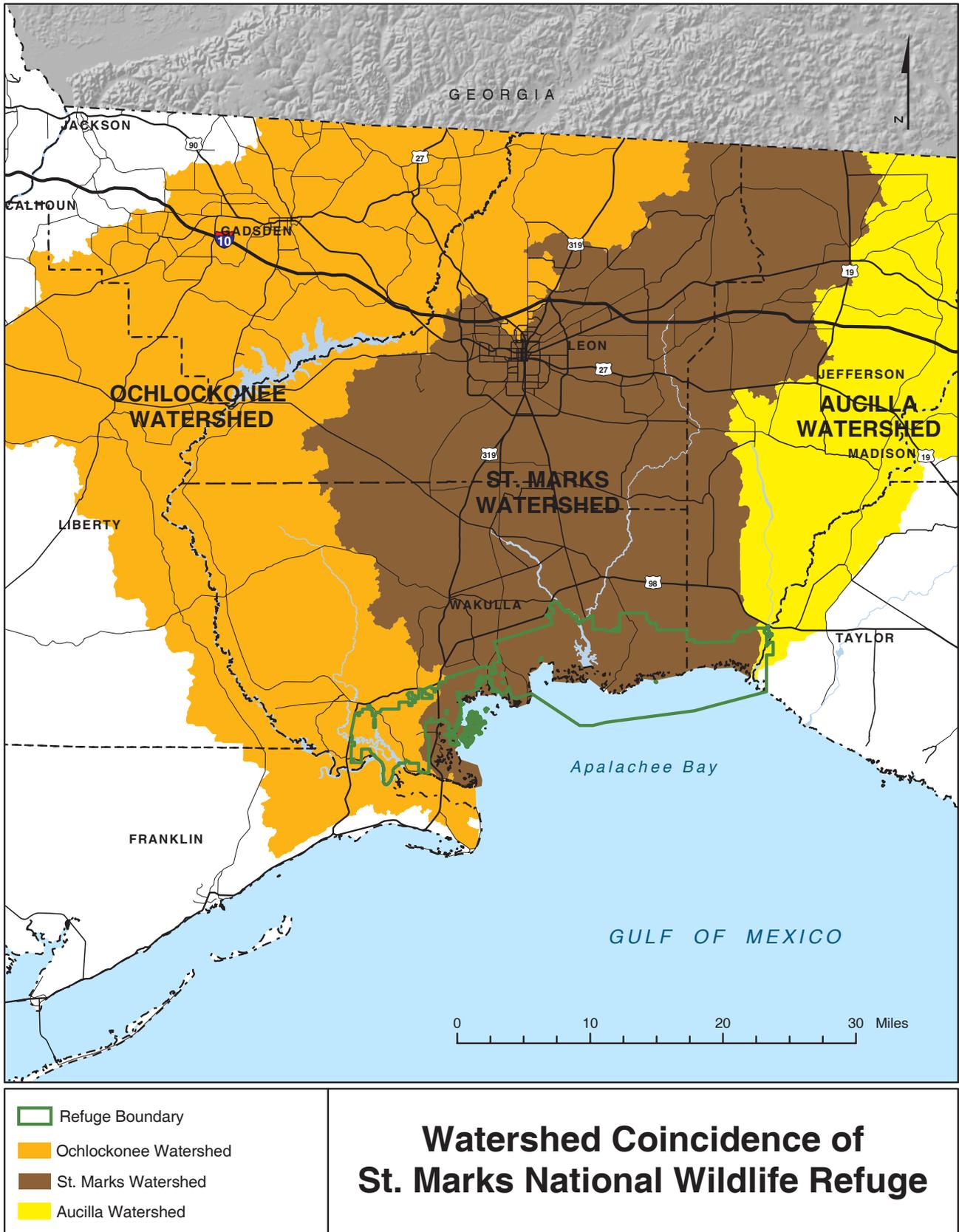


Figure 11. Watershed coincidence of St. Marks National Wildlife Refuge



The Department of Environmental Protection classifies both surface and ground waters according to their intended use and sets water quality standards and regulations to maintain these standards. There is only one groundwater classification called Class I, potable water supplies. Sixty wells were sampled by the Department during 2000 to assess water quality in confined and unconfined aquifers for both health and aesthetic contaminants. Basin resource indices signify good ground water overall on a regional scale. The Florida Aquifer supplies the drinking water for most of northwest Florida, with 90 percent of all drinking water coming from ground water. In its publication entitled *Looking at the Big Picture: St. Marks River Watershed*, the Northwest Florida Water Management District reports that ground water in the St. Marks Basin is generally plentiful and of high quality. It requires little treatment for public use.

Portions of Apalachee and Ochlockonee Bays are Class II (for shellfish propagation or harvesting) due to the presence of oyster beds. Few data exist on the condition of the waters that comprise the coastal watersheds and Apalachee Bay adjacent to the refuge. This area includes Dickerson Bay, Oyster Bay, Spring Creek, Shell Point, Walker Creek, Goose Creek Bay, the mouth of the St. Marks River, and the East and Pinhook Rivers. According to the 1997 Surface Water Management Plan for the St. Marks Watershed, "Apalachee Bay is not impacted by humankind and is in exceptional biological condition." Yet, shellfish closings after major rain events suggest otherwise. All other waters in both basins are Class III, meaning that they are intended for recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife.

The Department's 2001 Basin Status Report indicates that few water quality data have been collected for the South Ochlockonee River. Segments of the river have potentially been impaired by metals (e.g., iron), fish consumption advisories, and low dissolved oxygen. The report also states that the water quality of the Sopchoppy River is generally very good, although it has been listed for fish consumption advisories. The U.S. Geological Survey uses the Sopchoppy River as a national ambient water quality monitoring site to represent pristine water quality.

While the report ranks much of the St. Marks River as good, there are several problems, such as the occurrence of invasive aquatic vegetation, predominantly hydrilla and water hyacinth. At the town of St. Marks, four docking terminals carry, offload, process, and distribute petroleum products and bulk chemicals. Numerous oil spills have occurred throughout the years in this area. A spill of about 10,000 gallons in 1978 contaminated bottom sediments. Three potentially impaired water bodies for biology include Black and Lloyd Creeks and a segment of the St. Marks River (793B), which is also impaired due to low dissolved oxygen.

The Wakulla River also has problems with invasive aquatic vegetation (e.g., hydrilla and water hyacinth). Nitrate concentrations in Wakulla Springs have tripled in the past 25 years. A major decline in apple snails and the limpkin population since 2000 has been documented. A 2002 Northwest Florida Water Management District report states that "based on measurements of stream condition index and other observations, the biota of Wakulla Springs and the upper river have been adversely perturbed by anthropogenic (human-caused) impacts. These appear to result from the introduction of invasive aquatic plants and increased nutrient (nitrate) discharge."

Potentially impaired water bodies include McBride Slough (dissolved oxygen) and Big Boggy Branch (total coliform and biology).

According to the 1991 Aucilla River Surface Water Management Plan, the water quality in the Aucilla and Little Aucilla Rivers is classified as "good" by the Department of Environmental Protection, and both meet Class III standards.

The Northwest Florida Water Management District publication, *The Big Picture: St. Marks River Watershed* (2001), states that “one of the most effective methods of protecting water quality has been the public purchase of natural lands.”

CONTAMINANTS

Two contaminant studies have been conducted on the refuge by the Fish and Wildlife Service’s Ecological Services Field Office in Panama City, Florida. In 1988, a sediment study was done with 32 samples collected, of which 14 were onsite and 18 were on the St. Marks and Wakulla rivers (Hemming et al. 2002). Samples were analyzed for metals, polycyclic aromatic hydrocarbons, organochlorine and aliphatic hydrocarbons. The only contaminants found on the refuge were oil and grease, located in the impoundment known as Stoney Bayou #2. These contaminants are typically associated with small engine motor use. While metals (e.g., copper and mercury) and both polycyclic aromatic and aliphatic hydrocarbons were found on the industrial portion of the St. Marks River (i.e., near the refinery), none were detected on the refuge. No organochlorine residues were found in the study area. Since these are associated with pesticide use, it is a good indicator for the area.

In 1991, 7 species of fish were sampled for mercury contamination (Bateman et al. 1994). The 11 sampling stations—both on and off the refuge—included a variety of habitats. Four coastal saltwater sites, five freshwater ponds, lakes or impoundments, and two coastal rivers were sampled. Fish with muscle tissue that contains greater than 0.5 parts per million wet weight of mercury are limited for consumption. Four of the seven species exceeded the limits, including 12 of 36 largemouth bass sampled. The sites of contaminated bass were Otter Lake, Lake Renfro, and East River Pool. Other species above the limit were spotted sea trout (3 of 26), gafftopsail catfish (4 of 7), and hardhead catfish (4 of 26). The gafftopsail catfish was the only saltwater fish to exceed state consumption advisory levels. These were sampled in Dickerson Bay at channel marker 12. No fish are known to exceed the nonconsumptive standard of 1.4 parts per million wet weight. The study concludes that human-caused inputs of mercury should be stopped, since the difference between naturally occurring emissions (e.g., background levels) and toxic effects is very small.

AIR QUALITY

Air quality is a global concern. The U.S. Environmental Protection Agency has lead responsibility for the quality of air. Through the 1990 Clean Air Act, the Agency sets limits on the amount of pollutants that can be discharged into the air. Nationally, more than 170 million tons of pollution is emitted into the air annually within U.S. borders, through either stationary sources (e.g., industrial and power plants) or mobile sources (e.g., automobiles, planes, trucks, buses, and trains). There are also natural sources of air pollution, such as fires, dust storms, volcanic activity, and other natural processes. The Agency has identified six principal pollutants that are the focus of its national regulatory program: lead, carbon monoxide, ozone, nitrogen dioxide, sulfur dioxide, and particulate matter.

Air pollution causes damage to the environment and property and affects human health. Both federal and state governments track air quality and visibility impairment, through a system of 5,200 monitors at 3,000 locations across the United States. Florida has 227 monitors at 141 sites. Carbon monoxide is from combustion or fire sources and is a problem mainly in cold weather climates. Lead has not been detected above standard levels, except in places that have a smelter source. Nitrogen dioxide is only monitored in large metropolitan areas, but Florida has never approached the standard. Sulfur dioxide is emitted from power plants and paper mills. None of these four principal pollutants are monitored near the refuge since they are not considered problem pollutants in this area.

The Clean Air Act provides for the protection of visibility in national parks and wilderness areas, also known as Class 1 areas. A visibility station for monitoring airborne particulate matter was established on the refuge in June 2000. In April 2001, an ozone monitor was also installed. From the data collected since that time, the 85 parts-per-billion standard for ozone over an 8-hour period has been exceeded only twice, on May 14 and 16, 2001.

BIOLOGICAL ENVIRONMENT

NATIVE VEGETATION/PLANT COMMUNITIES/FLORA

The refuge encompasses more than 43 miles of coastal salt marshes backed by hardwood swamps, hardwood hammocks, and upland pine communities within Florida's Big Bend region. The dominant forces affecting vegetation characteristics are minor elevation changes, fire history and current fire management practices, historical timber harvest, and current timber management practices.

While elevation on the refuge ranges from sea level to 45 feet, subtle changes in topography result in substantial vegetation differences. Historically, frequent low-intensity fires burned the uplands every 1 to 8 years, resulting in a classic mosaic of longleaf and slash pine-dominated flatwoods and sandhills on the refuge's uplands. Prior to refuge acquisition, much of the original growth of pine and cypress was commercially harvested for lumber. Subsequent to refuge acquisition in 1931, approximately 1,900 acres of brackish and salt marshes were enclosed by levees and water management structures. These areas, formerly dominated by salt-tolerant marsh vegetation, now support a diverse assemblage of freshwater and brackish emergent, aquatic, and floating plants, including sedges, rushes, spikerushes, cattails, water lilies, and widgeon grass.

The refuge contains examples of 24 natural communities as defined in the Florida Natural Areas Inventory (FNAI) *Guide to the Natural Communities of Florida* (1990). In 2005 the refuge completed an in-house Geographic Information Systems (GIS) project to map the natural vegetation communities within the refuge, based on forest stand inventory data from the Forest Management Plan (1985) and corrected upon Digital Ortho Quarter Quad (DOQQ) aerial imagery from 1999 provided by the Florida Department of Environmental Protection. Discrete habitat units were delineated at a scale of less than one acre (38 percent of 5,969 polygons are from .01-.99 acres in size). Minimal ground truthing was employed during this phase, since the primary effort was to digitize available data. Forested habitats had already been assigned habitat descriptions that were easily matched to the FNAI's *Guide to the Natural Communities of Florida*. Nonforested areas of the refuge, primarily coastal marshes and associated habitat types, were relatively easy to distinguish and attribute at a scale of 1:5,000 on available DOQQ imagery. No attempt was made to distinguish marine or estuarine habitat types seaward of the coastal salt marsh fringe. The refuge's Executive Closure Areas include at least three additional FNAI marine/estuarine habitat types. Seven additional habitat types or groups, not described in FNAI 1990, were employed in this analysis. In general, these habitat types are either anthropogenically disturbed or managed or naturally occurring communities for which FNAI has not yet developed a full and relevant description. They are, in increasing order of area covered: (1) Borrow Pits and Non-vegetated Areas (including naturally occurring nonvegetated areas); (2) Coastal Depression Ponds; (3) Former Pasture / Grass and Brush; (4) Human Disturbed Recreational Areas and Road Shoulders; (5) Coastal Salt Barrens; (6) Managed Impoundments (excluding marsh or forested areas); and (7) Mesic Hammock.

A technical description of the predominant natural communities and land use data is provided in Section B, Appendix IV. The land cover data are shown for the St. Marks, Wakulla, and Panacea Units, respectively, in Figures 12, 13 and 14. Table 5 summarizes area of occurrence of these 24

FNAI and 7 additional habitat types on all lands owned and administered by the St. Marks Refuge as of May, 2005. The sum of all habitat types in Table 5 totals 68,558 acres, slightly less than the current official refuge acreage figure by 0.5 percent. This variance is the result of two primary factors. First, the official acreage figure represents surveyed and deeded acres, while the habitat acreage figure is the result of GIS analysis of land cover types using aerial imagery. Secondly, some areas of water features, if not completely surrounded by refuge lands, were not included in the GIS analysis of habitat types, and digitizing of the saltmarsh fringe may have included or omitted slivers of refuge acres.

The following are generalized habitat descriptions of the four most common habitat assemblages on the refuge and collectively account for 91 percent of the refuge area. The remaining 9 percent of vegetation assemblages are primarily Mesic Hammock, Maritime Hammock, and various human-altered habitat types.

Salt Marsh (Tidal Marsh)

Salt marshes cover 29 percent of lands within the refuge, forming the immediate landward side of the low energy coastline along Apalachee Bay and extending up tidally influenced rivers. They are plant communities of the intertidal zone, the transition area between terrestrial and marine environments. The dominant plant is black needlerush, found in expansive stands with few other plants, generally slightly elevated above average tidal influence. The lowest fringes of the salt marsh, inundated at least twice daily by tides, are dominated by smooth cordgrass. Saltmeadow cordgrass transitions between the tidal reach and the highest portions of the salt marsh community, which are only flooded during the highest tides or storm surges. There a mix of herbaceous and woody salt-tolerant vegetation is found, which includes saltbush, marsh elder, Christmas berry, seaside goldenrod, sea blite, marsh hay cordgrass, saltwort, glasswort, sea purlane, coastal dropseed, and sand cordgrass.

Longleaf and Slash Pine Flatwoods and Sandhills

Pine-dominated uplands occupy about 28 percent of the total refuge area, and are represented by four Florida Natural Areas Inventory natural community types: mesic flatwoods, scrubby flatwoods, wet flatwoods, and sandhill. While great variation exists between these communities, all are influenced by frequent fire. They typically have pine-dominated overstory and ground cover with a highly diverse herbaceous component. Vegetation plots representative of the various pine types on the refuge document approximately 650 vascular plant species (Section B, Appendix IV). Four of the six native pine species present on the refuge are common: longleaf, slash, pond, and loblolly. Sand pine is rare, occurring as scattered individual trees on the Panacea Unit, while spruce pine is an occasional component of some hardwood hammock forests. Woody midstory species are

typically dominated by scrub oaks (e.g., turkey, bluejack, sand-live, and sand-post); hollies (e.g., large gallberry, gallberry, and yaupon); oaks (e.g., live, laurel, and water); blueberry species (e.g., sparkleberry, highbush, and deerberry); and a variety of other trees (e.g., sweetgum, persimmon, red maple, swamp bay, pond cypress, and cabbage palm). The greatest diversity of these communities resides in the understory. The most common grasses, forbs, and woody plants include wiregrass, Florida dropseed, blueberries, huckleberries, and saw palmetto.

Figure 12. St. Marks Unit natural community types

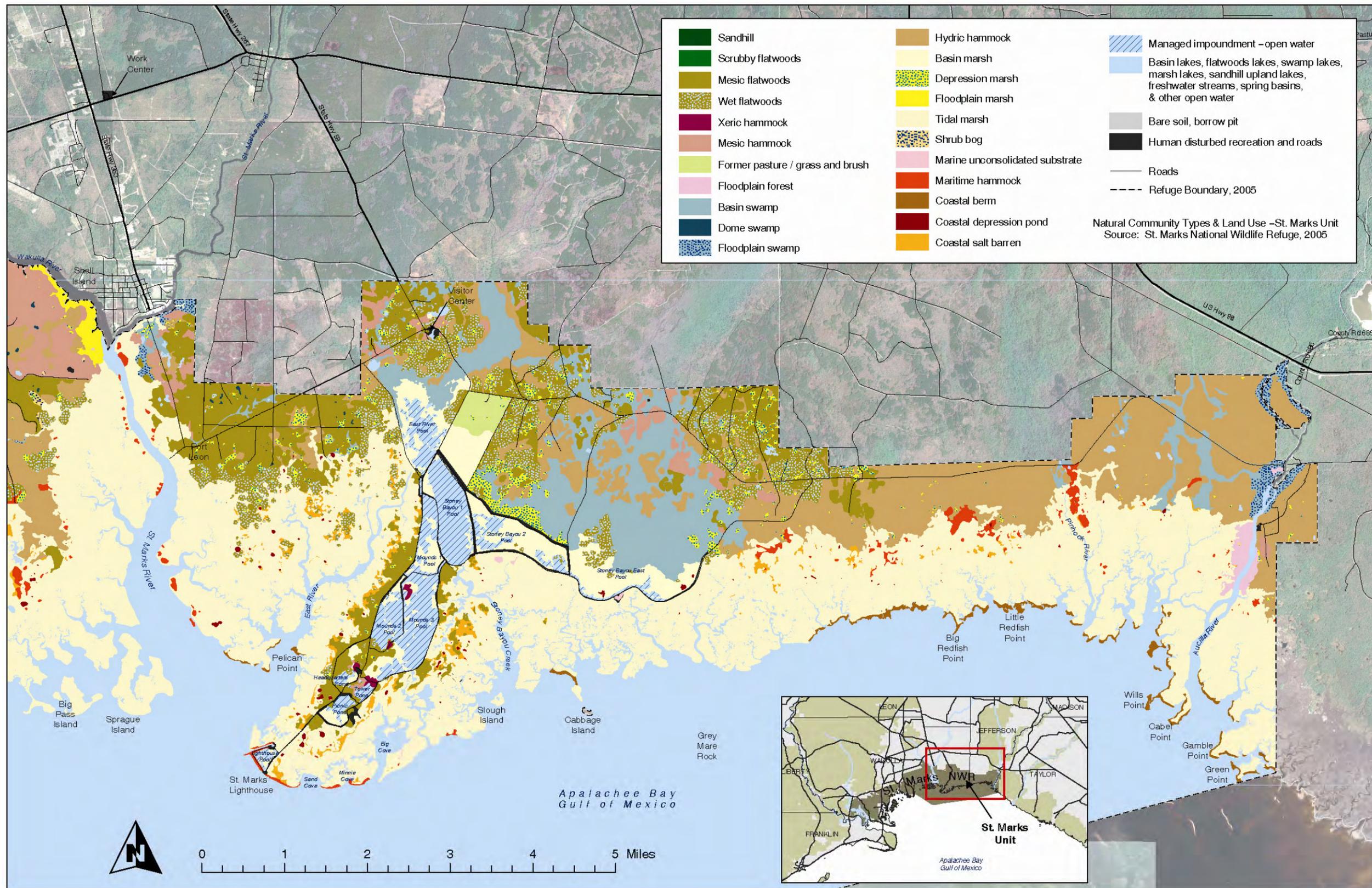


Figure 13. Wakulla Unit natural community types

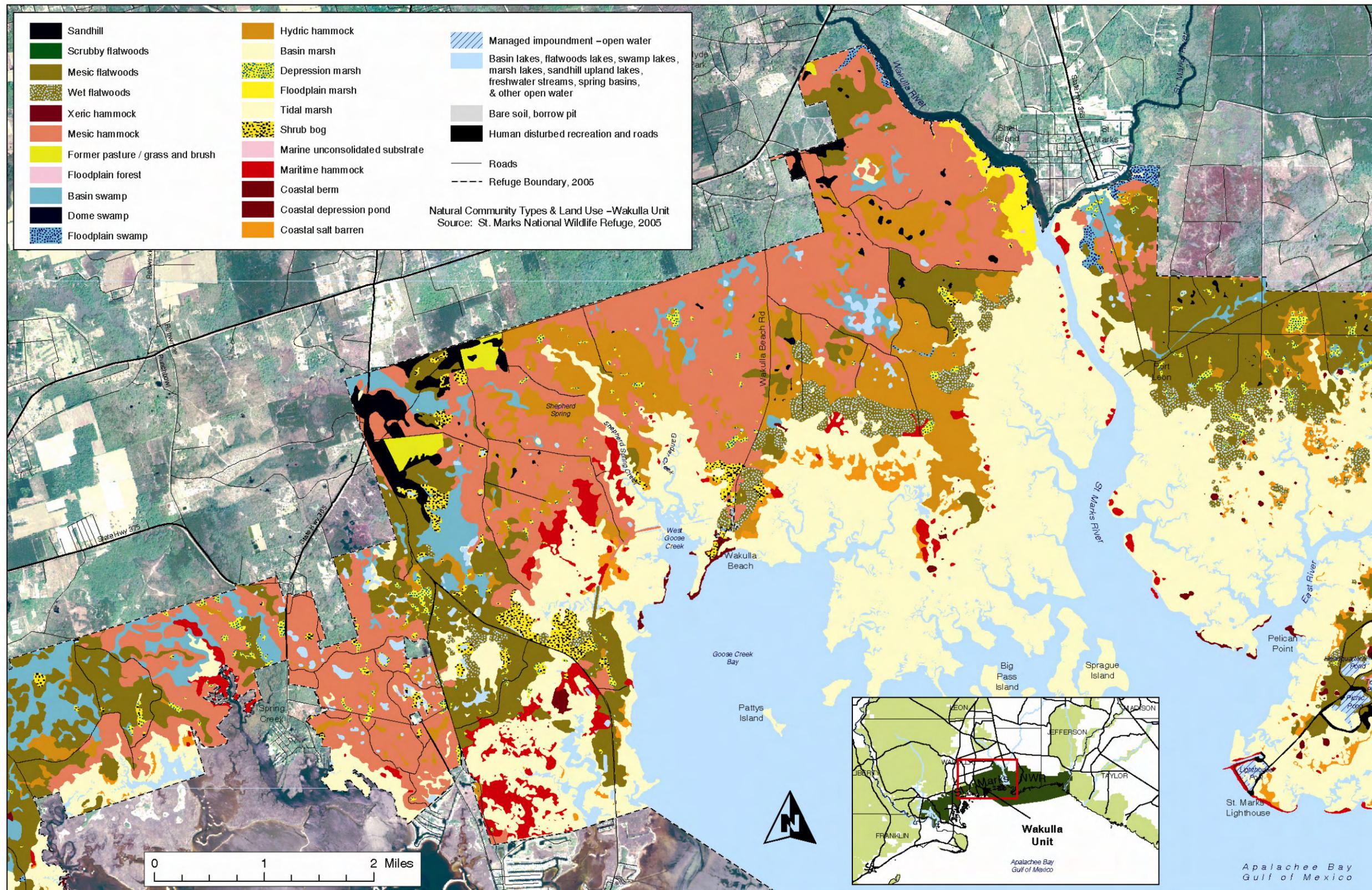


Figure 14. Panacea Unit natural community types

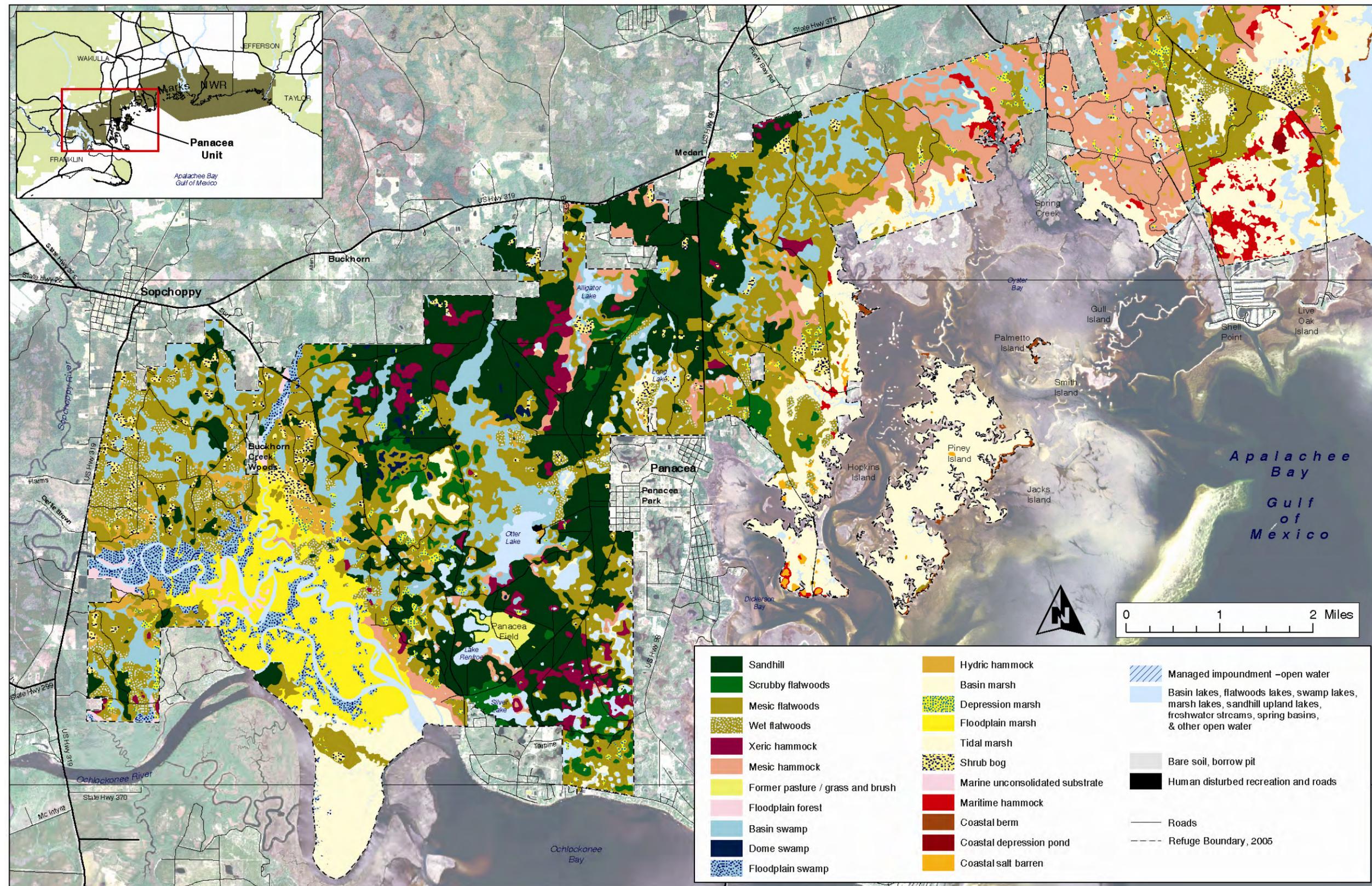


Table 5. Land use summary - natural community types in ascending order of area represented

FNAI Natural Community Type <i>(Refuge-specific habitats are noted in italics)</i>	Acres
Spring Basin	1.1
<i>Borrow Pits and Bare Soil</i>	4.1
Freshwater Stream	11.7
<i>Coastal Depression Pond</i>	110.1
Swamp Lake	138.8
Basin Lake	136.0
Dome Swamp	148.3
Flatwoods Lake	229.2
Floodplain Forest	257.7
Coastal Berm	273.1
Marsh Lake	273.1
Sandhill Upland Lake	330.7
<i>Former Pasture / Grass and Brush</i>	381.1
<i>Human Disturbed Recreation + Roads</i>	440.4
Xeric Hammock	500.8
Scrubby Flatwoods	514.6
Shrub Bog	701.2
<i>Coastal Salt Barren</i>	803.5
Maritime Hammock	848.9
Floodplain Swamp	889.1
<i>Managed Impoundment (normal pool level, open water portion)</i>	943.2
Depression Marsh	1,227.4
Floodplain Marsh	1,509.8
Basin Marsh	1,719.9

FNAI Natural Community Type <i>(Refuge-specific habitats are noted in italics)</i>	Acres
Wet Flatwoods	2,586.1
Sandhill	5,059.2
<i>Mesic Hammock</i>	6,136.0
Basin Swamp	6,187.4
Hydric Hammock	7,691.9
Mesic Flatwoods	9,791.2
Tidal Marsh	18,712.5
Total	68,558.0

Hardwood Swamp Forest and Hydric Hammock

In contrast to the pinelands of the refuge, hardwood habitat types generally have a closed canopy formed by a diverse array of overstory tree species. Lowland hardwood forests occupy 24 percent of the refuge, typically situated between saltmarsh communities and pine-dominated uplands, as a wetland mosaic interspersed within pine flatwoods, or associated with river and creek systems. Though represented by a broad array of ten FNAI community types, lowland hardwood forests frequently share several dominant common tree species: pond cypress, cabbage palm, live oak, water oak, red maple, blackgum, Southern and sweetbay magnolias, red cedar, and loblolly pine.

Freshwater Lakes, Marshes, and Impoundments

These habitat types collectively amount to 10 percent of the refuge's surface area, and provide a majority of the seasonal waterfowl and shorebird habitat available on the refuge. Public use activities such as wildlife viewing, photography, and freshwater fishing are highly concentrated within the roughly 1,600 acres of managed impoundments present on the refuge. Numerous natural freshwater lakes occur in the Panacea Unit, while extensive freshwater marshes are associated with the upper tidal portions of the Sopchoppy and St. Marks/Wakulla river systems. Dominant vegetation in these communities includes emergent herbaceous plants (e.g., cattails, sawgrass, spikerushes, and sedges); grasses (e.g., switchgrass, maidencane, and cord grasses); and sparse woody shrubs or small trees (e.g., willows, buttonbush, and wax myrtle).

EXOTIC PLANT SPECIES

The refuge staff has identified and initiated treatment of 18 species of terrestrial nonnative plants (classified by the Florida Exotic Pest Plant Council as Category I and II exotic invasive pest plants) on no less than 27 discrete locations throughout the refuge. The general locations of these species are provided in Section B, Appendix IV. The same section also provides details on treatments relating to each species and area of infestation. Table 6 below lists all current exotic invasive species tracked in the state by the Florida Exotic Pest Plant Council. It includes their respective terrestrial, aquatic, and watch-out list categories, and notes those that occur on or near the refuge.

Category I plants are altering native plant communities by displacing native species, changing community structure or ecological functions, or hybridizing with native species. This definition does not rely on the economic severity or geographic range of the problem, but on the documented ecological damage caused.

Category II plants have increased in abundance or frequency, but have not yet altered Florida plant communities to the extent shown by Category I species. These species may become ranked Category I, if ecological damage is demonstrated.

All known populations of Category I and II species on the refuge have undergone initial chemical and/or mechanical treatment, but it is suspected that numerous infestations remain to be discovered.

The majority of sites and species have been identified since 1999, although the largest two exotic pest plant infestations, cogon grass on the levees and Chinese tallow at an old field south of Picnic Pond, were identified and partially treated prior to this date. While these 18 exotic invasive plant species have disrupted natural communities and displaced native species on the refuge, less than 0.7 percent of the refuge's non-aquatic habitats have been affected to date. With continuous treatment, these infestations will be eradicated or brought under maintenance control, and new sites discovered before treatment options become limited.

In addition to the 18 upland species, 4 aquatic Category I and II species are known to be present in state sovereign waters on or adjacent to the refuge. Of these, hydrilla has by far been the most disruptive to natural communities, and it remains a potential threat to inland freshwater sites on the refuge.

The geographic origins of these 22 known species of terrestrial and aquatic invasive exotic plants are as follows: (1) temperate and subtropical East Asia, India and China, 59 percent; (2) tropical South America and the West Indies, 23 percent; and (3) subtropical and tropical Southeast Asia, 18 percent.

Eleven additional Category I and II species have been identified as potential problem species. They are either established in close proximity to the refuge or have demonstrated the potential to infest similar habitats to those on the refuge, and are within possible dispersal distance.

For additional information on distributions of particular species by county, visit the Atlas of Florida Vascular Plants website, www.plantatlas.usf.edu. For additional general exotic plant species information, visit the Florida Exotic Pest Plant Council website, www.fleppc.org.

FISH AND WILDLIFE/FAUNA

Birds

The documented natural communities of the refuge provide habitat for 278 species of birds throughout the year (Bird List, Section B, Appendix IV). A total of 116 are considered to be common or abundant during some seasons. Avian species that are listed under the provisions of the Endangered Species Act and documented on the refuge include the red-cockaded woodpecker, wood stork, bald eagle, and piping plover. State-listed species include the least tern, Peregrine falcon and Southeastern American kestrel. Even though it is situated between the Atlantic and Mississippi Flyways, the refuge provides important breeding, wintering, and stopover habitat for neotropical migratory birds (e.g., songbirds, raptors, and shorebirds). Through the Partners in Flight initiative, federal, state, and private agencies are developing and implementing a comprehensive approach for managing selected species of migratory nongame birds (see Priority Bird – (General) Habitat Relationships for Southeastern Coastal Plain, Section B, Appendix IV). In an attempt to prevent the listing of most of these birds as

Table 6. Invasive exotic plant species found in Florida and known to occur on the refuge

Common Name	Scientific Name	Florida Exotic Pest Plant Council Category
mimosa, silk tree	<i>Albizia julibrissin</i> *	I
coral ardisia	<i>Ardisia crenata</i> *	I
camphor-tree	<i>Cinnamomum camphora</i> *	I
wild taro	<i>Colocasia esculenta</i> *	I
winged yam	<i>Dioscorea alata</i> **	I
air-potato	<i>Dioscorea bulbifera</i> *	I
Water-hyacinth	<i>Eichhornia crassipes</i> ***	I
Hydrilla	<i>Hydrilla verticillata</i> ***	I
Cogon grass	<i>Imperata cylindrica</i> *	I
lantana, shrub verbena	<i>Lantana camara</i> *	I
glossy privet	<i>Ligustrum lucidum</i> *	I
Chinese privet, hedge privet	<i>Ligustrum sinense</i> *	I
Japanese honeysuckle	<i>Lonicera japonica</i> *	I
Japanese climbing fern	<i>Lygodium japonicum</i> *	I
Chinaberry	<i>Melia azedarach</i> *	I
nandina, heavenly bamboo	<i>Nandina domestica</i> **	I
Sword fern	<i>Nephrolepis cordifolia</i> **	I
Skunk vine	<i>Paederia foetida</i> **	I
torpedo grass	<i>Panicum repens</i> *	I
Water lettuce	<i>Pistia stratiotes</i> ***	I
Kudzu	<i>Pueraria montana</i> **	I
Mexican petunia	<i>Ruellia brittoniana</i> **	I
popcorn tree, Chinese tallow tree	<i>Sapium sebiferum</i> *	I
white-flowered wandering jew	<i>Tradescantia fluminensis</i> **	I
tung oil tree	<i>Aleurites fordii</i> **	II
alligator weed	<i>Alternanthera philoxeroides</i> **	II
Eurasian water-milfoil	<i>Myriophyllum spicatum</i> ***	II
golden bamboo	<i>Phyllostachys aurea</i> *	II
Chinese brake fern	<i>Pteris vittata</i> **	II
castor bean	<i>Ricinus communis</i> **	II
Purple sesban, rattlebox	<i>Sesbania punicea</i> *	II
Chinese wisteria	<i>Wisteria sinensis</i> *	II
malanga, elephant ear	<i>Xanthosoma sagittifolium</i> *	II

* = confirmed on refuge, treatment underway.

** = known or suspected to be present in proximity to refuge (watch-out list).

*** = aquatic invasive confirmed on or adjacent to refuge in state waters.

threatened or endangered species, these trust species are given high priority in management decisions. However, few systematic surveys for migratory nongame birds are currently underway on the refuge. Red-cockaded woodpeckers are monitored and banded yearly, in accordance with the Red-cockaded Woodpecker Recovery Plan (USFWS 2002). Nesting bald eagles, wading birds, and least terns are also surveyed annually.

Waterfowl. St. Marks' coastal marshes, seagrass beds, and riverine estuaries are important wintering and migration areas for several diving ducks of national importance (redheads and scaup). Additionally, the managed impoundments provide a mix of habitats and water depth capabilities not readily available in adjacent marshes or associated habitats of Apalachee Bay. Teal, pintail, widgeon, mallard, and many other ducks are common in the impoundments and may exceed 8,000 birds on any single survey event. Table 7 shows peak observed waterfowl use of the refuge impoundments for a 9-year period.

Of the refuge's 104,826 plus acres (including the Executive Closure Areas) less than two percent have the capability for water management. When managed, the 1,600 acres of impoundments provide flexibility for creating habitats scarce throughout the refuge and Apalachee Bay ecosystem. Impoundment management adds a multitude of plant/water communities required by a large variety of migratory bird groups (e.g., fresh water, shallow depths, and multi-vegetation types).

Shorebirds, Waterbirds, and Marshbirds. The refuge is host to 28 species of breeding shorebirds, waterbirds, and marshbirds (Section B, Appendix IV). Another 57 species of this group use refuge habitats for non-breeding portions of their life cycles. Examples of high-priority species found on the refuge include the black, king, and yellow rails; piping plover; little blue heron; American avocet; lesser yellowlegs; and Wilson's snipe.

Tower Pond has been specifically managed for shorebirds over the past few years. Thousands of shorebirds use the other impoundments during drought conditions also, which attests to the importance of the pools in providing quality northbound and likely southbound shorebird stopover habitat when it is made available. Similarly, these conditions can benefit wading birds, terns, and other species.

The refuge also contains inland waterbird rookeries within depressional marsh, scrub/shrub, and swamp forest habitat types. These sites have produced high proportions of failed nest attempts due to unreliable water levels during moderate to severe drought years.

Certain small islands in Apalachee Bay (especially Palmetto and Smith) are critically important as waterbird and shorebird nesting habitat, but only Palmetto Island is owned by the refuge. These two islands support one of the few brown pelican rookeries in the northeast Gulf of Mexico. The number of nesting wading birds shifts among islands over the years, demonstrating their collective importance.

Systematic monitoring of shorebirds, waterbirds, and marshbirds has not been conducted recently on the refuge.

Neotropical Migratory Birds. One of the refuge's primary purposes is conservation of migratory birds. This includes neotropical migratory birds, which are defined as shorebirds, waterbirds, and landbirds that are listed in the most recent (1983) American Ornithologists Union checklist. They are distinguished by having separate breeding and winter ranges, with at least part of the winter range being south of the Tropic of Cancer. Where separate populations of a species exhibit differing

Table 7. Peak observed waterfowl use of refuge impoundments, 1994-95 through 2002-03

SPECIES	94-95	95-96	96-97	97-98	98-99	99-00	00-01	01-02	02-03
American Coot	10,820	12,624	12,606	5,021	811	2,258	2,956	3,247	473
Snow goose	19	12	2	58	--	11	--	29	5
Greater white-fronted goose	5	--	--	6	--	--	--	1	--
Mallard	330	790	500	417	337	514	264	199	354
Black duck	15	16	5	9	2	23	8	6	6
Gadwall	75	192	166	150	125	110	1,335	293	187
Pintail	581	1,364	486	909	697	610	469	616	743
Green-winged teal	1,171	2,223	2,111	740	2,285	2,228	1,097	557	1,189
Blue-winged teal	463	1,347	497	239	228	1,573	365	364	171
American widgeon	611	1,086	664	568	175	682	598	510	865
Northern shoveler	230	158	254	58	34	212	133	138	46
Wood duck	2	1	--	4	--	--	--	4	--
Redhead	532	383	215	29	271	169	21	288	20
Canvasback	27	280	63	78	11	20	2	2	24
Bufflehead	128	109	14	3	50	5	7	19	117
Ruddy duck	67	182	327	100	12	39	87	12	29
Scaup	383	971	772	439	620	29	29	882	660
Red-breasted merganser	8	1	--	16	26	1	--	4	--
Hooded merganser	8	119	12	42	99	184	72	42	60
Common goldeneye	1	1	2	--	1	--	--	--	6
Ring-necked	167	457	161	152	17	10	403	140	296
Total ducks	4,799	9,680	6,249	3,953	4,990	6,409	4,890	4,076	4,773
Total waterfowl	15,643	22,316	18,857	9,038	5,801	8,678	7,846	7,353	5,251

breeding and wintering behavior, an effort has been made to include only those local species that spend the winter in the tropics. These species are of keen public and conservation interest because they migrate incredible distances, often at night, or in rain, wind, and snow. Breeding males are often visibly stunning and have distinctive songs or calls.

These same species are experiencing population-wide declines due to destruction and fragmentation of breeding and wintering habitat, poisoning by pesticides, and climate change. Collisions with skyscrapers and communication towers kill an estimated 4 to 5 million birds per year and are a major source of population decline. Predation is another source of decline, with feral domestic cats killing an estimated 39 million birds per year. Of the 278 regularly occurring avian species listed for the

refuge, 142 are categorized as neotropical migratory birds (Section B, Appendix IV). All but 3 of the refuge's 48 listed warblers, tanagers, vireos, and new world finches are neotropical migratory birds.

Raptors (Vultures, Hawks and Allies). Nineteen species of raptors are recorded on the refuge: 3 species of incidental occurrence; 7 species which are abundant or common during some portion of the year; and 9 species that are uncommon, occasional, or rare throughout the year. Eight species are known to nest on the refuge. The Partners in Flight program identifies swallow-tailed kites as the highest conservation priority raptor species in the South Atlantic and East Gulf Coastal Plains. This species is frequently sighted throughout the refuge from March through August.

Mammals

Fifty species of mammals are known or suspected to occur on the refuge, including the least shrew, Seminole bat, golden mouse, rice rat, fox squirrel, grey fox, river otter, bobcat, black bear, coyote, and manatee (Section B, Appendix IV). Presently, no surveys are being conducted to monitor the population levels of these species.

White-tailed deer are currently monitored through data collected at check stations during refuge hunts and occasionally through herd health checks by the Southeastern Cooperative Wildlife Disease Study, which is based in Athens, Georgia. The last health check was conducted in July 2002, and future checks are planned at 5-year intervals. In addition, night spotlight surveys were conducted annually from 1974 through 2000. On the Panacea Unit, the deer herd currently appears to be below the carrying capacity of the habitat; on the Wakulla Unit it is at carrying capacity.

Amphibians

Forty species of amphibians (21 frogs and 19 salamanders) are known or suspected to occur on the refuge (Section B, Appendix IV). These include the barking tree frog, river frog, gopher frog, striped newt, flatwoods salamander, and one-toed amphiuma. The U.S. Geological Survey's Florida Integrated Science Center examined the amphibians on the refuge as part of its Southeastern Amphibian Research and Monitoring Initiative. A 3-year inventory phase will be completed in 2005 and then monitoring of populations will occur. The Florida Fish and Wildlife Conservation Commission is surveying refuge ponds for the federally listed flatwoods salamander through 2007.

Reptiles

Sixty-eight species of reptiles are known or suspected to occur on the refuge (Section B, Appendix IV). These include the American alligator, 13 species of lizards, 36 species of snakes, and 18 species of turtles. The mole skink, island glass lizard, pine snake, eastern indigo snake, southern hognose snake, blue-striped garter snake, blue-striped ribbon snake, alligator snapping turtle, spotted turtle, gopher tortoise, Kemp's ridley sea turtle, and diamondback terrapin are noteworthy species. No specific monitoring of refuge reptiles is currently underway, although the amphibian surveys may generate some information on reptiles.

Invertebrates

No attempt has been made to catalogue the plethora of invertebrates on the refuge, although some outside researchers have studied certain species or groups. The Shepherd Spring basin and underwater cave system has been partially explored under a refuge special use permit by cave divers with the Woodville Karst Plain Project. Their explorations have yielded documentation of three imperiled but not federally listed invertebrates: the Big Blue Springs cave crayfish, Hobb's cave amphipod, and Florida cave amphipod. The Big Blue Springs cave crayfish is considered a G1 (globally imperiled) species, and is listed by the International Union for the Conservation of Nature as endangered. It is known to occur in less than five locations in three counties in Florida. The Hobb's cave amphipod is ranked as a G2 (globally vulnerable) species, and listed by the International Union

as “vulnerable.” It is known to occur in at least 36 sites in 5 counties in Florida. The Florida cave amphipod is also considered a G2 species. It is listed by the International Union as “vulnerable” and is known to occur at 15 sites in 10 counties in Florida. Mussels are discussed briefly under recovery plans and endangered and threatened species. Scallops are at times plentiful in Apalachee Bay, and scalloping is a popular recreational activity for skin divers.

The monarch butterfly fall migration roosting aggregation at the lighthouse area has been studied since 1981. The monarchs have been regularly banded at the lighthouse since 1989, first by researchers, then by refuge volunteers. As an outgrowth of the popular tagging project and general interest in migrating butterflies by the visiting public, the St. Marks Refuge Association, Inc. and refuge volunteers developed a checklist of butterflies in 2002 (Section B, Appendix IV).

Fish

Due to the high diversity of the refuge’s aquatic habitats--from open bays to tidal creeks, estuaries, blackwater rivers, spring runs, fresh and brackish impoundments, freshwater ponds, and wooded wetlands--the refuge hosts over 145 species of fish (Section B, Appendix IV). Fish surveys, including a simple inventory of fishes occurring on the refuge, are needed for resource management. To support sport fishing, the refuge occasionally stocks its impoundments with gamefish such as largemouth bass and bluegill.

Exotic Animal Species

Considered the most destructive exotic animal on the refuge, the feral hog competes with native wildlife for mast. It preys upon small vertebrates and invertebrates. By rooting it destroys wetland vegetation including many rare species. Hog rooting also damages grassy refuge roads and dikes and provides favorable conditions for the spread of invasive exotic plants. Refuge hunts provide some control of the hog population on the Wakulla and Panacea Units, but the hunting pressure is generally too light to be very effective.

Domestic and feral cats and dogs are occasionally found on the refuge, particularly near houses adjoining the refuge boundary. The impacts of these animals on overall refuge wildlife are considered relatively small, although free-ranging cats can have a devastating impact on small bird, reptile and mammal populations. The jaguarundi is a medium-sized cat that may have become established after release in natural areas across the state several decades ago (Neill 1977). The rarity of reported sightings suggests that the population is relatively small, and it is thought to have little impact on native wildlife.

Other exotic animals, including the rock pigeon, Eurasian collared dove, starling, greenhouse frog, Norway rat, house mouse, black rat, and possibly the house sparrow, occur in small numbers, mostly in developed areas. They are thought to have little impact on native refuge wildlife. A few species, such as the cattle egret, coyote, and armadillo, occur (or would have occurred) on the refuge due to range expansion, and are not currently considered to be exotic species.

Threatened and Endangered Species and Species of Special Concern

At least 60 imperiled animal and plant species have been documented on the refuge. These species are either federal or state listed as threatened, endangered, or species of special concern (Section B, Chapter IV). There are no federally listed plants known on the refuge at this time, although one endemic species (the Godfrey’s spiderlily) is under review. The Service has primary responsibility for federally listed species.

Many of these species are declining or experiencing severe population losses due to alteration and/or degradation of their habitats. By perpetuating intact natural communities, restoring degraded natural

communities and processes (e.g., fire-driven longleaf pine-wiregrass ecosystem), and eliminating adverse human impacts, the refuge can contribute to species recovery goals and benefit other plants and animals dependent on these endangered ecosystems. Monitoring efforts of sufficient intensity and duration to determine refuge-specific status and trends of federally listed species are needed.

A description of selected federally listed threatened and endangered species follows:

Endangered Species

Red-cockaded Woodpecker. Management efforts have increased the refuge's red-cockaded woodpecker population from 6 active clusters in 1999 to 11 active clusters in the spring of 2005. The refuge will continue to implement intensive species-specific management techniques, such as artificial cavity placement and translocation. These will be implemented in conjunction with landscape-scale habitat restoration and maintenance projects such as prescribed burning, uneven-aged pine management, and groundcover restoration. All nestling red-cockaded woodpeckers in the refuge population are banded, and the clusters are monitored yearly in cooperation with the primary core population recovery partners.

Wood Stork. No known nesting sites of wood storks are located on the refuge. However, isolated ponds, coastal marshes, and shallow water areas in impoundments provide important feeding habitat for this species on the refuge, particularly during the summer and fall months. The wetlands around Otter Lake provide roosting habitat during the warmer months.

Florida Manatee. A warm-season migratory herd from the Crystal River area uses waters traversing or adjacent to the refuge, generally from April through October. Sightings and numbers of manatees have been on the increase in recent years, concentrated in the spring run stream system of the Wakulla and St. Marks rivers, likely as a result of population and range expansion north and westward from peninsular Florida. In a study conducted by the Florida Fish and Wildlife Conservation Commission, maximum summer populations were documented at between 20 and 30 animals in these rivers between 1994 and 1996. In cooperation with local and state wildlife agencies, the refuge staff assists in enforcing seasonal waterway speed restrictions and participating in stranding events for sick, injured, or dead animals.

Ochlockonee Mocassinshell. This small bivalve mollusk is confined to the Ochlockonee River system of Georgia and Florida. It is very rare and may not be reproducing. No information is available on the abundance and distribution of this species within the Ochlockonee River, which borders the refuge.

Kemp's Ridley Sea Turtle. This is a small to medium-sized turtle with a nearly circular shell. Primarily a Gulf of Mexico species, it inhabits marine coastal waters with sand or mud bottoms. Juveniles frequent bays. Nesting is thought to occur on Gulf beaches in south Texas and Northern Mexico, although a few nests have been confirmed in Florida.

Green Sea Turtle. This large sea turtle inhabits marine coastal and oceanic waters and occurs in Florida year-round. Nesting beaches are not present in Apalachee Bay and nests are typically found west of the refuge in Franklin County and the western Florida panhandle beaches.

Threatened Species

Bald Eagle. The refuge supports about 13 to 15 bald eagle nesting territories along its 43 miles of protected coastline. Paired birds have high site fidelity and generally return to the same nest or a nearby alternate nest location each year. These locations are checked annually for nesting as resources are available. They are protected from ground disturbance by seasonal refuge road closures, hunting area restrictions, and fire/smoke management planning.

Flatwoods Salamander. The flatwoods salamander is restricted to intact longleaf and slash pine-dominated flatwoods of the lower Southeast Coastal Plain in Florida, Georgia and South Carolina. The refuge has three populations consisting of at least 41 locations/breeding ponds, all in the St. Marks Unit (David Cook, Florida Fish and Wildlife Conservation Commission, 2003, pers. comm.). The adjacent Apalachicola National Forest has 20 known populations at approximately 50 locations/breeding ponds. Within Florida, 30 populations are on public lands and 16 populations on private lands. Range-wide, the only other populations for the species occur in Georgia (11) and South Carolina (4). Adults dwell primarily beneath the ground and migrate seasonally during fall rain events to ephemeral breeding ponds, where eggs are deposited and hatch into larvae during the winter. Protection of the flatwoods salamander from mechanical groundcover disturbance and protection of breeding ponds from hydrological alteration are critical measures to ensure survival of this species. Additional surveys are being conducted cooperatively with the Florida Fish and Wildlife Conservation Commission and the U.S. Geological Survey, Florida Integrated Science Center.

Piping Plover. The piping plover is found on open, sandy beaches and on tidal mudflats and sandflats, and winters along both coasts of Florida. A winter census in 1991 found 511 plovers on the Gulf Coast. While Florida has much suitable habitat, increasing recreational demands have resulted in the harassment of foraging and roosting birds. Since the refuge has little open, sandy beach habitat, sightings have been rare and occur every few years.

Loggerhead Sea Turtle. This is a large sea turtle with a large, blunt head. It inhabits marine coastal and oceanic waters and is present in Florida year-round. Nesting beaches are not present in Apalachee Bay. Nests are typically found west of the refuge in Franklin County and the western Florida panhandle beaches.

Eastern Indigo Snake. This large, stout-bodied, shiny black snake can be up to 8 feet long. It is docile, non-poisonous and occurs throughout Florida, but is rare in the Panhandle. It inhabits scrub and sandhills and often winters in gopher tortoise burrows in sandy uplands while foraging in hydric habitats. It requires large tracts (over 5000 acres) of land to survive.

Purple Bankclimber. This bivalve mollusk can reach 8 inches long. In Florida it is distributed within the Apalachicola and Ochlockonee Rivers and is present year-round. It inhabits small to large rivers with slow to moderate current and sandy substrate sometimes mixed with gravel or mud.

Gulf Sturgeon. The Gulf Sturgeon is an anadromous fish that inhabits coastal rivers from Louisiana to Florida. It migrates from saltwater into large coastal rivers to spawn and spend the warm months; however; most of its life is spent in fresh water. Historically, the species occurred from the Mississippi River east to Tampa Bay.

RESEARCH NATURAL AREAS

The Research Natural Area System was established to preserve a representative array of all important natural biological communities for scientific education and research of their natural components and inherent processes. Natural processes are generally allowed to predominate without human interference except where some form of human activity (e.g., prescribed fire) is required to maintain important features of that community.

The refuge currently has nine designated Research Natural Areas (Table 8 and Figure 15). More complete descriptions can be found in the current Forest Management Plan (Reinman 1989). Since some of the plant communities differ from the original classification and few of the Research Natural Areas have received any educational or research attention, a review of these designated sites and their management is warranted.

Table 8. St. Marks National Wildlife Refuge Research Natural Area designations

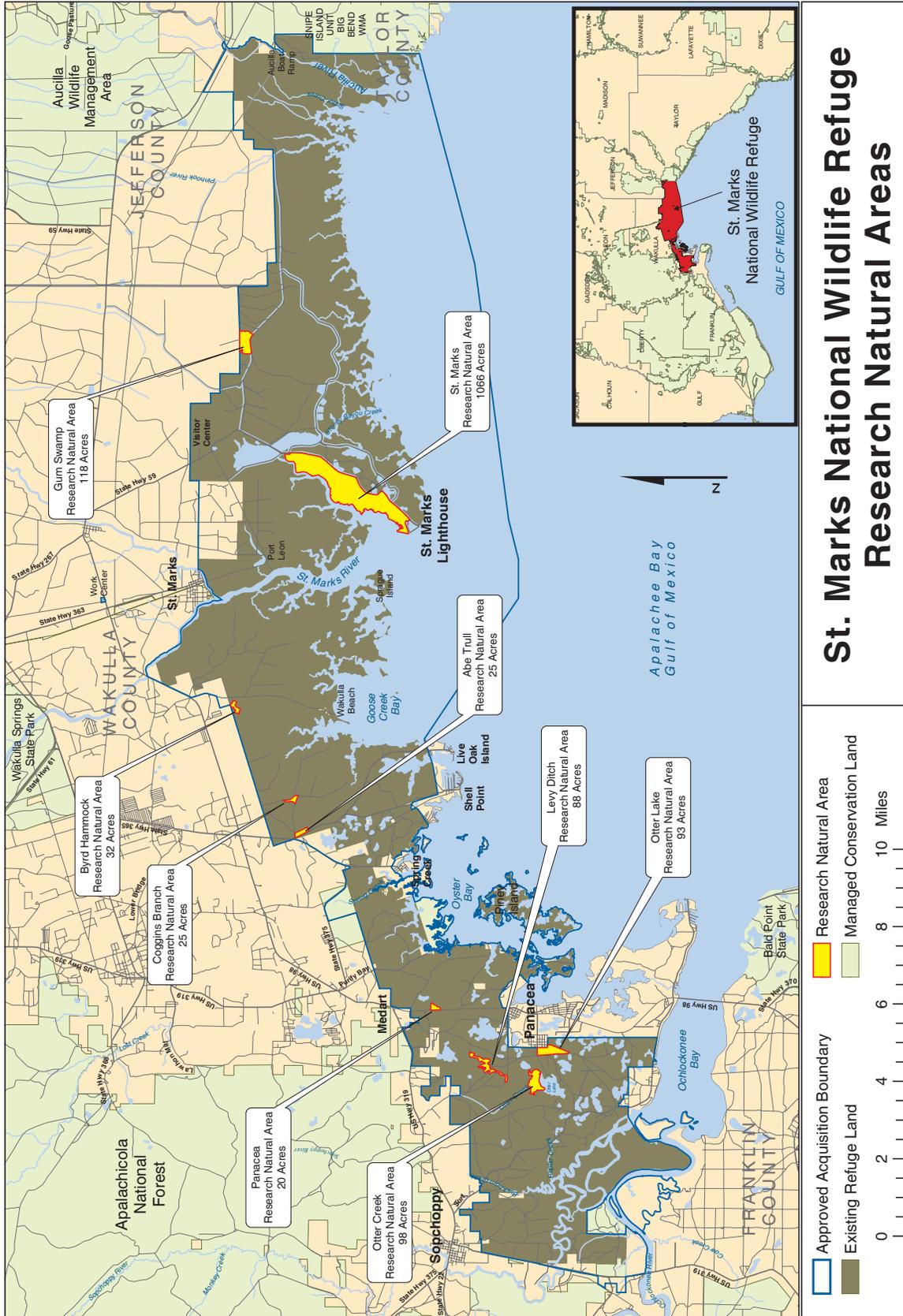
Research Natural Area	Date Established	Acreage	Type Classification
St. Marks	1948 (RNA -1967)	1,066	tidal salt marsh, coastal slash pine flatwoods, cabbage palm-slash pine hammock, water
Otter Lake	1973	93	longleaf pine-scrub oak
Otter Creek	1980	98	bald cypress
Levy Ditch	1980	88	live oak
Panacea	1980	20	Southern scrub oak
Abe Trull	1980	25	longleaf pine
Coggins Branch	1980	25	loblolly pine/hardwood
Byrd Hammock	1980	32	bald cypress/tupelo
Gum Swamp	1980	118	sweetbay/tupelo/red maple

FEDERAL WILDERNESS DESIGNATION AND STEWARDSHIP

Congress designated 17,746 acres of the refuge as the St. Marks Wilderness Area on January 3, 1975 (Public Law 93-632), to be managed under the Wilderness Act of 1964 (78 Stat. 890.892: 16 U.S.C. 1132). This Wilderness Area consists of four units. They are described below and portrayed in Figure 16.

The 1,250-acre Thoms Island (Panacea Unit) is located just west of Ochlockonee Bay and is bounded on all four sides by tidal waterways, including the Ochlockonee, Dead, Sopchoppy, and Shell Rivers. The majority of the unit is marsh dominated by black needlerush, but it also contains a mix of sawgrass and a small portion of mesic longleaf pine-wiregrass flatwoods.

Figure 15. St. Marks National Wildlife Refuge Research Natural Areas



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- The 1,066-acre St. Marks Natural Area (St. Marks Unit) is a long, narrow tract bordering Lighthouse Road on the west, from the south end of East River Pool to the boat ramp near the lighthouse. This area is comprised of 828 acres of tidal salt marshes, 203 acres of coastal slash pine flatwoods, and 24 acres of cabbage palmetto.
 - The East River-St. Marks River peninsula (St. Marks Unit) is an area of 3,630 acres. Most is salt marsh although 700 acres are coastal slash pine flatwoods interspersed with mesic and hydric hammock. A portion of the Florida National Scenic Trail passes through this area along the old railroad bed from St. Marks to Port Leon.
 - The largest unit is 11,800 acres and extends from just east of the St. Marks Lighthouse to the eastern boundary of the refuge, from a southern boundary that extends from mean high tide to the Mounds and Stoney Bayou dikes, and generally east to the northeast boundary of the refuge (St. Marks Unit). This area is characterized by expansive needlerush-dominated salt marsh and small tree islands vegetated primarily with slash pine, southern red cedar, live oak, and cabbage palmetto. Bottomland hardwoods and hydric hardwood hammock border the Pinhook and Aucilla rivers.

In all cases, the refuge ownership extends only to mean high tide. Below mean high tide are State of Florida sovereign, submerged lands. All areas are open to the public unless posted for seasonal animal closures.

Under the Wilderness Act, wilderness areas "...shall be administered for the use and enjoyment of the American people in such a manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as wilderness."

Sixteen principles of wilderness stewardship are derived from the Wilderness Act of 1964. They are:

- Manage wilderness as a distinct resource with inseparable parts;
- Manage the use of other resources and activities within wilderness in a manner compatible with the wilderness resource;
- Allow natural processes to operate freely within wilderness;
- Attain the highest level of primeval wilderness character within legal constraints;
- Preserve wilderness air and water quality;
- Produce human values and benefits while preserving wilderness;
- Preserve outstanding opportunities for solitude or a primitive and unconfined recreation experience in each wilderness;
- Control and reduce the adverse physical and social impacts of human use in wilderness through education or minimum regulation;
- Favor wilderness-dependent activities when managing wilderness use;
- Exclude the sight, sound, and other tangible evidence of motorized or mechanical transport wherever possible within wilderness;
- Remove existing structures and terminate uses and activities not essential to wilderness management or not provided for by law;
- Accomplish necessary wilderness management work with the "minimum tool;"
- Establish specific management direction with public involvement in a management plan for each wilderness;

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- Harmonize wilderness and adjacent land management activities;
 - Manage wilderness with interdisciplinary scientific skills; and
 - Manage special provisions provided for by wilderness legislation with minimum impact on the wilderness resource.

WILDERNESS MANAGEMENT – CURRENT ACTIVITIES

No restoration or active management is undertaken in wilderness areas except for prescribed fire and a minimal amount of invasive plant control. Controlled burning is one of the few human activities that can mimic nature. It is considered an acceptable management tool to preserve the wilderness value of the St. Marks Wilderness Area. This Area has been divided into 6 prescribed burning units: Thoms Island, Port Leon North, Port Leon South, St. Marks Natural Area, Salt Marsh, and Pinhook River Area. Current policy is that the southern three-quarters of the Thoms Island and Salt Marsh Units are not actively burned and wildfires are not suppressed. The pine uplands on the northern tip of Thoms Island are burned by prescribed fire. Depending on weather conditions, large portions of black needlerush-dominated salt marsh areas on the St. Marks Wilderness adjoining the St. Marks River and east of the Lighthouse to the Pinhook River Area occasionally burn during prescribed fire operations in the adjacent uplands. The St. Marks Natural Area is a modified no-burn area. If a wildfire occurs, suppression efforts would be limited to backfiring along Lighthouse Road. The other areas are burn/suppression areas.

Invasive plant-control efforts have focused on single-tree, basal bark herbicide treatments of Chinese tallow by backpack sprayer around the wetland margins within the St. Marks Unit. Access is by foot only. Similar treatments have been utilized on other invasive exotic plant species, such as lantana, cogon grass, purple sesban, and Japanese climbing fern, which are found near or within the wilderness areas.

FOREST MANAGEMENT - HISTORY

By the time the refuge was established, most of the forest had been heavily logged. Very little, if any, pristine uplands were ever acquired. In some instances, timber cutting rights were reserved by the former landowner for a period of years after the refuge was acquired.

Refuge pine management was initiated in 1942 with small sales of “worked out turpentine and round pond pine” for railroad ties and pulpwood (Givens 1942, p. 8). The early timber sales generally focused on removing turpentine-faced and defective trees, thinning young developing stands, and clearing agricultural fields for Canada geese (Reinman 1989).

In 1953, the first Forest Management Plan was developed, and in 1959 the refuge began to establish even-aged plantations. In many of these early plantations, former longleaf pine habitats were planted to slash pine or loblolly pine. The Forest Management Plan was revised in 1964. Grazing and the cutting of dead and downed oaks and pines for fuel wood were curtailed in 1965. Shelterwood cuts eventually became the preferred method to regenerate pine habitat.

In 1980, there was a major revision of the Forest Management Plan (U.S. Fish and Wildlife Service 1980b). Natural regeneration techniques, such as shelterwood and seed tree cuts, were established as the preferred methods over clear cutting. The size of regeneration areas was limited to 25 acres and the rotation of longleaf pine was extended from 80 to 120 years. In addition, non-rotational (e.g., future old growth) corridors were also established.

In 1989, the Forest Management Plan was again revised, this time adopting a multi-aged (uneven-aged) approach to pine management (Reinman 1989). Rotation management was eliminated. Pine regeneration is now promoted within pine stands in patches, much like what occurred in the longleaf pine forest historically (Schwartz 1907, Wahlenberg 1946, and Noel et al. 1998). The plan has also initiated the restoration of approximately 382 acres of former longleaf pine sites previously planted to slash and loblolly pines.

FOREST MANAGEMENT - CURRENT ACTIVITIES

The refuge's forest lands are administratively divided into 39 forest management compartments. These compartments are assembled into ten working groups containing two to five compartments each. Each year, the forest and wildlife habitat are inventoried for one working group and a forest management prescription is developed. However, in recent years, increased workloads and a lack of staff committed to the forest management program (other than prescribed burning) have slowed the development of forest management prescriptions. The last three prescriptions were produced in 1996, 1999, and 2003.

The forest management prescriptions include a summary of the data collected and the appropriate treatments (e.g., prescribed fire, timber harvest, and tree planting) necessary to maintain or improve the habitat. It is a working plan used by field personnel to accomplish the proposed habitat treatments over several years.

Under the current Forest Management Plan (Reinman 1989), pine habitats are managed in a multi-aged (uneven-aged) approach that promotes pine regeneration within each stand of pines, while retaining a range of tree size classes, particularly the oldest and largest trees. When the density of trees exceeds 80 square feet of basal area per acre, a particular pine stand may be thinned. This is done via commercial harvests and reduces the basal area to 50 to 60 square feet per acre. Thinning produces an irregular spacing of trees, with denser clumps and small openings of up to a quarter-acre, where much of the pine reproduction will occur. Dead snags and old trees with cat-faced scars or flat tops are retained. In general, the trees are divided in thirds between the largest size class (over 17 inches in diameter, if available), the medium diameter size class (11 to 17 inches), and the small diameter size class (5 to 11 inches). Where pine plantations are now comprised of pine species, such as slash and loblolly, that were not historically dominant on that site, they are restored to the historic species (usually longleaf pine).

Controlled fires are prescribed for the pine habitats on an average of every 3 years and they are conducted throughout the year. Forest prescriptions identify areas for particularly hot or cool fires and/or growing-season or dormant-season fires to achieve certain objectives, such as to reduce a large hardwood component in stands important to red-cockaded woodpeckers or to minimize damage to a unique hardwood area. Currently, hardwood stands are passively managed. There is no manipulation of tree composition or density, and fires are not generally prescribed.

ECOLOGICAL ROLE OF FIRE

Over the last several thousand years, fire has played a major role in developing and perpetuating pine forests and their associated wildlife communities. Historically, fires occurred during the spring and summer as a result of lightning, and throughout the year by Native Americans. By the early 1900s, cattlemen were burning much of the pinewoods regularly in the late winter and early spring to improve forage. Prescribed fire has been used by refuge personnel in these habitats since 1941.

The earliest accounts of the St. Marks Unit described the pinelands as "...park-like with various short grasses including wiregrass as undercover. Annual burning of the woods produces this park-like appearance to some extent, otherwise stands would have more brushy undergrowth" (U.S. Bureau of Biological Survey, ca. 1933, p. 3). The Wakulla and Panacea Units were also burned very frequently prior to refuge acquisition of these tracts. In general, the longleaf pine-wiregrass communities historically evolved with fires, which burned perhaps every 1 to 5 years.

Initially, it was refuge policy to protect the land from fire. One of the earliest management plans stated that "people must be educated to abandon promiscuous burning of the marsh and woodlands" (U.S. Biological Survey 1932). However, once the incidence of fire was reduced, the understory plant communities began to change.

In October 1940, the refuge conducted the first prescribed fire when 80 acres of marsh was experimentally burned for wintering geese. In March 1941, the prescribed burning program incorporated approximately 1,500 acres of uplands in the Wakulla Unit and a small area in the St. Marks Unit (Mounds). Prescribed burning of the pinelands expanded and by the mid-1940s, the refuge was primarily on a 2-year burn schedule. In 1947, a new backfiring technique was used and the burning schedule was revised to a 3-year cycle. By the 1948-49 burning season, the burning rotation was set at a 3- to 4-year interval between fires.

In 1952, burning had expanded to a 6-year interval. The planned burning frequency was decreased to every 4 years by the early 1960s, and remained at that interval until late 1985. Then with expanded coverage facilitated by aerial ignition, prescribed burning returned to a 3-year interval. In spite of the scheduled prescribed burning, weather and other factors often prevented the pinelands from being burned as frequently as planned. Since the early 1990s, the refuge's fire personnel have seen an increase in funding and staffing to conduct prescribed burning on the refuge. Currently, pine habitats are burned every 2 to 6 years; however, for most sites, the desired interval is once every 3 years.

Historically, fire frequencies varied in pine communities and even differed in stands of the same habitat type. Prescribed fire in refuge habitats varies in frequency as well as by season. The interspersed fire frequencies and seasons improves diversity in habitat. There is currently an increased interest in growing-season fires for the management of natural pine forests and wildlife. It is well documented that the season in which a fire occurs has profound effects on the response of the vegetation. Spring fires promote reproduction and expansion of grasses and forbs while reducing hardwoods and many other woody plants. This is especially true for wiregrass, which generally requires growing-season fire to induce flowering and seeding. On the other hand, summer fires have been found to enhance fruit production in many woody understory species. Approximately 40 percent of the refuge pinelands are prescribed-burned in the growing season, which increases diversity.

IMPOUNDMENTS - HISTORY AND CONSTRUCTION

Active wetland management on the refuge was initiated in 1936 with the construction of Pond #1 (Port Leon Pond/Lake Phillips) by the Civilian Conservation Corps. Pond #2, located along the Lighthouse Road, was developed over the next several years. It probably included all current impoundments on the St. Marks Unit except Lighthouse Pool, since early narrative refuge reports indicated the pond encompassed 6,000 acres. In addition to impoundments on the St. Marks Unit, the Civilian Conservation Corps began, but never completed, a large impoundment on the Wakulla Unit at West Goose Creek between Wakulla Beach Road and Live Oak Island Road. In 1942, World War II halted all construction on the refuge.

In the 1950s, a low dike system was built on the Wakulla Unit east of Wakulla Beach Road, and an interior cross dike was constructed in Stoney Bayou Pool to isolate the eastern portion of the impoundment, where numerous leaks had developed. In the 1960s, five 10-acre experimental pools were constructed on the St. Marks Unit, and the Headquarters, Tower, and Picnic ponds were separated from Mounds Pool. As forest roads were constructed and bridges replaced, corrugated metal pipes with flash board risers were installed in Johnson Creek, Womble Creek, and Levy Ditch on the Panacea Unit. From 1978 to 1981, funding from the Bicentennial Land Heritage Program was used to construct interior dikes to divide Stoney Bayou Pool into two impoundments (Stoney Bayou #1 and #2) and Mounds Pool into three impoundments (Mounds #1, #2, and #3). Figure 17 depicts the current impoundments and water control structures on the St. Marks Unit.

IMPOUNDMENTS - MANAGEMENT TECHNIQUES

Over the years, management techniques used in the impoundments to improve and maintain wintering waterfowl feeding habitat have varied substantially. Management in the 1930s and early 1940s generally consisted of plowing perennial vegetation in higher portions of the new impoundments and planting species such as smartweed, millet, and saltwater bulrush; replacing sawgrass, cattail, pickerelweed, needlerush, and other “weeds,” with waterlily, muskgrass, widgeon grass, and buttonbush; and manipulating water levels. In the 1950s and early 1960s, herbicides were introduced and widely used. In 1966, saltwater was pumped into Mounds Pool to control undesirable freshwater perennial vegetation and to encourage growth of widgeon grass and muskgrass. The introduction of salt water was very effective and continues to be used in all pools, except East River Pool.

In addition to management activities within the impoundment systems, several attempts were made over the years to improve natural wetlands for wintering waterfowl. Major documented projects included: (1) herbicidal treatment of approximately 200 acres of tidal needlerush marsh on the St. Marks Unit in an attempt to increase saltgrass for wintering Canada goose browse (1950s); (2) liming acidic ponds and planting redroot, smartweed, and three-square bulrush on the Panacea Unit (1950s); and (3) discing woody vegetation along pond margins on the Panacea Unit followed by fertilizing and planting millet (1960s).

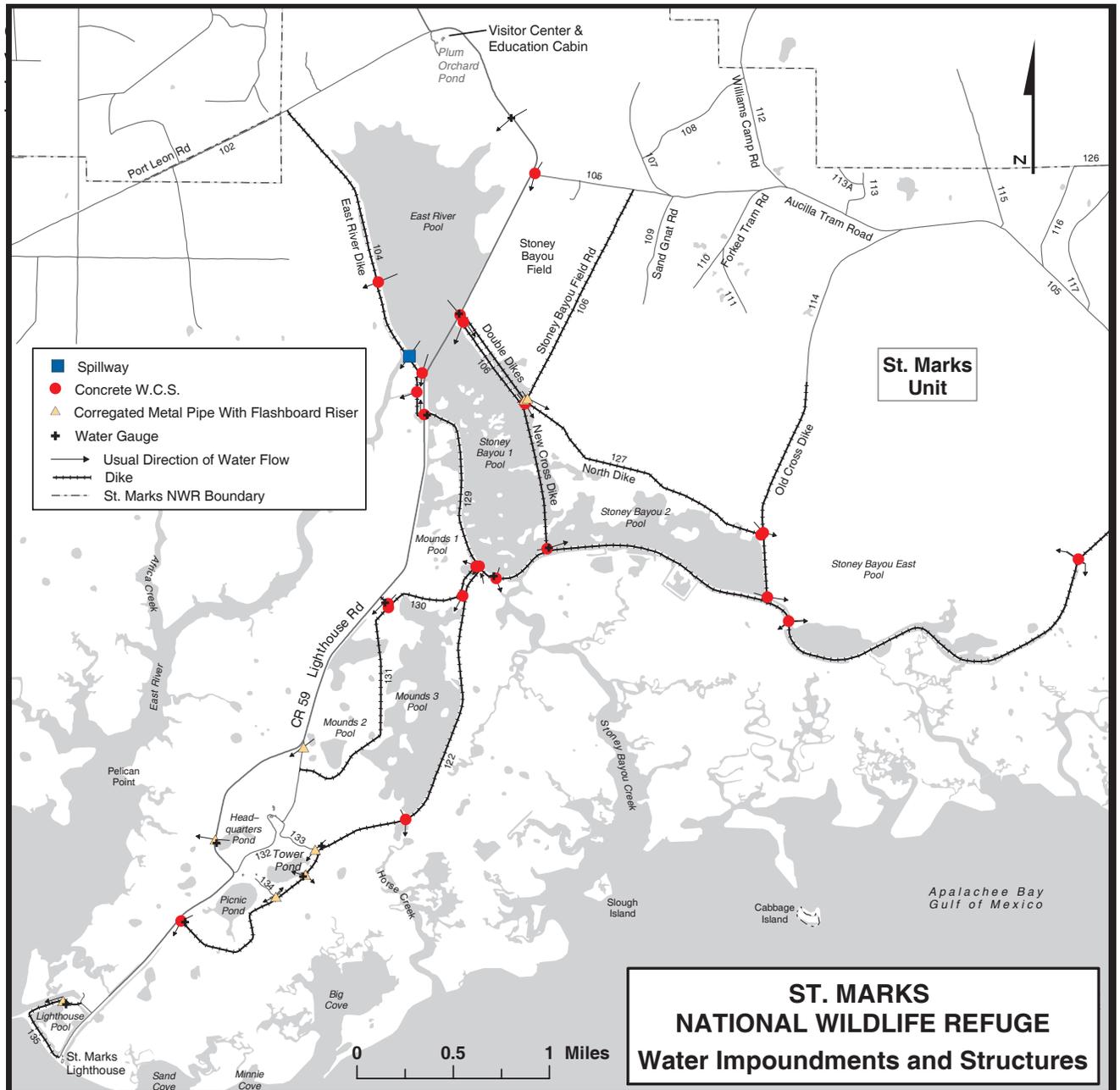
Fishery management activities were initiated in 1957 with fishery investigations conducted on refuge lakes and impoundments. Since then, technical fishery assistance has been provided in the form of fishery investigations, water quality analysis and angler and creel surveys. In addition, sportfish (largemouth bass, bluegill, redear sunfish, channel catfish and Gulf striped bass) have been provided by national fish hatcheries through the years to help meet fishery management goals and to enhance refuge recreational opportunities. A Fisheries Management Plan was completed in 1984.

IMPOUNDMENTS - CURRENT ACTIVITIES

The refuge currently manages 11 impoundments, plus three other wetland areas (Tables 9 and 10). Management of these areas consists of manipulating water flows through concrete water control structures and/or corrugated metal pipes with flash board riser structures. By adjusting the height of wooden stoplogs in these structures, water levels are set and gravity-induced water flows can be created from one impoundment to another.

With the constraints of limited and unreliable freshwater inflows from St. Joe Company lands to the north of the pools, the refuge has only one reliable opportunity each year to reflood the impoundments. That opportunity comes in February and early March, before the increases in evaporation and transpiration that occur during the dry season (April – May). All pools (with the

Figure 17. St. Marks National Wildlife Refuge water impoundments and structures



In the fall, Mounds #1, Mounds #3, and Stoney Bayou #2 Pools, and occasionally Headquarters and Picnic Ponds, are partially drawn down to create shallow-water habitat used by foraging dabbling ducks, wading birds, and shorebirds. East River and Stoney Bayou #1 Pools are managed to provide deeper water habitats for diving ducks and to provide fresh water as needed for other pools. Water levels are generally maintained in Mounds #2 and Stoney Bayou Field to support emergent marsh habitat.

Tower Pond can be managed much more actively than the other impoundments. This is due to its small size (20 acres) and close proximity to Mounds #3 Pool and Picnic Pond (for water inflows). Also, a new corrugated metal pipe connects the pool to the tidal marsh which allows for dewatering and reflooding with salt water during high tides. It can provide important foraging habitat for shorebirds during critical migration periods (April and August) when the other pools are normally flooded. The current yearly management regime generally involves flooding the pool from January through mid-March, drawing it down through mid-May, flooding through mid-July, drawing it down through August, flooding through mid-October, and a final drawdown in December.

Lighthouse Pool is isolated from the rest of the impoundments on the St. Marks Unit and has no freshwater source other than rainfall. There is one corrugated metal pipe connecting the pool to the adjoining boat canal, but the pipe is set too high to manipulate the water level. It serves as an overflow pipe. Active pumping with a portable pump is the only option for dewatering or actively flooding the pool.

The three other wetland areas managed by the refuge are Stoney Bayou East, Plum Orchard Pond (located behind the visitor center), and the Levy Ditch Green Tree Reservoir. Stoney Bayou East was originally part of a very large Stoney Bayou Pool, but was separated when numerous blowouts under the dike compromised its ability to hold water. Currently, the two concrete water control structures connecting the pool to the tidal marsh are left open to permit tidal flushing and prevent water build-up on either side of the frequently compromised dike. As a result, the impoundment is managed as tidal salt marsh and occasionally prescribed burned.

Plum Orchard Pond is a former borrow pit developed during Lighthouse Road construction. Management is generally restricted to occasional cattail spraying to maintain an open wetland for the enjoyment of visitors at the visitor center. There is no structure to control water levels. On rare occasions, the pond is pumped down and the muck accumulation is removed by heavy equipment.

The Levy Ditch Green Tree Reservoir is located on the Panacea Unit north of Otter Lake. The reservoir encompasses a 50-acre area of oak flats and cypress ponds that could potentially flood when stoplogs are added to a corrugated metal pipe in the road crossing at Levy Ditch. The ditch is reportedly a 1800s era effort to drain the area for farming. Stoplogs are generally added to the corrugated metal pipe in early fall to flood the acorn-rich area for wintering ducks, then removed by early March to minimize damage to the trees. The water level in the reservoir is dependent on rainfall and very unreliable, sometimes remaining dry throughout the winter.

Johnson Creek, a fourth wetland, was actively managed for waterfowl from 1971 through 1983. There was little noted waterfowl use and management was abandoned when the riser rusted. Storm surges from the series of tropical storms and hurricanes in 2004 removed the remaining pipe and section of road at the end of the tidal creek. In February 2005, the road was repaired and a larger aluminum pipe and riser were installed. This restored the management capability of the 30-acre area and should allow for improved habitat for shorebirds and wading birds. Before active management is initiated; however, current use of the wetland by marshbirds and other wildlife should be evaluated.

SOCIOECONOMIC ENVIRONMENT

REGIONAL DEMOGRAPHICS AND ECONOMY

According to the 2000 U.S. Census, the local, four-county area of Franklin, Jefferson, Taylor and Wakulla is sparsely settled and economically depressed when compared to the state at large (Table 11). Leon County to the north is urban, affluent and densely populated in comparison. Wakulla County has the highest population density within the four-county area, and Taylor County the lowest. Taylor County is the largest of the four in land area (1,042 square miles), while Franklin County is the smallest (545 square miles). Median family income and per capita income in all four counties are below the statewide averages of \$45,625 and \$21,557 respectively. Only Wakulla County has a median family income comparable to the national average of \$42,228. All four counties are below the national per capita income average of \$22,851.

Table 11. Socioeconomic profile - U.S. Census 2000

Characteristic	Franklin County	Wakulla County	Leon County	Jefferson County	Taylor County
Population (number)	11,057	22,863	239,452	12,902	19,256
Population Density (pop./square mile)	20	38	359	22	19
Total Land Area in square miles	544	607	667	598	1,042
Race/Ethnicity (Percent of Population):					
Caucasian	81.2	86.1	66.4	59.3	77.8
African American	16.3	11.5	29.1	38.3	19.0
Hispanic	2.4	1.9	3.5	2.2	1.5
Native American	0.5	0.6	0.3	0.4	1.0
Asian	0.2	0.2	1.9	0.3	0.4
Education:					
% Pop. over 25 w/high school degree	68	78	89	73	70
% Pop. over 25 w/college degree	12	16	42	17	9
Median Family Income (\$)	31,157	42,222	52,962	40,407	35,061
Per Capita Income (\$)	16,140	17,678	21,024	17,006	15,261

Historically, the economy of the local area has been based on the seafood industry, tourism, timber, naval stores, pulpwood production, and some manufacturing. Tourism and the seafood industry continue to be the mainstays of Franklin County. Apalachicola oysters have made the county famous statewide. Forest products are highly important to Taylor County, which leads the state in this industry.

Jefferson County has a diverse economic base and depends more on agriculture than the other counties. The 1995 restriction of using entangling nets for saltwater fishing reduced commercial fishing in the coastal counties of Taylor, Wakulla, and Franklin and spurred unemployment. Construction and tourism are growth industries for these counties. The 2000 Census shows that

residents of all four counties work primarily in public administration and the health and education fields. Taylor County has higher employment in manufacturing (20 percent) and Franklin County has more in the retail trade (14 percent) than the other counties.

Most of the St. Marks National Wildlife Refuge land base is within Wakulla County. The primary employment is in management, professional, and sales occupations. A third of Wakulla County's population is employed by local, state, or federal government agencies. Wakulla County continues to be an important residential area for commuters who work in nearby Tallahassee (Leon County), the state capital. According to the 2000 Census, the population in Leon County grew by 24 percent (from 192,493 to 239,452) between 1990 and 2000, an increase of 46,959 persons. During this same period, the population in Wakulla County increased by 61 percent, from 14,202 to 22,863.

Wakulla has been the fourth fastest growing county in the state for the past decade. Wakulla's immigration, particularly along its coastal areas, consists of affluent retirees and professionals from Tallahassee. More than half of the working individuals who reside in Wakulla County work outside the county and spend much of their income elsewhere. Development is most intense in the northeastern portion of the county, but it is also accelerating in the southern portion.

LAND USE

The data in Table 12 were created as a representation of land use in 1995 by the Northwest Florida and Suwannee River Water Management Districts.

Table 12. 1995 land use: percent of total land in county

Land Use Type	Franklin County	Wakulla County	Leon County	Jefferson County*	Taylor County
Urban/Built-Up	3	6	19	4	4
Agriculture/Rangeland	2	3	9	16	2
Upland Forests	8	26	22	20	3
Tree Plantation/Regeneration	52	26	33	30	48
Wetlands	34	39	16	31	43
Barren Land	1	0	0	0	0

* Figures may be slightly skewed (1 to 3 percent) due to a small region of missing source data. Jefferson County staff reports that it is mainly plantation and timber land (7/03).

RECREATION USE

National and Regional Context of Recreation Use on Refuges

The National Survey of Fishing, Hunting and Wildlife-Associated Recreation (U.S. Fish and Wildlife Service and U.S. Bureau of the Census, 2001) indicates that 82 million U.S. residents 16 years or older fished, hunted, or watched wildlife in 2001. During that year, 34 million people fished, 13 million hunted, and 66 million participated in at least one type of wildlife-watching activity, including observing, feeding, or photographing wildlife. From 1991 to 2001, the number of all anglers declined 4 percent and expenditures increased by 14 percent. Saltwater fishing increased 22 percent, but freshwater fishing declined by 6 percent. Similarly, the number of all hunters declined by 7 percent

during the same 10-year period. However, the number of big game and migratory bird hunters remained constant. Expenditures for hunting increased 29 percent, mostly due to equipment expenses. During the same period, the total number of wildlife watchers decreased by 13 percent. Again, in spite of the decline in participation, expenditures increased by 41 percent because of equipment purchases. In contrast, the statistics for fishing, hunting, and watching wildlife in Florida remained the same over the 10-year period.

Nationally and regionally, all public use and recreation on refuge field stations should be appropriate and compatible with the refuge purposes and closely related to one of the following six priority wildlife-dependent uses listed in the 1997 Refuge Improvement Act: hunting, fishing, wildlife observation, wildlife photography, environmental education and interpretation. Refuges are guided to assess and improve visitor experiences through regular reviews of the ten Visitor Services Requirements found in the Service's 1985 Refuge Manual and in the 1999 Service document, "Fulfilling the Promise, The National Wildlife Refuge System, Visions for Wildlife, Habitat, People, and Leadership." Refuges should strive to meet these requirements at a level appropriate to the number and type of visitors at their station, the recreational demand at that station, and the extent that staffing and funding will allow. Effects of public use levels on wildlife and habitat are also a strong consideration.

Refuge Recreation Use

Visitation to St. Marks National Wildlife Refuge was estimated at 311,415 for Fiscal Year 2004 (October 1, 2003 through September 30, 2004). Visitors may be counted for more than one activity during their stay. The majority of visitors (71 percent or 221,116 persons) enjoyed viewing wildlife and driving the 7-mile wildlife drive to the historic 175-year old lighthouse and beautiful Apalachee Bay. Saltwater fishing from three boat ramps and shores accounted for 65,264 or 21 percent of all visits. Freshwater fishing from boats, shores and levees accounted for 20,033 or 6 percent of the total visits to the refuge. Hunting visits totaled 2,081 for migratory bird, upland game and big game. There were an estimated 77,762 visits to the Visitor Center and 5,214 visits for environmental education.

Access

The refuge is divided into three units for public use data collection and resource management. From east to west, these are the St. Marks (Figure 18), Wakulla (Figure 19), and Panacea (Figure 20) Units. The majority of visitors enter the refuge via County Road 59 (Lighthouse Road) on the St. Marks Unit. The Visitor Center/Office is located 3 miles south of U.S. Highway 98 on County Road 59 and is open 7 days per week, except for federal holidays. The St. Marks Unit provides access for wildlife observation, saltwater and freshwater fishing, hiking, photography, and natural and cultural history education and interpretation. Entrance fees have been charged on this unit since 1987, when the Emergency Wetlands Protection Act instituted entrance fees on refuges. A fee booth is operated on weekends, with an honor pay station used for the remainder of the week. An electric gate operates on this unit and is open from 6 a.m. until 9 p.m. during daylight savings time, and from 6 a.m. to 7 p.m. during standard time.

Visitors traveling east to west along U.S. Highway 98 can also access the St. Marks Unit from Mandalay Road to the Aucilla River for boat launching, saltwater fishing, and wildlife observation. Wakulla Beach Road provides access to the Wakulla Unit for saltwater fishing, hunting, hiking, and wildlife observation. The Panacea Unit is accessible from Purify Bay Road for hunting, hiking, and wildlife observation; from Bottoms Road for saltwater fishing, migratory bird hunting at Piney Island, and boating and wildlife observation; and from Otter Lake Road for boating, fishing, hiking, picnicking, hunting, and wildlife observation.

Wildlife Observation and Photography

There are many opportunities for wildlife observation and photography, popular pastimes at the refuge. Four wildlife observation towers on the St. Marks Unit enhance the visitors' chances to see wildlife. The 7-mile wildlife drive on the St. Marks Unit has eight markers that are interpreted by a guide book to orient visitors to management activities and special wildlife viewing opportunities. A sightings logbook is maintained in the visitor center for staff and visitors to record unusual sightings of wildlife. "The St. Marks Light," a quarterly newsletter produced by the St. Marks Refuge Association, Inc., informs visitors about wildlife and staff activities throughout the year. In 2003, to commemorate the National Wildlife Refuge System Centennial, the Association sponsored the first annual wildlife and wildlands photography contest.

Interpretive Programs

The visitor center provides exhibits, brochures, and an orientation video. The main brochure has been translated into German, Italian, Spanish, and French to accommodate visitors. Programs, lectures, and guided tours are provided throughout the year for the public and groups, such as Audubon Society chapters, church and elder groups, garden and Rotary clubs and scout troops, etc. The regularly offered programs and festivals include: Coastal Awareness Day (September); Monarch Butterfly Festival and National Wildlife Refuge Week events (October); waterfowl tours (November through February); Holiday Homecoming (December); Welcome Back Songbirds (April); and Welcome Back Manatees (April).

The refuge is currently seeking a transfer of the St. Marks Lighthouse from the U.S. Coast Guard. The St. Marks Refuge Association, Inc., has raised funds and written grants to begin the process of transforming the structure into an interpretive museum and education center. Public interest in this project is very high. The lighthouse restoration will be a challenging stewardship and partnership opportunity.

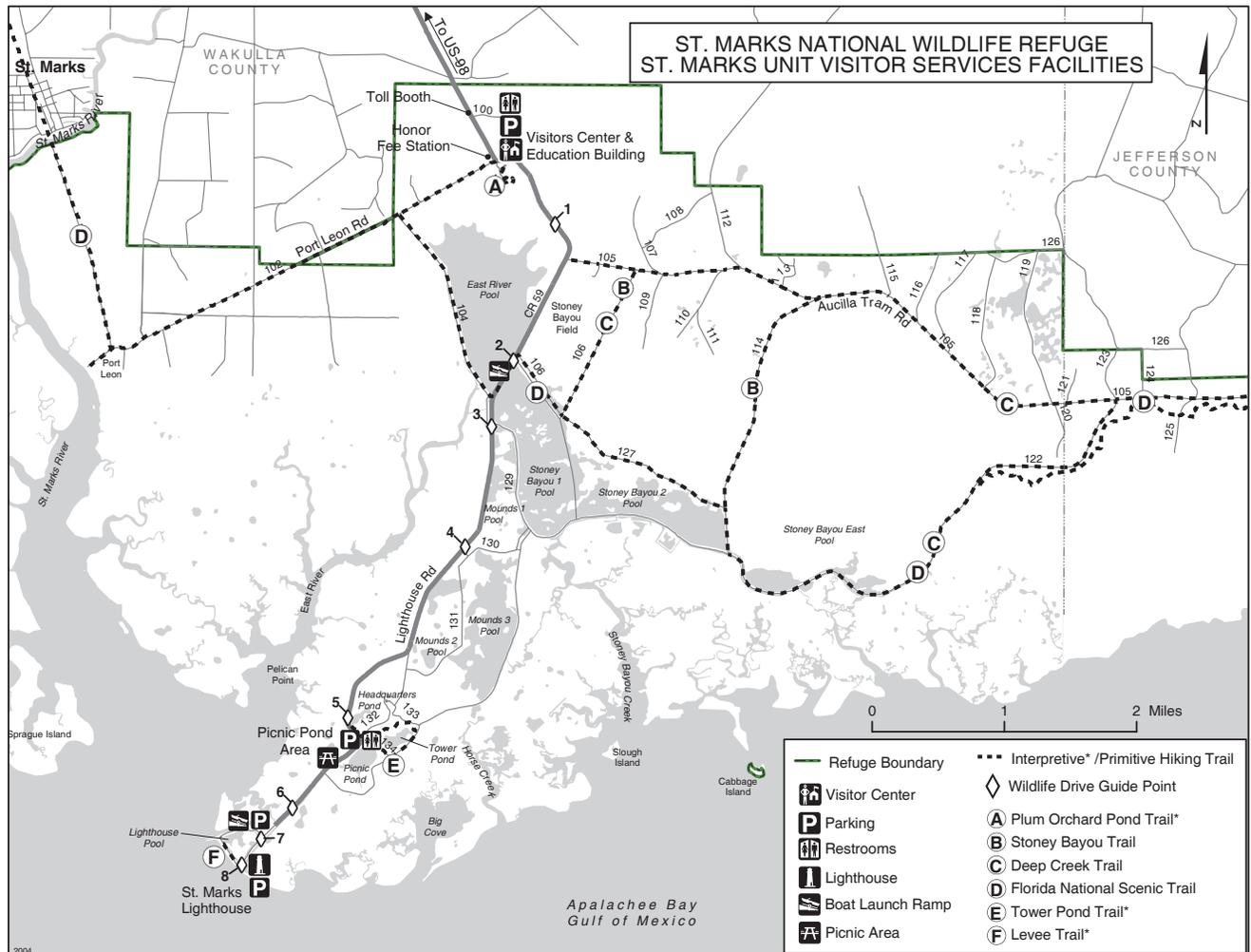
Walking/Hiking/Bicycling/Horseback Riding

There are three interpretive trails on the St. Marks Unit: Plum Orchard Pond, Lighthouse Levee, and Mounds (Tower Pond). These are frequently used by school groups, photographers, and other visitors. Five other marked trails across the refuge are more than 5 miles long and are used mostly for wildlife/wildlands observation. The refuge boasts the only section of the Florida National Scenic Trail found on a national wildlife refuge. The trail crosses 43 miles of the refuge (Figures 18 - 20) including the Wilderness Area. Approximately 3,100 hikers use the refuge portion of the trail for day hikes each year; however, only a few dozen apply for the overnight camping permits. A popular segment for day hikers is the Shepherd Spring/Cathedral of the Palms in the Wakulla Unit. Hikers can experience a natural freshwater spring adjacent to a shady stand of cabbage palms. Bicycling and horseback riding are allowed on service roads and levees outside the Wilderness Area.

Fishing

Access to both freshwater and saltwater fishing is provided on the refuge. Freshwater fishing from the banks of refuge levees, lakes, and ponds is allowed year-round for largemouth bass, sunfish, channel catfish, and other freshwater species. Boats with electric trolling motors may be used year-round in Otter Lake on the Panacea Unit, and from March 15 to October 15 in the impoundments on the St. Marks Unit. No boats are permitted in the impoundments on the St. Marks Unit from October 15 to March 15, due to migratory waterfowl use. Boat ramps are available in East River Pool, Stoney Bayou Pool #1, Mounds Pool #1, and Lighthouse Pool. Freshwater fishing access to ponds in the Panacea and Wakulla Units is allowed all year for boats of less than 10 horsepower. Drive-in access to ponds near the Otter Lake Loop Road in the Panacea Unit is seasonally open from March 15 to May 15.

Figure 18. St. Marks Unit visitor services facilities

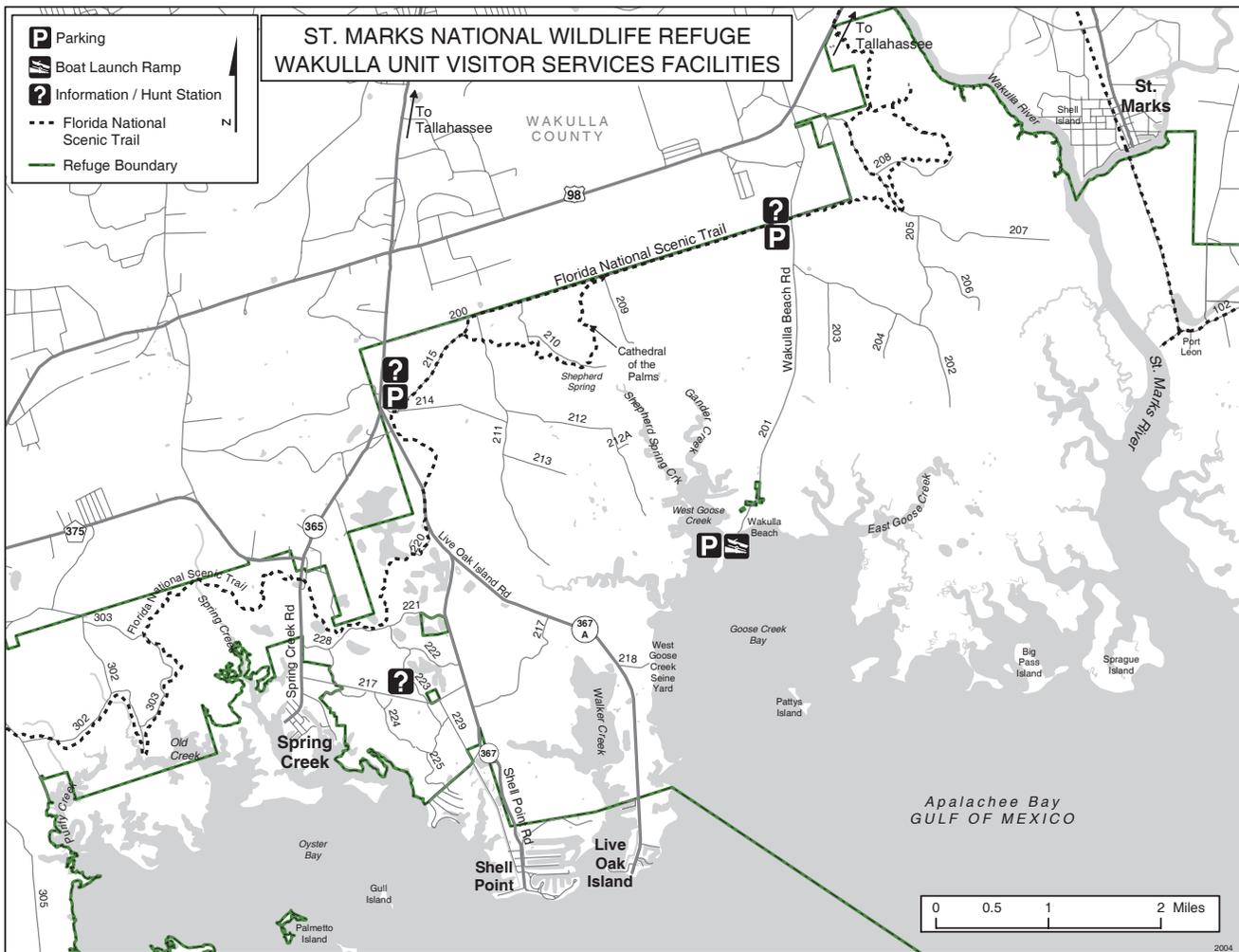


Boat ramps at the Aucilla River, lighthouse basin area, and Wakulla Beach connect to the Gulf from Apalachee Bay. The launching of airboats and jet skis is prohibited from the lighthouse and Wakulla Beach boat ramps. Scalloping continues to be a very popular activity during the season from July 1 until September 10, attracting fishers and skin divers from south Georgia and north Florida. Crabbing occurs in the tidal creeks and along the bay shoreline near the lighthouse. Crabbing is prohibited from levees and inside the refuge impoundments due to the hazards imposed on wildlife (mostly alligators).

Canoeing/Kayaking/Boating

Visitors can access the tidal creeks and rivers that transect the refuge via canoes, kayaks, and motor boats of any size. Interior lakes, such as the beautiful, 138-acre Otter Lake on the Panacea Unit, the ponds and the impoundments are restricted to boats with small motors (up to 10 horsepower). Many visitors rent canoes and kayaks from local vendors on the St. Marks and Wakulla rivers and paddle through the refuge, often glimpsing manatees, bald eagles, alligators, and deer along the way. The Big Bend Saltwater Paddling Trail, Florida's first legislatively designated water trail, begins at the eastern boundary of the refuge on the Gulf of Mexico between the Aucilla and Suwannee Rivers. The trail traverses a portion of the Big Bend Seagrasses Aquatic Preserve, hundreds of small tidal creeks, and seven medium-sized rivers.

Figure 19. Wakulla Unit visitor services facilities.



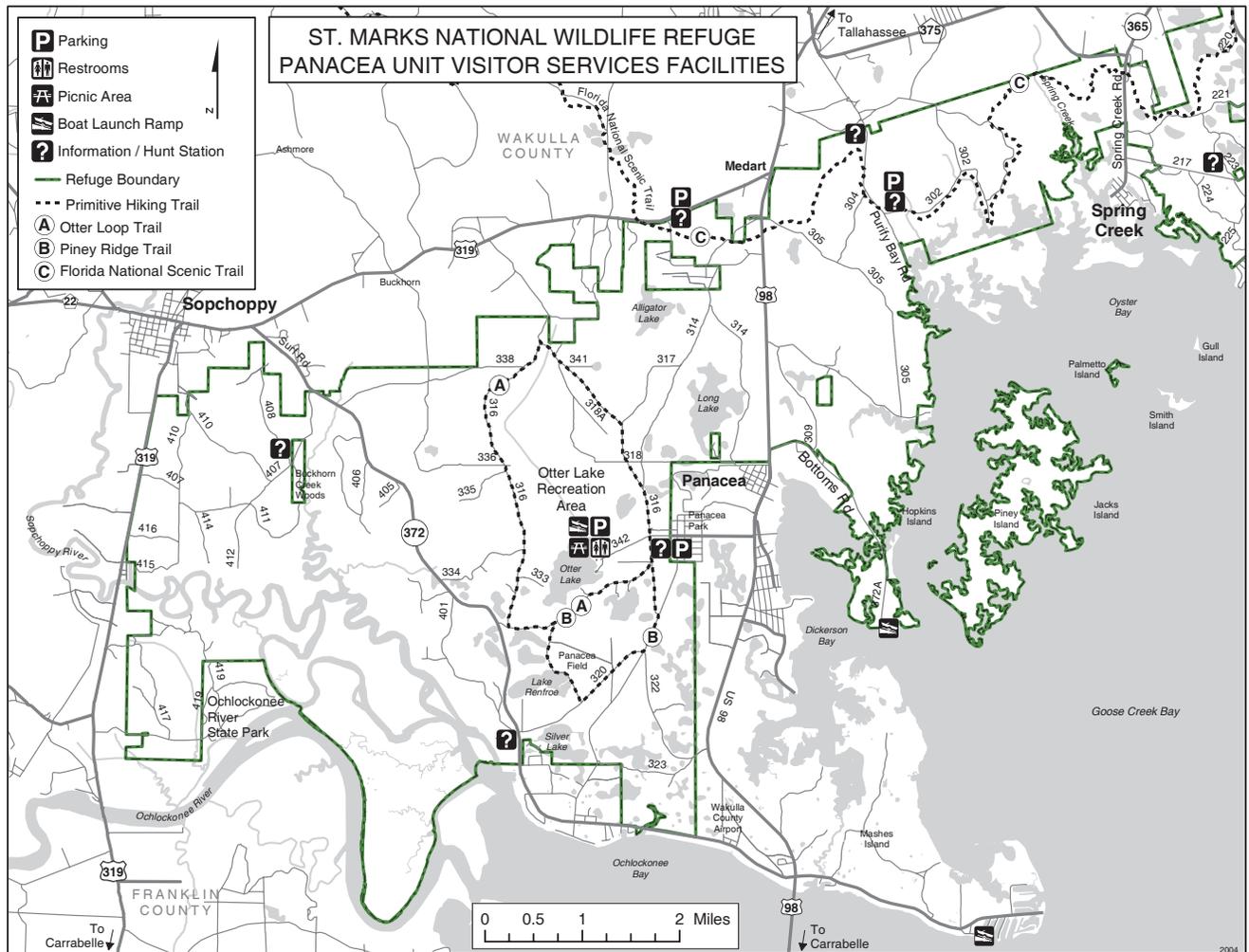
Hunting

The refuge offers quota hunts for deer, hog, and turkey during the fall and winter. Usually about 1,600 hunters apply for 995 permits. The quota hunt permits cost \$15 and generate funds to help offset the costs of law enforcement, check station staffing, and maintenance of the roads used by hunters. In addition, there are two non-quota hunts. The Piney Island waterfowl hunt is held during the migratory bird season. The small game and hog hunt is held annually around the New Year holiday. The refuge also hosts a mobility-impaired person gun hunt, which is supported by the Florida Disabled Outdoors Association.

Environmental Education

The refuge has a well-established environmental education program that provides ranger-led outdoor classrooms for on- and off-site groups. For Fiscal Year 2004, refuge staff and volunteers taught 2,994 students on-site and 1,815 off-site. The new Florida testing requirements and escalating travel costs have reduced field trips across the state. The refuge is trying to compensate by offering more off-site opportunities. Refuge rangers trained 405 teachers in Fiscal Year 2004 and partnered with a local Project Learning Tree school, Shadeville Elementary, to provide educational resources, such as an outdoor classroom and school forest.

Figure 20. Panacea Unit visitor services facilities



Field trips are scheduled in advance and involve hands-on, action-oriented learning in the field. Teachers can select the learning objectives and activities best suited to the units that they are teaching. Available programs include pond sampling, coastal explorer, insect safari, butterfly activities, animal adaptations, field scientist and bird identification. Teachers may also check out the learning station's equipment and conduct their own field trips on the refuge. Special activities, such as longleaf pine planting days for high school students and coastal cleanup days for middle school students, help stimulate stewardship of the refuge.

RECREATION ECONOMICS

An estimate of the direct contribution that the refuge makes to the local economy is \$9 million per year and 279 jobs (Table 13). This estimation is based on the total visitation to the refuge in Fiscal Year 2004, following a formula from the Florida Park Service for economic impact in the parks located in the panhandle of Florida. The total visitation is multiplied by the percentage of non-local visitors (outside a 100-mile radius of the refuge) and then multiplied by the average expenditure per person/per day of \$39.20. This equates to roughly \$7 million. When added to the Fiscal Year 2004 refuge expenditures of \$2 million, it equals the total direct economic impact of \$9 million (Table 13).

Table 13. Direct economic benefit of St. Marks National Wildlife Refuge to the local economy

St. Marks NWR Annual Attendance	Non-local Visitor Percentage (%)	Average Per Person/Day Expenditure	Visitor Expenditures in Local Area	FY 02 Refuge Expenditures	Total Direct Economic Impact
311,415	X .59	X \$39.20	= \$7,202,406	+ \$2,120,200	= \$9,322,606

Increased State Sales Tax Revenue = \$9,322,606 multiplied by 7 percent = \$652,582.

*Total Jobs Generated = 242.**

** The Division of Socioeconomic Studies, National Park Service, Denver, Colorado, estimates that 30 local jobs are created for each \$1million spent locally to visit a national wildlife refuge.*

FIRE RISK AND SUPPRESSION

The objective of managing wildland fire on the St. Marks National Wildlife Refuge is to safely suppress fires through the appropriate management response at a minimum cost, consistent with the values at risk, while minimizing effects of suppression activities on the environment.

The refuge is rated as a “medium consequence” refuge based on wildland fire history, occurrence, fuel type, severity indices, and local conditions. Historically, wildland fires have been limited in size due to the high frequency of prescribed burning that has occurred on the refuge since 1941. Since 1990, an average of 6 wildland fires occurred annually on the refuge with a mean size of 23 acres. In 1995, the largest single fire occurred and consumed over 1,341 acres. The refuge averages 55 prescribed burns and 9,630 treated acres each year. This equates to a 3-year cycle to prescribe burn all forested uplands on the refuge.

Florida is the lightning capital of the United States; lightning accounts for many wildland fires in this state. While numerous lightning strikes occur on the refuge each season, few wildland fires erupt from these strikes since fuels have been reduced. The combination of an active prescribed burning program and the presence of natural and established fire lines have reduced the magnitude of wildland fires on the refuge. Only during severe drought will damaging wildland fires likely occur. Such conditions occurred within the state between 1998 and 2002.

For over a decade, Wakulla County has been among the fastest growing counties in Florida based on the percent change of population. This increase of population in the wildland-urban interface has added additional responsibility to the refuge’s fire management program. The Florida Division of Forestry has primary responsibility for wildland fire suppression through a cooperative agreement with the Department of the Interior, which includes the refuge. This agreement allows Division of Forestry and refuge firefighters to respond to all wildland fires on the refuge by implementing the Unified Command System. Also, the refuge coordinates with the Wakulla County United Fire Fighters Association to protect both the refuge’s natural resources and the properties of adjacent landowners. There are nine volunteer fire departments in this association and the refuge works actively with six of these departments.

St. Marks National Wildlife Refuge, as of 2006, does not have an updated Fire Management Plan that allows wildland fires, natural- or man-caused, in the management of resources. The use of wildland fire to accomplish resource objectives or refuge policies requires all objectives and policies to be

addressed in a refuge's Fire Management Plan. It is the intent of the District Fire Management Officer for St. Marks to update this document to cover any policies or objectives that have not been addressed since the last writing of the plan in 1996 or under the amendment of 2001. This is scheduled for completion by the year 2006. Until the Plan is rewritten, the objective is to safely suppress wildfires at a minimum cost consistent with the value at risk, while minimizing the impacts of the suppression activities on the environment. It is also stated that this means taking aggressive action in managing a wildfire on all parts of the refuge, including wilderness areas. Until the Plan is rewritten, wildland fires cannot be used to meet resource management objectives outside of what is stated above.

The U.S. Fish and Wildlife Service has national policies that are already in place in the Fire Management Handbook. These policies will be incorporated as the refuge revises its Fire Management Plan. This document was updated in 2001 and does not necessarily compare to previous fire management policies prior to that writing. Under the new policies, the Service's first priority is "Protection of human life" in regards to any fire management action. The Fire Management Handbook states that the Service will utilize the full spectrum of fire management actions--from prompt suppression of unwanted fires to managing naturally-ignited fires--in realizing and accomplishing specific resource management objectives. The vast majority of wildland fires will continue to receive a suppression-oriented response. It should also be noted under the current Service policy, responses should be appropriate for individual conditions and objectives associated with the ignition, and not related to a fire type for classification. This will permit the Service to achieve effectiveness and efficiency in operations. Management actions on wildland fires will no longer be driven by fire type designation such as natural- or man-caused. Fires will no longer be extinguished under a default response but will be suppressed for specific reasons. Fires that are managed for resource objectives will have a specific rationale for such management identified in the refuge's Fire Management Plan.

CULTURAL ENVIRONMENT

PREHISTORIC BACKGROUND

A description of the first people and settlements in Florida follows. There is much discrepancy between anthropologists in assigning time frames for the cultural periods. Therefore, the dates and summaries here are based largely on the information from the State of Florida's website (<http://dhr.dos.state.fl.us>). "Florida Historical Contexts" was written by Nina Borremans and various authors under a project directed by Jerald T. Milanich in 1990.

Paleoindian Period (13,000 - 7,900 B.C.)

The Paleoindian period lasted about 5,100 years between 13,000 and 7,900 B.C. The environment of Florida was substantially different from present day. The lowest stand of ocean occurred between 18,000 and 14,000 years ago and the coastline extended up to 100 miles seaward of its current location. Around 9,500 years ago, only half of the continental shelf was submerged. The coastal area strips were arid and contained savannahs and dune scrub, except where punctuated by springs and rivers.

Stratified sites identified along the Gulf Coast are under 10,000 years old, but surface finds of pebble tool complexes have been found. Over 140 Paleoindian sites have been identified across Florida, with about 40 known to occur near the refuge along the banks and offshore from the Aucilla River. There are a few land sites in Jefferson County and scores of underwater sites along the Aucilla River in Jefferson and Taylor Counties. Most of the sites found in Florida are where permanent surface water was accessible or chert was located; both are associated with the Aucilla River. It is thought

that most of the Florida coastal sites would be temporary occupations and are most likely now submerged. Shell middens 10,000 years old may exist miles offshore.

Until the past decade, the only evidence of Paleoindian occupation was hard chert tools and artifacts, and there was little information on the social, political, or religious systems of the people. Anthropologists speculated that the region was sparsely populated, that food resources were abundant, and that the hunter/gatherer society operated at the band level of organization. But research studies done by the Florida Historical Museum and Florida State University during the 1990s changed what is known about the Paleoindians of North America. While it was thought that the earliest North Americans crossed over from Eurasia to present day Alaska and filtered into North America, University researchers have found an abundance of evidence of Clovis (Paleoindian era) people east of the Mississippi River but lacking in the west, Canada, and Alaska. They postulate that the earliest Americans may have come by vessel from either Europe or South America.

The research and excavations done on sites in the Aucilla River and offshore have been the first to document the link between Pleistocene megafauna and Paleoindian lithic (stone) remains. The studies provide evidence that the continent's earliest people hunted large mammals and are thought to be nomadic and follow animal herds. As the climate changed due to global warming, the seas rose and large game disappeared. These sites and studies found evidence that the Paleoindians adapted their diet to eat small game and transitioned from their nomadic ways to more settled encampments.

Archaic Period (7,900 - 500 B.C.)

The Archaic tradition denotes a period between 10,000 and 2,500 years ago. It is divided into three parts: Early (7,900 - 5,000 B.C.), Middle (5,000-3,000 B.C.), and Late (3,000- 500 B.C.). Accessibility to abundant shellfish has been suggested as facilitating semi-permanent and permanent village life, an increasing trend from the early to late periods. Anthropologists believe that there was an egalitarian form of social organization.

Although there are about 1,500 Archaic sites recorded throughout Florida, little research has been done on Early to Middle Archaic sites along the Gulf Coast of Florida. It was not until the 1990s that base camps were discovered from those periods. Two pre-ceramic occupations were found near a chert quarry site. There are only seven Archaic cemetery sites in Florida and a site on the Aucilla River is the only one of this period near the Gulf Coast. Most Early and Middle Archaic sites are likely drowned. According to Bense (1977), "...if one were to systematically test the first terrace sediments, when present, on the rivers in northwest Florida, such as the Apalachicola, St. Marks, Sopchoppy and Ochlockonee, Early-Middle Archaic occupations would be found. Transient settlements, such as hunting stations, could possibly exist on the higher terraces and flatwoods adjacent to the river valleys."

Jefferson County contains more than 100 Archaic sites. The types of Archaic sites found in Florida include lithic (stone) scatters, villages (Middle-Late), quarries, caves, cemeteries, and middens (shell and bone). Five types of cemeteries have been identified—wet cemeteries, cemeteries, midden burials, mounds, and burials in solution pockets. Coastal Archaic middens have been tested throughout the Gulf Coast. Late Archaic middens are known to occur as far north as the Florida-Georgia border. Because sea levels continued to rise during the Archaic, many more sites are probably located on the continental shelf.

Most of the Archaic sites are surface collections, which contain Bolen beveled and unbeveled or Big Sandy 1 artifacts, the most common Early Archaic marker. Pottery first appeared in the late Archaic around 4,000 years ago in the form of fiber-tempered Orange wares. In the Florida Panhandle and along the Gulf of Mexico, fiber-tempered pottery has been called Norwood and differs from typical Orange pottery of east Florida in its greater sand content.

For northwest Florida, the late Archaic had more occupation than any previous cultural period. Several sites in and near the refuge contain late Archaic components. The pattern of settlements in the Big Bend region during the Norwood Phase is small to medium habitation sites on coastal marsh edges and on river drainage systems.

Woodland Period (500 B.C. - 900 A.D.)

There are three phases of the Woodland period: Deptford (500 B.C.-100 A.D.), Santa Rosa - Swift Creek (100 - 300 A.D.), and Weeden Island (300 - 900 A.D.). Settlement increased during the Woodland period, which is characterized by elaborate ceremonial complexes, mound burial, permanent settlements, population growth, increased sociopolitical complexity, and increased reliance on cultigens. Dr. Nancy White pointed out that the “cultures” of the above are really pottery types.

There are over 500 Deptford sites in northwest Florida, the most common sites being either coastal or estuarine shell middens. The other two types are inland middens and burial mounds. Several sites on and near the refuge have Deptford components. There are also two possible Deptford burial mounds.

The Woodland phase, Santa Rosa - Swift Creek, is characterized by innovative pottery technology, mound burial, and a ceremonial complex, which was influenced by cultures to the north. Four-hundred sites have been identified in northwest Florida. Most of the information about these cultures comes from small, compact, coastal shell middens. These can be circular, horseshoe-shaped, rectangular, or linear. The refuge contains sites that suggest a summer exploitation of coastal resources. The Weeden Island phase is most common with 1,000 sites in northwest Florida, including the refuge.

Mississippian - Ft. Walton Period (900 A.D. - European contact)

The ancestors of the Apalachee Indians had complex communities with a temple mound in each large capitol town. Crops such as corn, beans, and squash were cultivated.

HISTORICAL PERIOD

During the age of European colonialism, the best-documented European contact near the refuge occurred in 1528 when a Spanish expedition of about 300 men, under command of Panfilo de Narvaez, trekked from Tampa into Apalachee territory. Hoping to find precious metals, they encountered many hardships. Only four members survived and returned to Spanish Mexico 8 years later. Much of the expedition account was recorded in 1536 or 1537 by Cabeza de Vaca, an expedition member who made it to back to Spain.

In search of gold and silver, Hernando de Soto began a 4-year trek in 1539 through Florida and the present-day southeastern United States. He retraced the same route to Apalachee with 600 men. De Soto and his soldiers camped for 5 months in the area now known as Tallahassee.

In the 200 years after these initial explorations (1550-1750 A.D., also known as the Leon-Fort Jefferson Period) as many as 140 Spanish mission churches were established across Florida. Begun

in St. Augustine, they appeared in sequence westward. The first missions built in the Apalachee territory were established in 1633 and this continued for a 70-year period. These developed into rancheros and centers for trade, culture, and education.

Unfortunately, the Spanish introduced many diseases to the native population, which reduced their numbers dramatically. As reported by Milanich in "Florida Indians and the Invasion from Europe" (1995), John Hann estimated the Apalachee population at 50,000 in the early 1500s. By 1608, it decreased to between 30,000 and 36,000 persons. A census taken in 1638 totaled 16,000 Apalachee Indians. By 1675, only 10,000 remained.

In the early 18th century, Colonel James Moore led English colonists from the Carolinas and their northern Indian allies on slave raids into Florida, causing the abandonment of missions. Native people were enslaved and sold in the Carolinas or exported to the West Indies to work on plantations. According to Milanich (1995), 1,300 persons were taken and resettled as a buffer between the English Carolina settlements and Spanish Florida settlements. The burned remains of missions are found throughout Leon and Jefferson Counties. One group of Apalachee Indians fled west to Louisiana. These were the only descendants of the original Floridians to survive past the 1760s. Forty-five individuals remained in 1825.

In 1679, the Spanish Governor of Florida built the first wood fort at San Marcos, located at the confluence of the Wakulla and St. Marks Rivers. Pirates looted and burned the fort 2 years later and in 1718 a second wood fort was built. This was replaced by a stone fort constructed in 1739 with limestone quarried from the refuge. The fort flooded due to a hurricane in 1758. For 20 years (between 1763 and 1783), Florida was under British control and trade centers were established locally. In particular, the Panton and Leslie Company trading post was established on the west side of the Wakulla River, just north of present-day U.S. Highway 98. The Spanish regained control of San Marcos by 1786. In 1800, a former British officer, William Augustus Bowles, led 400 Creek Indians against the Spanish and took over the fort. Five weeks later, a Spanish flotilla of nine ships reclaimed the fort.

In 1818, General Andrew Jackson invaded the Seminole Indian territory. The Seminoles had repopulated the former Apalachee territory. Jackson also killed Britains and Spaniards, causing a diplomatic crisis for the United States with both England and Spain. Florida was ceded to the United States in 1821 and Andrew Jackson returned to Florida to establish a new territorial government. The Second Seminole War occurred between 1835 and 1842. During his tenure as president, Jackson displaced and eradicated many of the Seminoles who had repopulated the area after the Apalachees were killed, enslaved, or driven out of the area. The Seminoles and Miccosukees were forced into a few small areas of Florida. Many Seminoles escaped into the Everglades.

Construction of the St. Marks Lighthouse began in 1829. It was completed in 1830 at a cost of \$11,765. The second oldest light station in Florida, it stood 65 feet high and was made from stones from Fort San Marcos, which had been abandoned in 1824. In 1831, the lighthouse was rebuilt to original specifications, which called for solid wall construction. The lighthouse was relocated and rebuilt in 1842. In 1843, a massive hurricane occurred and several people drowned. In 1844, the lighthouse was built 10 feet higher, with 6-foot-thick walls and a 160-foot-long seawall. In 1850 and 1851, hurricanes again struck the coast at St. Marks; the latter one destroyed the lighthouse keeper's house and seawall.

A railroad, built between Tallahassee and St. Marks in 1836, affected settlement patterns in the area. Towns bypassed by the railroad, such as Magnolia and Rock Haven, disappeared over time. Lots in the proposed town of Port Leon were sold by the Tallahassee Railroad Company in 1838. The

following year, the railroad was extended via wooden bridge to the new town of Port Leon where wharves, warehouses, and stores were built. At this same time, epidemic diseases were common and the Federal Government built a marine hospital at the site of Fort San Marcos using stones from the fort. A yellow-fever epidemic nearly ended Port Leon in 1840, but in 1841 a hotel, tavern, and custom house were built. The towns of St. Marks and Port Leon soon became thriving seaports of the antebellum cotton plantation economy centered in Tallahassee. This period of economic heyday was short-lived though, as a powerful hurricane in 1843 completely destroyed Port Leon. The survivors decided to move upriver to higher ground and established the town of Newport.

In 1861, Federal Union troops initiated a 4-year blockade of the St. Marks River at the outset of the War Between the States. Dozens of evaporative saltworks were established in the high marshes of what is now the refuge. Local citizens were exempted from conscription to the Confederate Army for tending the boilers and salt vats. Salt was critical for preserving meats needed to supply the Confederate troops and local populace. Blockade runners plied the numerous tidal creeks in their effort to supply Confederate troops with this indispensable commodity. The Confederates took over San Marcos and named it Fort Ward. About 75 to 100 Confederates erected a battery, Fort Williams, 50 yards west of the lighthouse to protect the saltworks. On June 12-14, 1863, Union troops damaged the lighthouse by setting it on fire.

In early March 1865, 900 federal troops landed at the lighthouse and marched to destroy the bridge at St. Marks with the intent of taking over Tallahassee, which by 1824 had become the capital of Florida. They captured East River bridge, causing Confederate troops to withdraw to Newport. The Confederate cavalry, joined by volunteers from Tallahassee, forced the Union troops to take a round-about route to Natural Bridge. In a 10-hour period, three major attacks and a series of skirmishes ensued at Natural Bridge. The 600 confederate troops repulsed an equal number of Union soldiers who eventually retreated and returned to Key West. The Union suffered losses of 21 deaths, 89 wounded, and 38 captured. The Confederates lost 3 men and 22 were wounded.

In 1866, the lighthouse was repaired and a new Fresnel lens was installed. Another hurricane in 1874 damaged the lighthouse. It was rebuilt and height was added in 1883. The U.S. Coast Guard was given control of the lighthouse in 1921. It was a manned light station for 118 years until automated in 1961. On July 31, 1972, the lighthouse was named in the Federal Register of Historic Places. It remained a primary aid to navigation until 2000.

By 1872, the war and droughts had taken their toll on the plantation economy and its associated shipping industry, and less than 100 combined residents remained in the towns of Newport and St. Marks. Three decades prior, St. Marks had been the fifth most populous town in Florida. The local economy now relied heavily upon exploitation of the naval stores (turpentine and pine resins) and lumber produced in the vast expanse of flatwoods blanketing the coastal lowlands between the Aucilla and Ochlockonee rivers. Like cotton, the local timber and turpentine industry was destined to fall victim to unpredictable weather events and larger national emergencies. A series of hurricanes and tropical storms in the late 1890s and 1920s felled a number of the “cat-faced” trees worked for their resin. Floridians were used to economic hardship by the time of the Great Depression in 1929.

It was during the Depression that the refuge was established in 1931, and in the early 1930s a headquarters complex of buildings was developed at the site of the former town of Port Leon. The Civilian Conservation Corps constructed the first impoundment for waterfowl in 1936 and established Lighthouse Road and the levees. By the 1960s, most structures were removed from the Port Leon site. The current day headquarters includes a visitor center and office at Plum Orchard Pond on the St. Marks Unit, and a maintenance workshop and fire crew quarters on U.S. Highway 98.

III. Planning Issues

INTRODUCTION

This Comprehensive Conservation Plan was prepared in compliance with the National Wildlife Refuge System Improvement Act of 1997 and the National Environmental Policy Act of 1969. The latter law requires the Service to actively seek public involvement in environmental planning.

In June 2000, an interagency coordination team met to discuss issues and concerns that were likely to affect the conservation and management of the refuge. Scientists and land managers representing the following organizations participated: Fish and Wildlife Service, U.S. Geological Survey, USDA Forest Service, Florida Department of Environmental Protection, Florida Fish and Wildlife Conservation Commission, Florida Natural Areas Inventory and Tall Timbers Research Station. In August 2000, the planning team identified several draft goals to guide management of the refuge. In order to obtain public input, six open-house public scoping meetings were held in nearby communities:

- August 14: St. Marks - Charter School on Shell Island Road;
- August 15: Panacea - Women's Club on Otter Lake Road;
- August 16: Perry - County Commission Chambers, Old Post Office Building;
- August 17: Monticello - Chamber of Commerce, 420 West Washington Street;
- August 22: Tallahassee - Leroy Collins Leon County Main Library; and
- August 23: Crawfordville - Wakulla County 4-H Club, 84 Cedar Avenue.

More than 100 persons attended these meetings and identified a variety of issues and opportunities concerning management and conservation of the refuge. Additionally, the refuge staff distributed 400 public comment forms (Section B, Appendix V) to interested citizens, neighbors, organizations, public officials, and friends of the refuge. The staff evaluated responses from persons who attended the meetings, along with those who mailed back responses (85 individuals and 5 organizations). General comments were received between April 28 and October 22, 2000. The comments from the public scoping meetings and those expressed on the comment sheets are summarized in Section B, Appendix V.

All public and interagency comments were considered. No comments were received from tribes. Some of the comments are not within the sole jurisdiction of the refuge and some are completely outside its jurisdiction. The staff team identified those comments that, in the team's best professional judgment, are most important to the refuge to address during the 15-year planning period. A summary of the priority issues follows. The comprehensive conservation plan was designed to address these priority issues.

PRIORITY RESOURCE ISSUES

OVERARCHING REFUGE ISSUES

External Threats

Within the next 15 years, there will be major changes in the type and intensity of development surrounding the refuge. Presently, much of the adjacent area is timberland, but large tracts of land are slated for sale as residential development. Both Leon and Wakulla Counties are fast-growing, particularly in residential land use. Changes in the population of these counties will affect wildlife and habitat resources through disturbance, habitat loss and drainage, and hydroperiod changes. Also,

demand for recreational services and access is expected to increase. The threat of contaminants to air and water quality may rise with increased development. The refuge needs a conservation buffer in order to protect existing resources and fulfill wildlife objectives. Partnerships with conservation and government agencies should be pursued for this purpose.

Resource Protection

In addition to its biological assets, among the refuge's most valuable resources are its designated wilderness area and cultural sites dating from Paleo-Indian times to the Civil War. With increased population and visitation, the demand for recreational access is expected to rise, which may affect these resources. Law enforcement may need to be increased.

Partnerships

For each set of issues (e.g., habitat management and visitor services), there is a common need for basic inventories of refuge resources and the impacts to them from visitation and development. Developing partnerships with nearby universities and other government agencies is critical for assessing and monitoring resources and for evaluating land and wildlife management techniques over time. Refuge personnel should enhance partnerships with adjacent landowners and nearby government agencies to achieve conservation goals and improve land management.

HABITAT MANAGEMENT

Prescribed and Wildland Fire Management

As land use patterns change and development intensifies along refuge borders, the wildland-urban interface becomes more of a consideration for both prescribed fire and wildfire management. With an increase of housing developments, it is more likely that smoke from prescribed fire projects will enter populated areas; that escaped fires or wildfire starts could threaten homes; and that there will be aesthetic concerns among residents along refuge boundaries due to fuel management projects. The risk of fire starts through accidental or deliberate actions could also increase. Visual quality issues and smoke exposure for residential users may become issues. However, the benefit to residents is substantial in that reduced fuel loads will lessen the threat of wildfires.

Forest Management

The management of forest habitats on the refuge has at times been controversial. Commercial logging and prescribed fire are the primary management techniques used in pinelands to restore and maintain the appropriate habitat conditions that benefit wildlife and contribute to biodiversity. Research and monitoring studies are needed to determine if the refuge is meeting its goals of improving habitat. Current information is also needed for public outreach.

Exotic and Invasive Plant Species Control

Exotic invasive plant species are currently disrupting natural communities on the refuge by displacing native species and altering ecosystem functions. There are 18 terrestrial exotic invasive plant species known to occur on the refuge. The most widespread and problematic species include cogon grass, Chinese tallow, Japanese climbing fern, mimosa, and lantana. Combined, these plants occupy less than 1 percent of non-aquatic refuge habitats. Preventative measures are needed to address the threat of infestation of aquatic weed species, especially hydrilla and Eurasian water-milfoil, to the refuge's lakes, ponds and waterfowl management impoundments.

Impoundments for Waterfowl Management

The management of the impoundments on the St. Marks Unit has been compromised by alterations of the watershed north of the refuge. With changes in the hydroperiod, there are fewer management options for manipulating the pools to optimize waterfowl use. Future development of the lands in this

watershed may adversely affect waterfowl management and is likely to affect water quality as well. The management of impoundments is complicated by the competing needs of waterfowl, shorebirds and wading birds, and public fishing demands. Staff resources also limit the amount of waterfowl management activities that occurs on the refuge.

WILDLIFE MANAGEMENT

Wildlife Survey and Monitoring

Wildlife populations need to be adequately surveyed and monitored to properly determine population trends, identify management needs, and evaluate the impacts of management actions.

Exotic and Feral Animal Control

The distribution and impact of exotic and feral animals on native plants and wildlife within the refuge are poorly known. Feral hogs are known to substantially alter wetland habitats and potential breeding ponds for the federally listed flatwoods salamander. Imported fire ants may affect ground-nesting species. Domestic cats are thought to impact locally nesting migratory birds and other small animals, and have been proven to do so in other locations.

VISITOR SERVICES

The priority issues facing the Visitor Services Program center on ensuring quality, appropriate and compatible wildlife-dependent recreational opportunities and facilities, while maintaining resource protection and integrity. With increasing demands for recreation, this will be more challenging in the next 15 years. The impacts of visitor use on wildlife, plants, and habitats, and the human carrying capacity on the refuge have not been assessed. Once they are, appropriate measures should be developed and implemented to minimize adverse impacts.

In addition to the demand for more recreation, the demand from commercial vendors is increasing for commercial uses, such as guided tours and non-priority public uses. The priority public uses are wildlife-dependent and include hunting, fishing, wildlife observation, wildlife photography, environmental education and interpretation.

Once ownership of the St. Marks Lighthouse is transferred to the Service, there will be issues associated with how to fund the restoration of the lighthouse and determine its most appropriate uses.

REFUGE ADMINISTRATION

Administrative Resources

Adequate staffing, funding, and facilities are needed to fulfill the refuge's mission and purposes and to implement the vision for the next 15 years as detailed in this plan through goals, objectives, and strategies.

Law Enforcement

The refuge currently has one full-time law enforcement officer and two dual-function officers (forestry technicians). With the phase-out of dual-function officers, additional full-time law enforcement capability is needed.

IV. Management Direction

INTRODUCTION

This section outlines the provisions of Comprehensive Conservation Plan for managing the refuge over the next 15 years. An overriding concern reflected in this plan is that wildlife conservation is the first priority in refuge management according to the Service's mission for refuges. This plan contains the goals, objectives, and strategies that will be used to achieve the refuge vision.

REFUGE VISION

The St. Marks National Wildlife Refuge will be a model for conserving the natural diversity of plants and animals, preserving cultural resources, and providing opportunities for research, environmental education, and quality outdoor recreation. The refuge will link other north Florida wildlands with vital habitat for threatened and endangered species, migratory birds, and resident wildlife and it will protect the rich resources of Apalachee Bay. Conservation of the natural health and beauty of the refuge is the Service's promise to the community and future generations.

REFUGE GOALS

Goal 1. Wildlife Habitat and Population Management

Conserve, restore, and enhance a natural diversity and abundance of habitats for native plants and animals.

Goal 2. Threatened, Endangered, Rare, and Imperiled Species

Conserve and enhance populations of threatened, endangered, rare, and imperiled plants and animals and their native habitats.

Goal 3. Migratory Birds

Provide high-quality habitat for migratory birds.

Goal 4. Visitor Services

Promote an understanding and appreciation of fish and wildlife resources and provide visitors with a quality, safe, and enjoyable experience compatible with wildlife and wildland conservation.

Goal 5. Cultural Resource Management and Protection

Protect archaeological, cultural, and historic resources for future generations as examples of human interaction with the natural environment.

Goal 6. Wilderness

Protect and preserve the wilderness character of those refuge lands designated by Congress as part of the National Wilderness Preservation System.

Goal 7. Refuge Administration

Provide administrative support and sufficient resources to ensure that the goals and objectives for refuge habitats, fish and wildlife populations, land conservation, and visitor services are achieved.

COMPREHENSIVE CONSERVATION PLAN SUMMARY

The management plan outlines the enhancement of wildlife populations and related habitats over the next 15 years. It also improves refuge safety and protection of resources and provides visitors with more opportunities for wildlife viewing and wildlife-dependent recreation. Environmental education and outreach will be expanded considerably under this plan.

Many objectives and strategies focus on maintaining and restoring native communities, particularly longleaf pine. The development of a Land Management Research and Demonstration Area will enable the refuge to become a leader in longleaf pine research and conservation. It will allow staff to share knowledge with others to benefit both privately and publicly owned lands. Programs to control or eradicate terrestrial and aquatic nonindigenous and invasive plants are proposed, as is nuisance animal control. Hydrologic studies and land conservation are also proposed to maintain the integrity of refuge resources and to manage the impoundments to benefit migratory birds.

Many ongoing and proposed programs and efforts focus on threatened, endangered, rare, and imperiled species of plants and animals. The need for extensive inventory and monitoring for baseline data is addressed in this management plan, particularly for red-cockaded woodpeckers, bald eagles, wood storks, least terns, and flatwoods salamanders.

Since a primary purpose of the refuge is to provide habitat for migratory birds, improvements of the impoundments to provide high-quality habitat for waterfowl, shorebirds, and marsh birds is proposed. So, too, are strategies to improve forested habitat, such as pine flatwoods, pine-cabbage palmetto hammocks, mesic and hydric pine hardwood, and hardwood hammocks.

A primary focus of the visitor services program, as proposed, is to enhance environmental education and outreach efforts substantially to reach larger numbers of students and visitors. This plan places priority on wildlife-dependent recreation, such as photography, hiking, and wildlife observation. Fishing and hunting improvements are proposed, with more opportunities for participation by youths. The restoration of the St. Marks Lighthouse will provide an opportunity to present the refuge's rich cultural and historic heritage.

Sensitive areas and rich resources, such as the refuge's designated Wilderness Areas and cultural resources, will receive more protection from increased law enforcement presence. A major provision of this plan is a comprehensive study of all refuge archaeologic and historic resources. Another means of wilderness protection will be to limit certain activities and recreation.

Meeting basic refuge operation needs has been addressed. Essential new office space, staffing, and equipment are proposed.

REFUGE GOALS, OBJECTIVES, AND STRATEGIES

The goals, objectives, and strategies presented below are the Service's responses to the issues and concerns expressed by the planning team, intergovernmental partners, and the public. The goals, objectives, and strategies are presented in hierarchical format. Chapter V, Plan Implementation, identifies the projects associated with the various strategies.

These objectives and strategies reflect the Service's commitment to achieve the mandates of the National Wildlife Refuge Improvement Act of 1997, the mission of the National Wildlife Refuge System, and the Endangered Species Act of 1973. The refuge's purposes guided the development of the vision and goals. The Service intends to accomplish these goals, objectives, and strategies within the next 15 years.

GOAL 1. WILDLIFE HABITAT AND POPULATION MANAGEMENT

Conserve, restore, and enhance a natural diversity and abundance of habitats for native plants and animals.

Discussion: Management will seek to protect and enhance state and federally listed species and trust species as a priority. In all management actions, the possible impacts to trust species will be evaluated before an action is taken.

In place of single species management, ecosystem and landscape habitat management will be emphasized. The removal of exotic plants and the restoration of native plants will support genetically diverse populations of native wildlife. Specific management techniques for maximizing biodiversity, biological integrity, and environmental health within various community types are outlined below. Since there are many threats to the refuge involving development of surrounding lands, strategies for conserving the integrity of the refuge through conservation of lands adjoining the refuge are also presented.

Objective 1: Emphasize and encourage the protection of additional conservation lands, outside the current acquisition boundary, that are critical to the management of refuge protected resources. This conservation focus area includes lands south of U.S. Highway 98, southeast of Panacea, south of the Ochlockonee River, and the Wacissa River drainage basin. This can be accomplished through partnerships with the state and local governments, other federal agencies, natural resource protection organizations, and neighboring landowners.

Strategies:

- Purchase the remaining 3,386 acres of lands within the approved acquisition boundary according to the 2000 Final Environmental Assessment and Land Protection Plan.
- By 2014, map properties and develop a management plan for the 16 Florida and Georgia conservation easement properties and for the fee-simple title property located in Madison County, Florida (Figure 4).
- Annually contact the following state agencies to discuss ongoing actions and plans for habitat conservation with potential to influence refuge lands: Suwannee River and Northwest Florida Water Management Districts, Florida Fish and Wildlife Conservation Commission, Florida Department of Environmental Protection, Florida Department of Agriculture, Division of Forestry, and Florida Department of Community Affairs. Work in cooperation with these agencies to manage state lands adjacent to the refuge according to leases and Memorandums of Understanding/Agreement.

Objective 2: By 2011, develop a Habitat Management Plan to update and incorporate relevant strategies and information from the Forest Management and Marsh and Water Management Plans commensurate with the objectives outlined in this section.

Strategy:

- By 2011, improve inventory and initiate monitoring of refuge habitats and associated wildlife with emphasis on those listed, rare, or keystone species that are most likely to be impacted by habitat management.

Objective 3: Eradicate or control terrestrial non-indigenous and invasive plants. Eradicate all known populations of Florida Exotic Pest Plant Council-listed plants and find new infestations before they cover more than 0.1-acre per species. Cogon grass, Chinese tallow, and Japanese climbing fern may not be possible to eradicate given current treatment options. Reduce these three species at or below 10 percent of present extent and density levels by 2023.

Strategies:

- Maintain and use systematic surveys, casual surveys, and historical data of terrestrial infestations and treatment areas in the refuge's GIS database to prioritize ongoing treatments, annually search for new infestations, and document successful eradication where possible.
- Maintain a watch-list of invasive non-indigenous plants (e.g., terrestrial and exotic) that are known or suspected to be in the refuge area and a threat to resources.
- Continue partnerships within the framework of the Florida Department of Environmental Protection, Bureau of Invasive Plants Panhandle Working Group, and with the Bureau's terrestrial specialists to share relevant treatment options and to continue receiving state funds and labor for treatments at low or no cost to the refuge.
- Work with adjacent landowners and the local community at large to provide education about the importance of eradicating non-indigenous invasive plant species, procedures to eliminate sources of these plants on private property, and preventive measures to ensure that private lands near the refuge do not become sources of exotic invasive plant propagules.
- Reseed or replant native species after eradication or control measures have been performed where feasible.

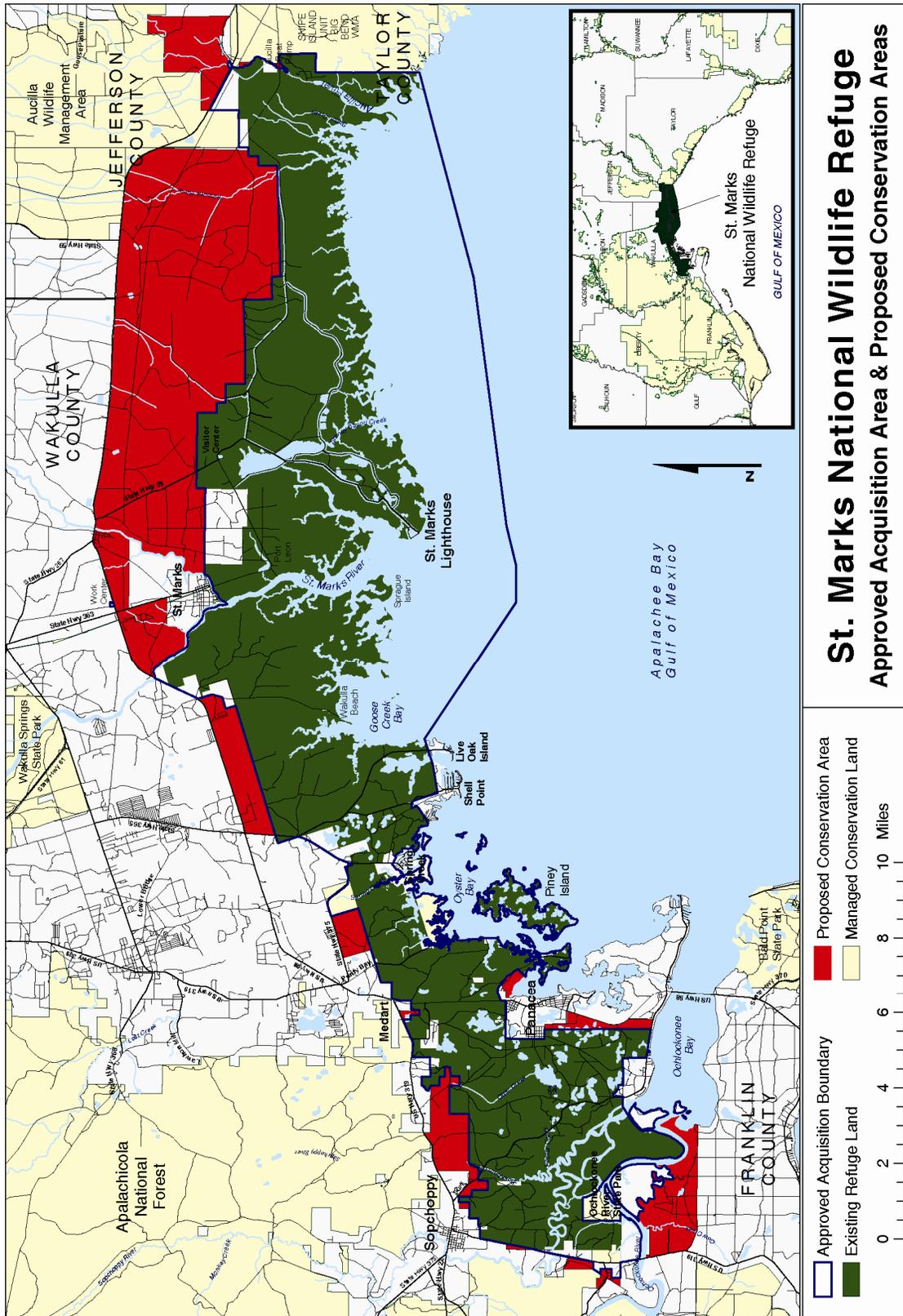
Objective 4: Eradicate or control aquatic non-indigenous and invasive plants. Active annual integrated pest management of cattails with water level manipulations, salinity manipulations, prescribed burning, and ground and aerial application of aquatic approved herbicides will be continued after ensuring that the habitat needs of important secretive marshbirds and other species using emergent vegetation are being met.

Strategies:

- Maintain a watch list of invasive nonindigenous plants (e.g., aquatic and exotic) that are known or suspected to be in the refuge area and a threat to refuge resources.

Effective immediately, close boat trailer access to the impoundments on the St. Marks Unit to prevent the introduction of hydrilla and Eurasian water-milfoil into these waterbodies. Hand- launching of boats with electric trolling motors will be allowed at times when these waterways are not otherwise restricted for wildlife use.

Figure 21. St. Marks National Wildlife Refuge approved acquisition area and proposed conservation areas



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- Continue partnerships within the framework of Florida Department of Environmental Protection, Bureau of Invasive Plants Panhandle Working Group, and with the Bureau's aquatic specialists to share treatment options and receive labor and financial assistance from the state.
 - Provide educational signs and enforcement where necessary to ensure that visitors to refuge aquatic areas are aware of the threats posed by the most common and invasive exotic aquatics. These include hydrilla, Eurasian water-milfoil, Brazilian elodea, and water hyacinth. Focus on areas most susceptible but not yet infested with these species, such as the impoundments and spring runs and basins.
 - By 2008, define parameters and priorities of cattail control in relation to seasonal bird use of managed impoundments.
 - By 2010, conduct research and reviews of available data to ensure that cattail management activities account for habitat needs of secretive marshbird species.

Objective 5: Eradicate or control terrestrial exotic and invasive animals. Feral hogs are known to be having major negative effects on refuge resources, including at least one federally threatened species, the flatwoods salamander. Limit habitat disturbance by feral hogs to only isolated and incidental rooting in known or likely flatwoods salamander habitat on the St. Marks Unit.

Strategies:

- By 2007, implement effective means of reducing hog numbers and damage on the St. Marks Unit, with particular emphasis on protecting threatened and endangered species and habitats.
- By 2009, revise the Animal Control Plan.
- By 2009, initiate monitoring for presence, abundance, and impacts associated with other terrestrial exotic and/or invasive animal species, including invertebrates.

Objective 6: To maintain air and water quality, partner with the local counties, the Florida Water Management Districts, the Florida Department of Environmental Protection, the Panama City Ecological Services Field Office, and the U.S. Geological Survey Water Resources Unit to identify and address any sources of contaminants, or water or air pollution, that could impact the refuge and its resources.

Strategies:

- On an ongoing basis, monitor Class I air quality (visibility).
- Use the results of the Contaminants Assessment Process (2004), which is a literature review developed by the Ecological Services Office, to design a study that will identify and address any contaminants on the refuge.
- By 2009, evaluate mercury contamination of refuge fish, wildlife, and habitat.

Objective 7: Protect natural wetlands and aquatic habitats and restore natural hydroperiods for the benefit of native wildlife with an emphasis on trust species.

Strategies:

- By 2011, conduct a refuge-wide hydrologic study to address historic water flows and current alterations and impediments, such as roads, ditches, and fire lines.

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- By 2012, initiate the restoration of natural hydroperiods and drainage altered by refuge roads and fire lines.
 - By 2012, monitor and assess impacts from watercraft vessels in the Executive Closure Area to determine if limitations are needed regarding access to prevent noise, disturbance to wildlife and seagrass beds scarring.
 - By 2015, conduct a hydrologic study and work with adjacent landowners to address water quality and quantity, hydroperiods, and direction of flow within the East River drainage basin.
 - In partnership with the Florida Department of Environmental Protection and the Northwest Florida Water Management District, incorporate the results of seagrass surveys into protection strategies for the Big Bend Seagrasses Aquatic Preserve of which the Executive Closure Area is part.
 - Since propeller scarring is a threat to the seagrass beds and to wintering waterfowl that rely on the beds, the refuge will maintain in current condition, but not improve, the saltwater boat ramp, channel, and tidal basin. Maintenance is slated for 2010.

Objective 8: Improve management of refuge fisheries.

Strategies:

- To reduce the potential for invasive weed (e.g., hydrilla and Eurasian water-milfoil) introduction into the refuge pools, effectively immediately, eliminate the use of trailers to launch boats on the St. Marks Unit and limit motors to electric trolling motors.
- By 2012, in partnership with the Service's Panama City Field Office fisheries personnel, update the 1984 Fishery Management Plan to benefit migratory birds and other trust species, as well as the fishing public.
- By 2012, evaluate the need/potential to stock forage fish for wood storks and other wading birds.
- By 2018, initiate surveys to document fishery resources in the Panacea and St. Marks Units and compile a species list for finfish, shellfish, and crustaceans.
- Within 15 years of the date of this plan, survey the depressional ponds for fish and other aquatics. Determine what the natural condition is for these ponds (fish/no fish, and which species) and then restore at least some of these to the natural condition.

Objective 9: Continue to restore and maintain open multi-aged, historic pine communities with low, diverse understories. Annually conduct habitat inventories on 7 percent of the forested compartments and prescribe treatments to maintain average pine basal areas of 50 to 80 square feet per acre and retain greater than or equal to 65 pines (>5 inches DBH) per acre. Evaluate revising the target pine basal areas upward for stands with larger diameter pines. Manage pine understories to average less than 4 feet in height.

Strategies:

- By 2008, develop a Land Management Research and Demonstration Area on the refuge focusing on restoration and management of longleaf pine ecosystems by employing a biologist and expanding related research and educational programs.
- Continue to restore slash or loblolly pine plantations to longleaf (or other historic) pine.
- Initiate restorations using the most environmentally sound method necessary to effectively accomplish the restoration. Techniques will favor the least invasive and minimal disturbance alternatives and may include burning, using herbicides, discing, or employing other methods.

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- Continue habitat restoration of the old agricultural fields (e.g., Panacea, Abe Trull, Wakulla, Mounds, and Stoney Bayou).
 - By 2011, as part of the Habitat Management Plan, develop a restoration plan for the fields identifying (to the extent possible) the historic habitat(s), the current plant communities, the restoration needs, the methods to achieve the restoration, and the projected restoration schedule.
 - Continue to use commercial harvest to conduct thinning as identified in forest or habitat management prescriptions, while maintaining strict oversight to minimize rutting or other habitat damage. Thinning operations will also be managed to limit possible disturbance to critical wildlife habitat. Regulations to avoid take of flatwoods salamanders will be followed in accordance with 50 CFR 6(a)-(e) during timber harvests within the 1,476-foot radius buffer zone surrounding salamander breeding ponds.
 - Continue to use prescribed fire to maintain understories less than 4 feet in height in pine habitats.
 - Use more growing season fires to increase diversity by reducing woody plant cover and increasing herbaceous plant cover and richness.

Objective 10: By 2020, evaluate hydric pine-cabbage palm management techniques and literature to improve the management of this habitat.

Strategies:

- Review literature and consult with experts on the ecology of the hydric pine-cabbage palmetto community and options for its management. Evaluate wildlife use of hydric pine-cabbage palmetto through literature review and surveys.
- By 2012, based on literature reviews, consultations, and surveys, initiate a series of studies of potential management techniques for the pine-cabbage palm community (e.g., prescribed fire or tree removal) as deemed necessary to evaluate potential management techniques. Monitor wildlife impacts of these techniques on key species. Incorporate the findings of these studies into the Habitat Management Plan.

Objective 11: By 2020, evaluate modifying the structure of mesic and hydric hardwood and pine-hardwood hammocks to provide better habitat for breeding birds.

Strategies:

- By 2019, review the literature and consult with experts on the ecology of mesic and hydric hardwood and pine-hardwood hammock communities and options for the management of these community types.
- By 2019, evaluate bird and other wildlife use of pine-hardwood and hardwood stands. Include a variety of stands so that the entire range of conditions encountered on the refuge and diverse sites off refuge (e.g., wetlands modified by conversion to pine plantations) can be evaluated.
- By 2020, inventory pine-hardwood and hardwood habitats during compartment cruises, collecting information on species composition, stand structure (including patchiness), and signs of past management/perturbations (e.g., fire scars and wind damage). Stands should be delineated based on hydrological gradient (e.g., hydric and mesic), as well as on composition and structure.
- By 2020, evaluate management options (including fire) in hydric and mesic pine-hardwood and hardwood hammocks and, if warranted, initiate experimental overstory and/or midstory

manipulation or other management on a small scale to evaluate the techniques and wildlife responses. Initial midstory and overstory manipulation (if desirable) should be by noncommercial tree removal (or deadening, without using heavy equipment) on up to four sites, of no more than 10 acres in size. Adequate monitoring of species composition, structure, and bird and other wildlife responses must be in place before treatment.

GOAL 2. THREATENED, ENDANGERED, RARE, AND IMPERILED SPECIES

Conserve and enhance populations of threatened, endangered, rare, and imperiled plants and animals and their native habitats.

Discussion: The refuge and surrounding waters host a number of federal and state listed threatened and endangered species of plants and animals, as well as rare or declining species considered “species of special concern” (Section B, Appendix IV). Many of these species are declining due to alteration and/or degradation of their habitat. By restoring natural communities, such as longleaf pine and its associated groundcover, and by eliminating adverse human impacts, the plight of many of these species will improve dramatically. Other species may require additional attention and management (on and sometimes off the refuge) to increase their population and improve their long-term viability. All plans and actions are subject to consultation with the Ecological Services Field Office under Section 7 of the Endangered Species Act to ensure that there are no adverse impacts to federally listed species. See Section B, Appendix XII.

In April 2005, the ivory-billed woodpecker, thought to be extinct, was rediscovered in Arkansas. Although no sightings have been documented on refuge lands, the refuge contains suitable habitat for the woodpecker. This plan will be revised as necessary according to Service directives and guidance resulting from the development of a recovery plan for this species or other species.

Objective 1: Assess refuge and adjacent lands for rare and listed plants and animals (ongoing).

Strategies:

- By 2008, support and encourage research by partners on basic life history and management needs of species and on communities of region-wide concern, especially plants and animals that are currently at risk according to state or federal determinations. The development of the refuge as a Land Management Research Demonstration Area for the longleaf pine ecosystem will facilitate much of this critical research.
- By 2008, create and periodically update a database of occurrences of all rare and listed species in coordination with Florida Natural Areas Inventory.
- By 2014, inventory refuge lands for rare and listed plants and animals through contracts, partnerships, or use of existing or additional staff.
- By 2015, evaluate lands and waters adjacent to the refuge for potential rare and listed species habitat. Examples include flatwoods salamanders, Gulf sturgeon, and Godfrey’s spiderlily. Explore acquisition, protection, and partnership opportunities which will protect additional habitat and corridors.
- Use adaptive management to periodically review the status of listed and rare species, to evaluate the literature and information from researchers, biologists, and managers, and to continually assess and prioritize management actions and strategies.

Objective 2: Manage the red-cockaded woodpecker population and habitat for the expansion of the species on the refuge according to the Red-cockaded Woodpecker Recovery Plan. Within the 15-year lifespan of this comprehensive conservation plan, the target goal is to increase active clusters on the refuge to 24.

Strategies:

- By 2009, revise the refuge-specific Red-cockaded Woodpecker Recovery Plan. Evaluate lands managed for red-cockaded woodpeckers, including new additions, and adjust refuge population goals accordingly.
- Continue leadership and involvement in the Central Florida Panhandle Core Population group to coordinate red-cockaded woodpecker management of the Apalachicola National Forest/St. Marks population. Continue to support red-cockaded woodpecker monitoring and management on Ochlockonee River State Park and Apalachicola National Forest.
- Continue to actively manage red-cockaded woodpeckers through color-banding and monitoring, artificial cavity installation and translocation. Specifically, continue to translocate females to single males, as needed, and unrelated, subadult pairs of birds into suitable, unoccupied clusters.
- Since research indicates that red-cockaded woodpecker populations are more productive where growing season prescribed fires are conducted in their foraging habitat, shift prescribed fires in current and future foraging habitat to the growing season as much as feasible. Also, increase fire frequency to 2-year intervals in sandhill red-cockaded woodpecker-occupied recruitment clusters and surrounding foraging habitat to reduce midstory oaks (per Red-cockaded Woodpecker Recovery Plan).

Objective 3: Monitor roost sites for protection and enhance wood stork use on the refuge.

Strategies:

- By 2009, protect the roost sites at the northeast cove of Otter Lake from human disturbance. If needed, limit human activity in the area where roosting is taking place.
- Beginning in 2010, determine refuge wood stork population, abundance, and distribution and initiate monitoring.
- Beginning in 2010, inventory wetlands on the refuge and off-site (easements and fee simple property) for use or potential use by wood storks for feeding and roosting. Monitor roost sites monthly.
- By 2011, if reliable foraging habitat is provided in the impoundments, consider installing artificial nesting platforms.
- By 2012, through the revised Habitat Management and Fisheries Management Plans, evaluate enhancement opportunities, such as stocking, producing forage fish and water level manipulation.

Objective 4: Monitor the nesting bald eagle population and limit disturbances. Currently, 13 to 15 active nesting territories exist on or adjacent to the refuge. Areas around nests are closed for public use and human activities on a seasonal basis.

Strategies:

- By 2008, improve the marking of buffers around active eagle nests, restricting hunting, boating, and other uses.
- Continue to follow the special management considerations and prescribed fire techniques for bald eagles as outlined in the Wildlife Management Plan for the Forested Uplands of the St. Marks National Wildlife Refuge (1989).
- Continue consultation with the Service's Panama City Ecological Services Field Office.
- In order to meet fire requirements for bald eagles, continue to fly annually in January to find active eagle nests. Periodically search for new nests. If active nests are found, before burning within the primary buffer zone, conduct additional surveys until nesting activity ends.

Objective 5: By 2012, increase reliable, secure nesting habitat for the least tern. The only known nesting prior to 2006 has been on the Stoney Bayou 1 platform.

Strategies:

- By 2010, improve the potential nesting area on Porter Island and use recordings to attract least terns.
- By 2012, install at least one additional nesting platform in Stoney Bayou #1 Pool and monitor its use by least terns.

Objective 6: Continue to identify flatwoods salamander distribution and habitat on the refuge. Manage habitat appropriately.

Strategies:

- Continue controlled burning and thinning in pine flatwoods, but minimize adverse impacts from logging, roadwork, fire line plowing, and other uses of heavy equipment. Evaluate season-of-fire impacts.
- Timber harvesting in pine flatwoods habitat within a 1,476-foot radius buffer zone surrounding a known flatwoods salamander breeding pond would be conducted in accordance with federal regulations (50 CFR Part 17 RIN 1018-AE38 6 (a) to (e)).
- Shift prescribed fires to the growing season (as feasible) near known flatwoods salamander breeding ponds. Maintain frequent fire regimes (2- to 3-year intervals) in these sites whether in growing or dormant season (or both).
- By 2011, determine habitat restoration needs for flatwoods salamanders.
- By 2011, evaluate ditches, roads, and other hydrological alterations in flatwoods salamander breeding habitat and begin restoring hydroperiods as desirable and feasible. Assess impacts to known breeding ponds before restoration is initiated.
- The Florida Fish and Wildlife Conservation Commission is conducting a survey of potential flatwoods salamander breeding ponds. Within 10 years of the conclusion of the study, survey all other potential breeding ponds that were not surveyed or where the salamander was not found.

Objective 7: Identify striped newt and gopher frog distribution and habitat on the refuge.

Strategy:

- Inventory potential breeding ponds and prioritize the sites for actual surveys for individuals and habitat restoration needs. Initiate surveys by 2007.

Objective 8: The gopher tortoise is on the Southeast Region's list of management concern and a keystone species that provides habitat for a host of other rare species, including the federally listed eastern indigo snake. Maintain healthy grassy/herbaceous groundcover in longleaf pine sandhills and conduct a survey of the population.

Strategies:

- Improve longleaf pine sandhill restoration and management through the Land Management Research and Demonstration Area program.
- Continue prescribed burning in gopher tortoise habitat. Shift to growing season fires as much as feasible in the sandhills.
- By 2008, protect gopher tortoise burrows during logging, non-emergency fire line plowing, or other heavy equipment use in sandhills.
- By 2009, survey burrows to determine percentage that are active and assess population status. Monitor to evaluate prescribed burning and other management techniques.
- By 2010, determine if human and domestic or feral animal predation is impacting the gopher tortoise population. Take appropriate actions.
- By 2013, evaluate the potential to translocate tortoises to areas of unoccupied (or underutilized) suitable habitat. Any tortoises introduced from off-refuge sites must be disease free. The State of Florida requires permits to relocate or translocate tortoises.

Objective 9: By 2012, determine population size and distribution of eastern indigo snakes on the refuge. Assess the impacts of habitat management. Initiate the monitoring of refuge eastern indigo snakes by examining gopher tortoise burrows, area searches, or some other technique.

Objective 10: Assess sea turtle use of seagrass beds in Apalachee Bay. By 2022, determine threats and develop and implement strategies for seagrass beds protection.

Objective 11: Provide suitable black bear habitat, including corridors and links to the major population centers of the Apalachicola National Forest/Tate's Hell State Forest, and the Aucilla/Wacissa river areas.

Strategies:

- Determine black bear distribution and population dynamics on the refuge and adjoining lands.
- Working with the state and other partners, develop and implement a strategy for the protection of lands important to the black bear population utilizing the refuge. Develop a land protection plan to protect lands necessary to provide for an adequate corridor between the Apalachicola National Forest/Tate's Hell State Forest, and the Aucilla/Wacissa river areas.

Objective 12: Work with the Service's manatee coordinator, state agencies, and other entities to protect manatees. Continue to work with partners to develop any boat speed or other restrictions that

are necessary to reduce boat collisions or other disturbances to manatees. Continue to include the manatee in marine resource education programs.

Objective 13: By 2011, determine the importance of the refuge to the Gulf sturgeon and other rare and imperiled fish. Work with the Service's Panama City Fisheries Office, the state, a university, or other entity to initiate a study of imperiled fish.

Objective 14: By 2011, work with the Service's Panama City Fisheries Office, the state, a university, or other entity to initiate a study that would determine population levels and distribution of imperiled mussels and other rare invertebrates, including cave/spring fauna, on the refuge. The study will include the upstream reaches of rivers and creeks. Develop protection and/or management strategies, and determine monitoring needs.

Objective 15: By 2014, inventory and manage rare and listed plants. There are no federally listed plant species known to occur on the refuge or in Wakulla County; however, the refuge hosts one of only two known small populations of the recently described Godfrey's spiderlily. There are at least 27 state-listed species (15 threatened, 7 endangered, 5 commercially exploited), several of which are included on the Southeast Region's list of species of management concern. Many other state-listed species are likely to occur on the refuge.

Strategies:

- A partial botanical inventory of the refuge's upland pine communities has been completed (Section B, Appendix IV). By 2021, complete botanical inventories for all vegetative communities on the refuge. Incorporate findings of rare plants into management plans to assure that these plants are benefited (or at least not adversely impacted) by management actions.
- Complete inventories for the hardwood communities before any active management activities to promote understory and mid-canopy diversity are implemented.

GOAL 3. MIGRATORY BIRDS

Provide high-quality habitat for migratory birds.

Discussion: The refuge provides habitat for an extensive variety of birds, both resident and migratory species. A brief summary of predominant bird types and their preferred habitat follows.

Waterfowl (ducks, geese, and coots)

The refuge's coastal marshes, seagrass beds, and riverine estuary sites are important wintering and migration areas for several diving ducks of national importance (e.g., redheads and scaup). Additionally, the managed impoundments provide a mix of habitats and water depth capabilities not available in adjacent marshes. Teal, pintail, widgeon, and other ducks are common in the impoundments and have at times exceeded eight thousand birds on any one survey event.

Shorebirds, Waterbirds, and Marshbirds

One impoundment (i.e., Tower Pond) has been specifically managed for shorebirds over the past few years, but the thousands of shorebirds using the other impoundments during dry conditions attest to their importance in providing quality shorebird stopover habitat. Similarly, these habitats can benefit wading birds, terns, and other species. Inland waterbird rookeries have often been unsuccessful due to unreliable water levels.

Certain small islands in Apalachee Bay (especially Palmetto and Smith) are critically important as waterbird and shorebird nesting habitat. They are not adequately protected because they are either privately owned (Smith), or the refuge has limited jurisdiction over the surrounding waters. The Executive Closure Area only protects migratory birds from hunting. It does not allow for restrictions of State waters due to disturbance impacts or boating impacts on seagrasses.

Neotropical Migratory Birds/Partners in Flight Roles

Due to the refuge's size, diversity of habitats, and location along the northern Gulf coast, it is an important breeding, wintering, and stopover site for neotropical migratory birds. Many of the highest priority breeding and wintering species are associated with the open pine/grassy understory habitats where the refuge has focused much of its forest restoration efforts. The challenge will be to continue the current progress in pine habitats, establish adequate monitoring, and expand management activities (as needed) into other habitats.

Objective 1: By 2010, improve inventorying and monitoring of migratory birds by revising the Biological Inventory and Monitoring Plan. The revised plan will devise strategies for obtaining data on the distribution and use of refuge lands by high priority migratory bird species. It will prioritize inventory needs by species and species groups and it will describe survey methodologies and protocols.

Strategies:

- By 2009, evaluate current monitoring of priority species and species groups. Develop a priority list of monitoring needs, including those species which are prone to impacts by management (active treatments or disturbance), and for which there is limited knowledge of population size, distribution, and habitat use on the refuge.
- By 2009, evaluate marshbird use of coastal marshes and pools with particular emphasis on yellow, black, and king rails. Incorporate the findings into the management of the impoundments and coastal marshes. By 2009, evaluate the impacts of prescribed fire on marshbird habitat.
- By 2010, evaluate priority sparrow use of coastal marshes and impoundments with particular emphasis on saltmarsh and Nelson's sharp-tailed sparrows and seaside sparrows. Incorporate findings into the management of the impoundments and coastal marshes.
- By 2010, evaluate priority bird use of pine habitats, focusing particularly on priority Bachman's and Henslow's sparrows, red-headed woodpecker, and brown-headed nuthatch.
- By 2010, initiate surveys for nesting and roosting swallow-tailed kites. Protect these important sites from disturbance.
- By 2012, evaluate the impacts of prescribed fire on priority marsh sparrow habitat.

Objective 2: Provide sufficient habitat and sanctuary on the refuge to support migrating, wintering, and breeding waterfowl of the Atlantic and Mississippi Flyways.

Strategies:

- Maintain at least two serviceable pumps and provide adequate resources to operate these in order to manipulate water levels and salinities in the impoundments.
- Unless there are higher priority needs identified in the future for shorebirds and/or marshbirds, continue to manage at least five St. Marks Unit impoundments to provide important wintering and migratory stopover habitat for waterfowl, with special emphasis on black ducks, pintails, canvasbacks, and scaup.
- To reduce the potential for invasive weed (hydrilla and Eurasian water-milfoil) introduction into the refuge pools, effective immediately, eliminate the use of trailers to launch boats on the St. Marks Unit and limit motors to electric trolling motors.
- By 2012, install a water gauge at Levy Ditch Greentree Reservoir and map the flooded basin at different water levels.
- By 2013, monitor duck populations in coastal marshes and Apalachee Bay, with emphasis on black ducks and redheads. Determine “hot spots” of use and focus efforts to protect habitats and birds from disturbance. Limit disturbance to waterfowl in all habitats, especially in the impoundments and Executive Closure Areas. Pursue obtaining authority for jurisdiction of the water column in the Executive Closure Areas.
- By 2014, maintain a minimum of 50 wood duck nest boxes across the refuge. Assist the state in accomplishing banding goals.
- By 2015, evaluate how past and present management practices affect waterfowl use at the current 50- to 60-acre Levy Ditch Greentree Reservoir. Inventory and evaluate flooded forested habitat (i.e., tree species and condition, habitat composition and structure). Initiate bi-monthly waterfowl surveys, September 1 through March 15. Adjust management accordingly.

Objective 3: Provide nesting, foraging, and important migratory stopover habitat for shorebirds, waterbirds, and marshbirds in accordance with the Southeastern Coastal Plain and Caribbean Region Shorebird Conservation Plan, the Partners in Flight Program, and the Southeastern Coastal Plain Colonial Waterbird Conservation Regional Plan. Limit human disturbance.

Strategies:

- Maintain at least two serviceable pumps and provide adequate resources to operate these in order to manipulate water levels and salinities in the impoundments.
- By 2011, as feasible, manage at least two impoundments for north and south bound migratory shorebirds, while retaining high-quality habitat for waterfowl. Initiate experimental management of the Johnson Creek area for shorebirds.
- When feasible, provide nesting habitat for Wilson’s plover in at least one impoundment.
- Annually survey (in April) to determine the most likely locations of wading bird rookeries. Identify potential disturbance factors and minimize problems as much as possible.
- By 2014, acquire islands (particularly Smith and Gull) that provide nesting habitat for shorebirds and waterbirds as allowed for under the 2000 Land Protection Plan. In partnership with the State of Florida and concurrence with the landowner, consider designating Smith Island as a Critical Wildlife Area.
- By 2015, investigate the possibility of using artificial nesting structures for wading birds in freshwater habitats.
- By 2015, evaluate shorebird use of coastal habitats using the International Shorebird Survey protocol. Identify and implement management actions, including protecting important shorebird sites from human disturbance.

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- By 2011, negotiate (if possible) an agreement with the state that would allow the refuge to restrict public access around the refuge islands in Oyster Bay during critical nesting or migration periods. Consider a similar agreement for the protection of seagrass resources in the Executive Closure Area. On an ongoing basis, inventory and monitor avian uses of these islands.

Objective 4: Employ active water and plant community management activities on most impoundments to create a range of freshwater to slightly brackish environs on approximately 1,600 acres within the St. Marks Unit. Production of a mix of wetland communities, mudflats, and water depths for a variety of Apalachee Bay avian groups will be emphasized, with priority on providing habitat for shorebirds, marshbirds, waterfowl, and waders. A secondary focus of the pools is to allow an amount of public use for activities, such as fishing and bird watching, that will not adversely impact migratory bird presence and use.

Strategies:

- Throughout the next 15 years, improve impoundment management capabilities, flexibility, and emphasis to provide quality habitat for waterfowl (particularly black ducks, pintails, canvasbacks, and scaup), while providing more habitat for other priority bird groups, such as shorebirds and marshbirds.
- By 2010, evaluate, maintain, and upgrade several water control structures to a flapgate/stoplog design, where tides may be used.
- By 2011, revise the Marsh and Water Management Plan (1986) and incorporate it within the proposed Habitat Management Plan. Include impoundment management in annual habitat prescriptions.
- By 2011, monitor water levels (at least bi-monthly), salinities, and vegetation for each impoundment in the St. Marks Unit.
- By 2011, monitor waterfowl, shorebird, and waterbird responses to habitat management within the impoundment system using bimonthly ground surveys, increasing in frequency to 10-day intervals during spring and fall shorebird migration periods (March–May; July–October) according to the International Shorebird Survey protocol.
- By 2021, protect and initiate the restoration of the East River watershed south of U.S. Highway 98 by direct purchase, easement, buffer area, partnership, or some combination of these methods in order to have more reliable water flows and additional options for managing the impoundments.

Objective 5: Manage to restore and maintain/improve refuge forested habitats, particularly pine flatwoods, pine cabbage-palmetto hammocks, mesic and hydric pine hardwoods, and hardwood hammocks for migratory birds.

Strategies:

- By 2013, evaluate the responses of Bachman's and Henslow's sparrows, brown-headed nuthatches, red-headed woodpeckers, and other priority birds to seasonality and frequency of prescribed fire. Incorporate findings into management plans.
- By 2017, determine woodcock presence and habitat use on the refuge. Initiate appropriate habitat management as needed to help meet the goals and objectives of the North American Woodcock Management Plan.

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- By 2019, evaluate habitat use by Kentucky and Swainson's warblers and wood thrushes on and adjacent to the refuge.
 - By 2020, determine habitat needs of Kentucky and Swainson's warblers and wood thrushes and, if necessary, initiate experimental management treatments.

GOAL 4. VISITOR SERVICES

Promote an understanding and appreciation of fish and wildlife resources and provide visitors with a quality, safe, and enjoyable experience compatible with wildlife and wild land conservation.

Discussion: As identified in the National Wildlife Refuge System Improvement Act, there are six priority wildlife-dependent recreation uses. These are hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. Fundamental to the provision of these uses are viable and diverse fish and wildlife populations and the habitats upon which they depend. These priority uses, along with all other uses, must be appropriate and compatible with refuge purposes and the mission of the National Wildlife Refuge System. The compatibility of refuge uses is addressed in Section B, Appendix VI.

To ensure a quality, wildlife-dependent recreational experience, while achieving a "wildlife first" mandate, certain management tools and restrictions may be used. For example, the number of refuge users and conflicts among users may be limited by (1) permitting uses; (2) designating trails, levees, and sites for specific kinds of wildlife-dependent recreation use; and (3) permitting uses at certain times of the year. The refuge does not have commercial use permits or concessions; however, commercial fishing boats may be launched at the Aucilla River and Wakulla Beach boat ramps.

Those objectives and strategies that can be shown on maps are depicted in Figures 22, 23, and 24.

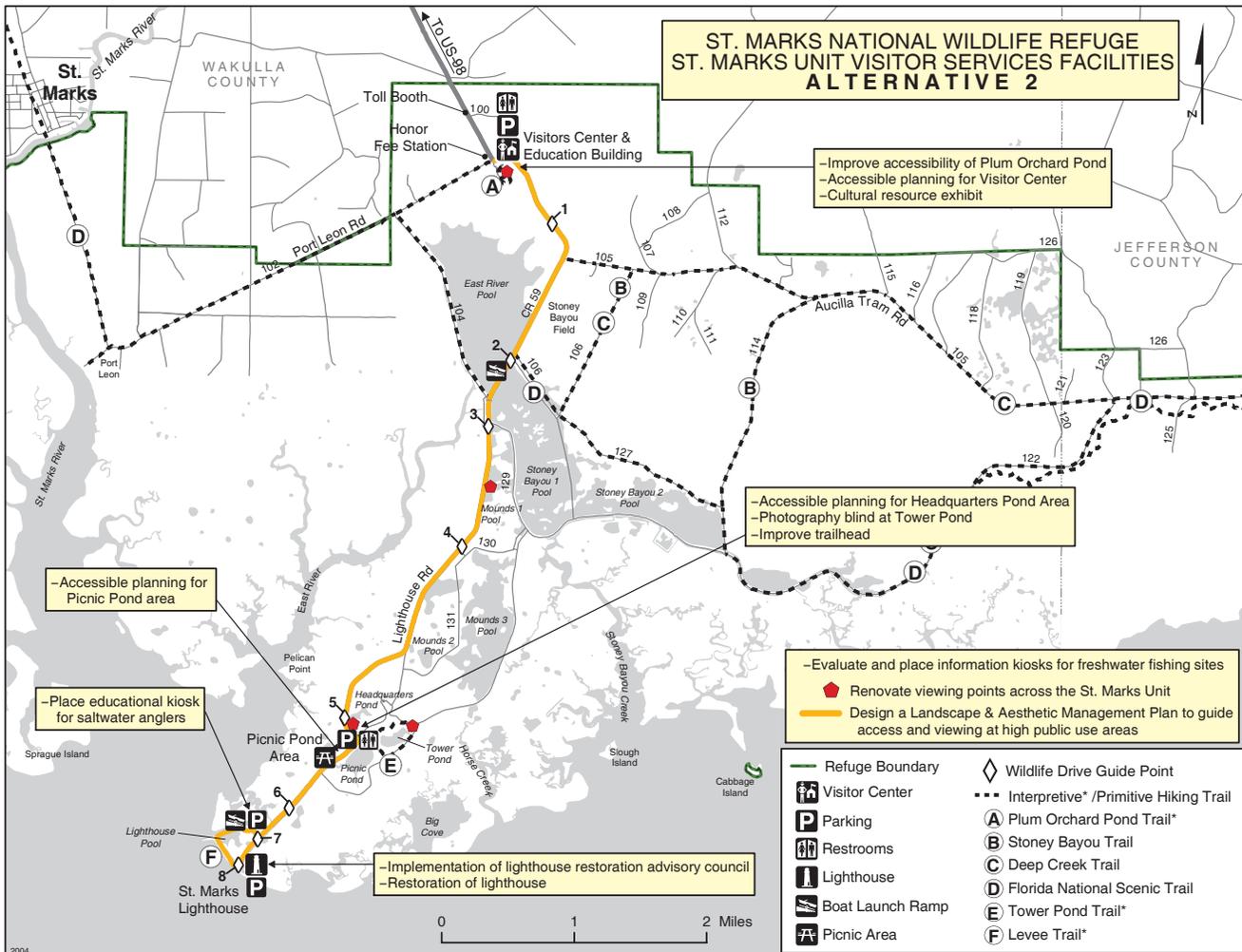
Objective 1: By 2011, complete a Visitor Services Management Plan for the refuge. Specific emphasis will be placed on assessing and enhancing the environmental education program for target audiences to strengthen each visitor's relationship with wildlife and the environment.

Objective 2: By 2011, assess all refuge environmental education and interpretation programs in order to increase awareness of the refuge's mission and support for its abundant natural resources. Determine if visitors, students, and local residents understand the key resource issues of the refuge, such as endangered species, migratory birds, fire, and forest management.

Strategies:

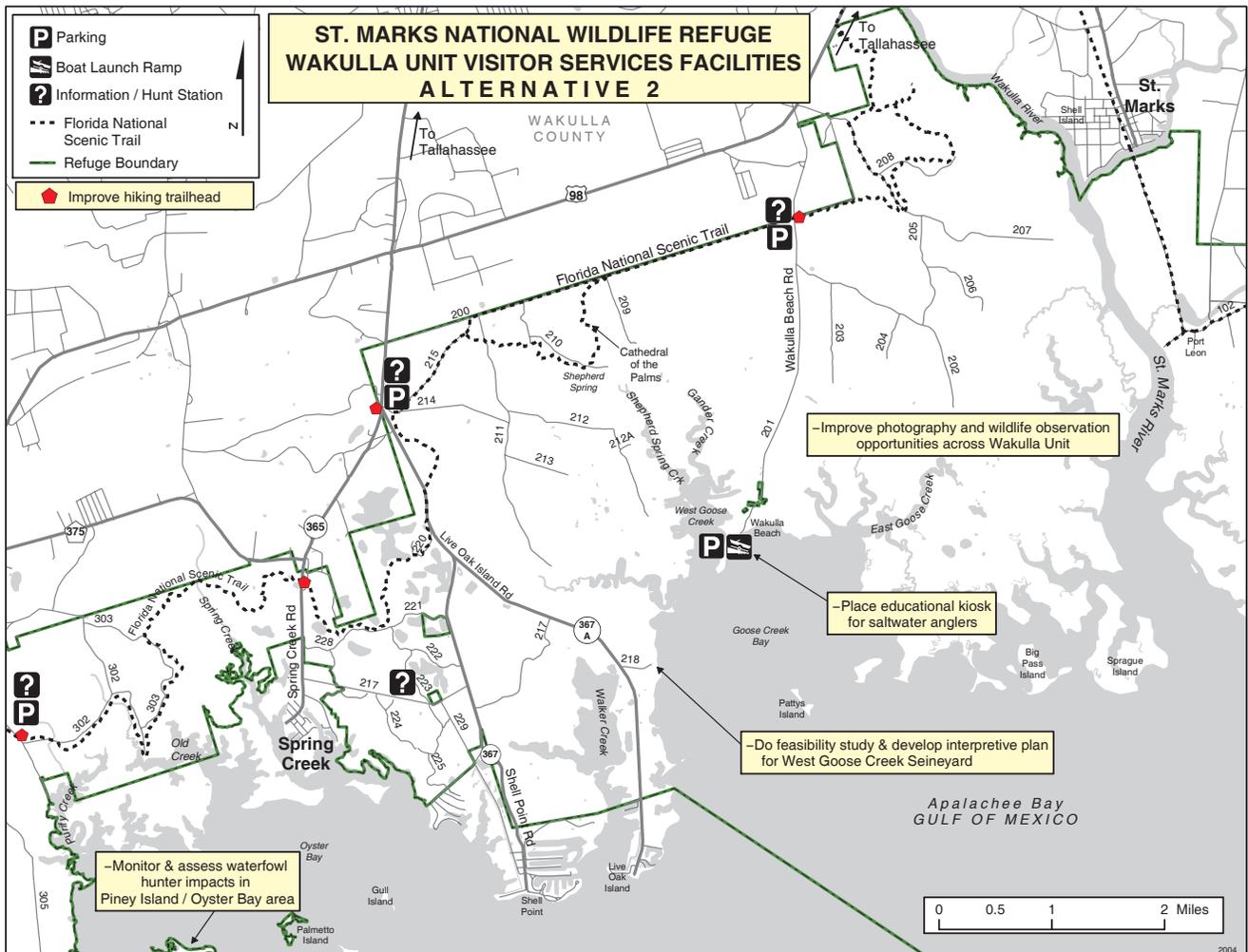
- Beginning in 2006, develop off-site educational exhibits on key resource issues and attend a minimum of 10 off-site public events each year to educate off-site audiences.
- Beginning in 2006, annually plan programs and exhibits on key themes to reach target audiences.
- To better disseminate refuge information and regulations to visitors, beginning in 2006, annually review all printed materials, such as newsletters and brochures, and revise the Sign Plan by 2009.
- By 2009, review all outdoor learning stations for success in reaching target audiences about key resource issues.

Figure 22. St. Marks Unit visitor services facilities - Alternative 2



- Promote refuge messages by increasing student contacts from 4,000 students annually in 2004, to 10,000 students by 2013. Include strategies to reach off-site audiences. Develop “discovery kits” for key resource topics that could be used for lessons or presentations by volunteers. Evaluate establishing partnerships with museums, community classroom consortiums, etc.
- By 2013, increase visitor center operation function and off-site outreach opportunities, including non-traditional audiences.
- By 2017, construct an environmental education laboratory and classroom building and budget for staff and equipment.

Figure 23. Wakulla Unit visitor services facilities

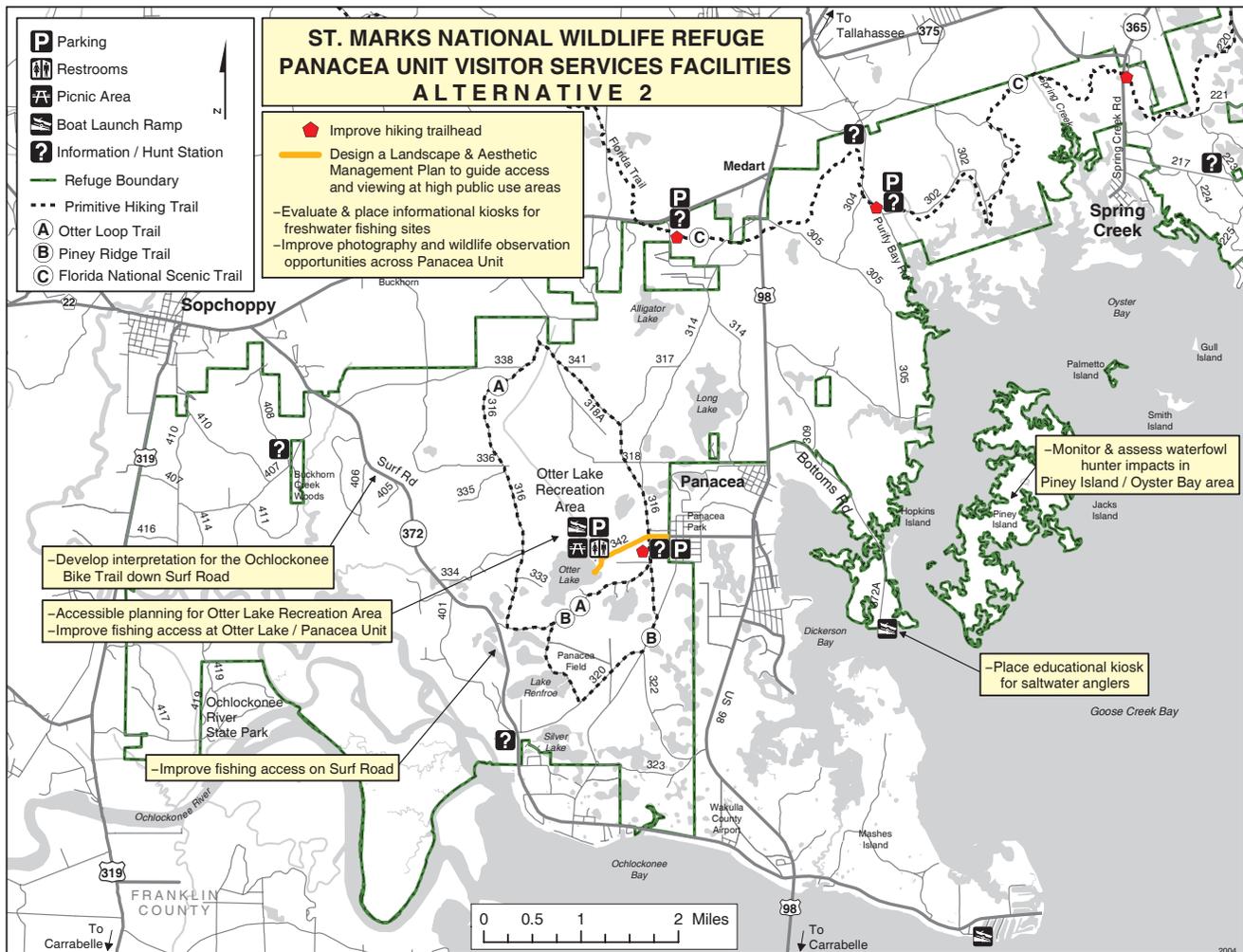


Objective 3: Provide biologically sound hunting opportunities commensurate with population status of game species on the refuge.

Strategies:

- By 2010, assess the feasibility of incorporating youth hunt programs and clinics into the refuge hunt program.
- By 2011, update the Hunt Plan.
- By 2012, monitor and assess waterfowl hunter impacts in the Piney Island area to determine if limitations are needed regarding access to prevent noise, disturbance to wildlife, or seagrass beds scarring.

Figure 24. Panacea Unit visitor services facilities



Objective 4: Provide safe sport fishing opportunities to the public, compatible with wildlife and resource objectives and the Fisheries Management Plan. This plan is being rewritten and will include strategies to assess the health of the lakes and impoundments.

Strategies:

- To reduce the potential for invasive weed (hydrilla and Eurasian water-milfoil) introduction into the refuge pools, effective immediately, eliminate the use of trailers to launch boats on the St. Marks Unit and limit motors to electric trolling motors.
- By 2008, assess the condition of the Lighthouse basin boat ramp and canal and determine present depths of the channel. If warranted, by 2011, maintain and stabilize saltwater boat basin and canal at lighthouse to 2006 conditions.
- Beginning in 2008, develop a youth fishing program through partnerships with the state and counties.

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- By 2009, educate anglers about the regulations for fishing and refuge resources by developing and producing a refuge fishing brochure.
 - By 2011, evaluate and, as needed, enhance fishing opportunities on the Panacea Unit for all visitors, especially at Otter Lake. Examine ways to enhance parking and access to lakes off of State Highway 372.
 - By 2012, educate anglers and all visitors about fishery and marine resources, including the Big Bend Seagrass Aquatic Preserve. Use printed or website information, the media, signs, and kiosks to be located at the Aucilla River, Lighthouse, and Wakulla Beach Road boat ramps.
 - By 2012, in the Executive Closure Area, monitor and assess watercraft impacts -- scarring from propellers to seagrass beds and disturbance to wildlife from movements and noise -- to determine if any restrictions regarding access are needed to protect resources.
 - By 2013, evaluate bank fishing opportunities for both saltwater and freshwater anglers on the refuge. Improve maps and information available to the public; evaluate signage and the use and placement of education kiosks. Assess parking and access to the levees.

Objective 5: By 2011, assess and enhance opportunities for all visitors to view and photograph wildlife and wildlands as a means of understanding and supporting the refuge mission. Since refuge trails offer a means of introducing the public to wildlife and wildlands, emphasis will be placed on enhancing trails and wildlife viewing opportunities on the Panacea and Wakulla Units.

Strategies:

- Partner with the St. Marks Refuge Association, Inc., to hold an annual outdoor photography contest.
- Beginning in 2008, use volunteers and other partners to host a minimum of one outdoor photography class annually.
- By 2011, clearly define major trailheads, especially along the Florida National Scenic Trail, and improve educational and regulations information, parking, and safety.
- By 2011, enhance wildlife observation opportunities and interpretation on the Wakulla and Panacea Units by improving the trailhead for the Cathedral of the Palms/Shepherd Spring hike. Priority projects will tie-in to the proposed Ochlockonee Bay Bike Trail along Highway 372.
- Effective immediately, periodically evaluate speed reduction strategies for Lighthouse Road to protect wildlife resources and visitors.
- By 2013, assess the feasibility of managing access on Lighthouse Road to enhance wildlife viewing. Evaluate strategies, such as using a tram to move visitors and closing the road to vehicles on certain days, in order to promote bicycle and foot access.
- By 2016, improve management of public use areas for accessing and viewing by developing a Landscape and Aesthetic Management Plan with guidance from the biologists and law enforcement staff.
- By 2019, construct an observation platform with interpretive signage at Mounds Pool #3 to improve viewing and photographing of wintering waterfowl, eagles, hawks, and wading birds.

Objective 6: Upon transfer of the St. Marks Lighthouse to the refuge, evaluate the document entitled "Condition Assessment Report of the St. Marks Lighthouse, September 2002," and incorporate relevant strategies into the visitor services program using an advisory team to secure resources, make suggestions, and oversee restoration efforts.

Objective 7: By 2009, promote awareness of key refuge resources using a variety of media, such as the website, news releases, television, radio, and newsletters to reach visitors, local businesses, local governments, and students.

Objective 8: In order to increase awareness and support of refuge management and resources, by 2010, focus outreach efforts on the refuge volunteers and the St. Marks Refuge Association, Inc., and a minimum of five existing partners a year.

Strategies:

- By 2009, design and conduct an assessment to measure and report up-to-date economic benefits that the refuge brings to the community.
- By 2010, increase, by 10 percent, staff and volunteer participation in community decision-making processes by attending meetings of planning and development boards, environmental agencies, chambers of commerce, school support associations, tourist development councils, etc.
- By 2020, construct a resident facility for researchers, volunteers, Student Conservation Association staff, etc., that can undertake refuge projects.
- Once funding for the Land Management Research and Demonstration Area project is approved, work with Demonstration area biologists to expand partnerships with local, regional, national, and international academic centers to assist in research, inventorying and monitoring, and education and interpretation to meet education and biological goals.

Objective 9: By 2010, design and conduct an assessment of visitor use impacts to determine the carrying capacity of high public use areas and to detect disturbance to wildlife, or damage to soils, vegetation, and other resources.

Objective 10: Beginning in 2009, to make visitors feel welcome at the refuge and to help them to have safe and enjoyable visits, staff will annually assess all programs and facilities to ensure that they are at or above Service standards.

Strategies:

- Enhance the visitor experience at the refuge observation towers by installing sun-protective coverings, interpretive signs, and where appropriate, outdoor viewing scopes.
- By 2010, refuge staff will work with the Florida Disabled Outdoors Association to plan improvements at the Visitor Center area, the Lighthouse area, Picnic Pond area and Headquarters Pond Trail, and the Otter Lake Recreation Area for universal access.
- By 2011, and then on a 5-year interval, conduct a random survey to ascertain whether the majority of refuge visitors feel welcome by the staff and refuge facilities, enjoy their visit, and can identify that they are on a national wildlife refuge.
- By 2013, improve universal access along Plum Orchard Pond Trail with custom educational signs, benches, and expanded boardwalks. Assess the feasibility of extending the trail to the East River Pool, nearby cypress swamps, the prescribed fire demonstration plots, and/or cabbage palm hammock.

GOAL 5. CULTURAL RESOURCES MANAGEMENT AND PROTECTION

Protect archaeological, cultural, and historic resources for future generations as examples of human interaction with the natural environment.

Discussion: With the enactment of the Antiquities Act of 1906, the Federal Government recognized the importance of cultural resources to the national identity and sought to protect archaeological sites and historic structures on those lands owned, managed, or controlled by the United States. The body of historic preservation laws has grown dramatically since 1906. Several themes recur in the laws and the promulgating regulations. They include: (1) each agency is to systematically inventory the “historic properties” on its holdings and to scientifically assess each property’s eligibility for the National Register of Historic Places; (2) federal agencies are to consider the impacts to cultural resources during the agencies’ management activities and seek to avoid or mitigate adverse impacts; (3) the protection of cultural resources from looting and vandalism are to be accomplished through a mix of informed management, law enforcement efforts, and public education; and (4) the increasing role of consultation with groups, such as Native American tribes and African American communities, to address how a project or management activity may impact specific archaeological sites and landscapes deemed important to those groups. The objectives and strategies below outline the Service’s plan to achieve its mandated historic preservation responsibilities.

Objective 1: The refuge will integrate cultural resource preservation into refuge programs, operations, and management plans to protect cultural resources in perpetuity.

Strategies:

- Beginning immediately, prior to any non-emergency, ground-disturbing activity, the refuge will complete the “Request for Cultural Review Compliance” form and forward it to the Regional Archaeologist for review. The refuge will conduct road maintenance in known areas with cultural resources in a manner that will not disturb those resources. Tree stumps will be left in the ground so the root mass and any associated cultural resources in the immediate area will not be disturbed.
- Beginning immediately, the refuge will evaluate the effects of fire management activities on cultural resources in the vicinity of those activities and agree to use strategies that will not disturb cultural resources. A section on fire’s impacts on cultural resources and an “Unanticipated Site Discovery Plan” will be incorporated in the refuge’s fire management plan by 2008. As the refuge prepares an annual burn plan, this cultural resource protocol will be included. The cultural resource GIS layers will be consulted to guide planning. Heavy equipment will not be used in areas with identified cultural resources. If new cultural resources are discovered during fire management activities, then the use of heavy equipment will be stopped at that location.
- When step-down plans (e.g., fire management, road maintenance, safety, and emergency response) are written or rewritten for all refuge programs, a section addressing cultural resource management will be included.

Objective 2: By 2009, the refuge will develop and implement law enforcement procedures to protect the refuge's cultural resources and to diminish site destruction due to looting and vandalism.

Strategies:

- Beginning immediately, the refuge will routinely submit Listing of Outlaw Treachery (LOOT) forms to the Regional Archaeologist. Past archaeological violations, including unpermitted collecting cited under 50 CFR, will be entered into the LOOT system.
- By 2009, all refuge law enforcement officers will have taken the Archaeological Resources Protection Act training course (No. XP-ARPTP-402 or equivalent).
- By June 2009, pertinent refuge staff will have taken the Overview for Cultural Resources Management Requirements course (No. WLD2117).
- Establish and implement a regular system of patrolling and monitoring damaged sites.
- Law enforcement officers will participate in cultural resource protection training at annual law enforcement refresher courses.

Objective 3: By 2010, the refuge will facilitate partnerships to aid in the management of cultural resources with the pertinent federal and state agencies, the State Historic Preservation Office, professional archaeologists, Native American communities, and the general public.

Strategies:

- By 2009 the refuge, with the assistance of the Regional Archaeologist, will identify potential partnerships on archaeological and historic investigations and promote interdisciplinary research.
- By 2010, the refuge, with assistance from the Regional Archaeologist, will investigate the potential to negotiate a Memorandum of Understanding with pertinent federal agencies, such as the USDA Forest Service and the National Park Service, that facilitate investigations of Archaeological Resources Protection Act violations and unpermitted artifact collection on the refuge.
- The refuge will initiate contact with the Seminole Tribe of Florida, the Seminole Nation of Oklahoma, the Muscogee (Creek) Nation of Oklahoma, the Poarch Band of Creek Indians of Alabama, and the Miccosukee Indian Tribe for information on and input into the management of important cultural and sacred sites located within the refuge on an as needed basis.

Objective 4: By 2012, the Regional Archaeologist will develop a Cultural Resources Management Plan.

Objective 5: By 2013, the refuge will revise the scope of museum property.

Strategies:

- The refuge will scan historic photographs, maps, and documents.
- The Regional Archaeologist will negotiate an agreement with the Florida State Museum or other appropriate facilities for the permanent curation of archaeological collections and associated documentation derived from archaeological investigations on the refuge.

Objective 6: By 2012, conduct a refuge-wide cultural resource survey.

Strategies:

- By 2009, the refuge will develop GIS themes for the refuge's cultural resource sites that mesh with existing covers for habitat type, vegetation, hydrology, and soils. The map will use standard data parameters currently under consideration for the Service. Locations of archaeological sites are confidential as per Section 470w-3.a of the National Historic Preservation Act and Section 9 of the Archaeological Resources Protection Act. Information about the location, character, or ownership of any historic property under the Service's jurisdiction is not subject to Freedom of Information Act requests.
- By 2009, the Regional Archaeologist will develop a scope of work for a comprehensive archaeological survey and geomorphic investigations of the refuge, a cost estimate, and ranking factors for contractor selection.
- By April 2009, funding for the scope of work will be requested through RONS.
- By 2009, the refuge will seek the assistance of a volunteer and, with guidance from the Regional Archaeologist, will procure pertinent scientific reports and articles and produce an annotated bibliography to document the region's history, geomorphology, and utility of the scientific methodology.
- A Phase I/Phase II archaeological survey for potentially threatened resource sites will be completed by 2012.
- Refuge employees and others with historical knowledge of the refuge will continue to collect location information on historic properties.

Objective 7: By 2013, the refuge will develop and implement an educational program that will provide an understanding and appreciation of the refuge's ecology and the human influence on the region's ecosystems.

Strategies:

- The refuge will develop a display that conveys its cultural history to the public. Theme displays on historical areas or on historical uses of the refuge (e.g., logging, turpentine industry, and/or seine fishing) will be developed.
- Staff will develop educational displays, a brochure, and an education kit to convey the historical significance of the refuge.
- The refuge will incorporate information that promotes responsible use of culturally important areas into refuge education programs.
- By 2013, the refuge will develop a site plan and project cost estimate to evaluate whether to develop the West Goose Creek seineyard as an interpretive site.

Objective 8: By December 2015, the Regional Archaeologist, with assistance from the refuge, will prepare National Register of Historic Places determinations of eligibility or nomination forms for all qualified structures over 50 years old and archaeological sites.

Strategy:

- The Regional Archaeologist will consult with the State Historic Preservation Office to determine National Register eligibility for the refuge's historic properties. Input from pertinent local historical societies and federally recognized tribes will be sought throughout this process.

GOAL 6. WILDERNESS

Protect and preserve the wilderness character of those refuge lands designated by Congress as part of the National Wilderness Preservation System.

Discussion: The St. Marks Wilderness Area was established in 1975, and designated by Congress as part of the National Wilderness Preservation System. The wilderness area contains approximately 17,746 acres of tidal marsh, river swamp, and coastal pine flatwoods and hammocks. Ninety-four percent (16,496 acres) of the wilderness area lies between the St. Marks and Aucilla Rivers and encompasses the southern portion of the St. Marks Unit. Thoms Island, near Ochlockonee Bay, accounts for 1,250 acres of the designated wilderness area.

Refuge planning policy requires a Wilderness Review concurrent with the comprehensive conservation planning process. The Service inventoried other refuge lands within the planning area and found no areas that meet the eligibility criteria for a Wilderness Study Area as defined by the Wilderness Act. Therefore, the suitability of additional refuge lands for wilderness designation is not analyzed further in this plan. The results of the wilderness inventory are included in Section B, Appendix XI.

Objective 1: Revise the Wilderness Management Plan by 2009.

Strategies:

- Inventory and assess exotic and invasive species threats.
- All refuge step-down plans need to incorporate the provisions of the Wilderness Management Plan and restrictions of the Wilderness Act. Priority should be placed on updating the habitat management plans first.

Objective 2: Control exotic animal species according to the Animal Control Plan which will be revised by 2009.

Objective 3: By 2010, revise the oil spill contingency portions of the Safety Plan to take into account the restrictions of the Wilderness Act.

Objective 4: Prescribe management (e.g., fire) as appropriate with the Habitat Management Plan, National Fire Initiative and wilderness guidelines set forth within the Wilderness Act.

Strategy:

- Inventory and evaluate wildlife habitat within the Wilderness Area in order to write habitat management prescriptions.

Objective 5: As new lands are acquired by the refuge, consider them for wilderness designation. Within 2 years of an acquisition, conduct a Wilderness Review of the lands to determine if they meet the criteria for wilderness study areas.

Objective 6: Maintain air quality monitoring (e.g., ozone/haze) station on the refuge. Any wilderness 5,000 acres or larger and designated prior to 1977, is considered a Class I airshed. Under the Prevention of Significant Deterioration provisions of the Clean Air Act, the federal land manager has

“an affirmative responsibility to protect the air quality related values (including visibility) of any Class I area and to consider, in consultation with the Environmental Protection Agency, whether a proposed major emitting facility will have an adverse impact on such values.”

Strategy:

- Improve air quality monitoring of the Class I St. Marks National Wildlife Refuge Wilderness Area.

Discussion: The Interagency Monitoring of Protected Visual Environments program establishes current visibility levels, identifies sources of existing impairment, and documents long-term trends to track progress toward meeting the National Visibility Goal stated in the Clean Air Act. Monitoring will include updating of a vegetation inventory, evaluating inshore estuary nutrient status, mapping seagrasses, evaluating plankton, assessing ozone injury to vegetation, compiling a literature survey on sensitive plants, and conducting wet and dry deposition monitoring of pollutants. This monitoring is especially important due to an expansion of a power plant adjacent to the Class I area, within a few hundred feet of the designated Wilderness Area.

Objective 7: Exotic plant species will be inventoried to determine the extent of occurrence. If a problem is identified, exotics will be removed according to the minimum tool requirements of the Wilderness Act.

Objective 8: Provide opportunities for public use in wilderness area that are dependent upon a wilderness setting, protect resources, and minimize disturbance to wildlife and vegetation.

Strategy:

- Maintain the portions of the Florida National Scenic Trail through the Wilderness by the use of “minimum tools.” Maintain the trail for foot traffic only. As outlined in the Compatibility Determinations (Section B, Appendix VI), horseback riding and bicycling are prohibited from the Wilderness Area.

Objective 9: By 2013, acquire in-holdings in the Wilderness Area.

GOAL 7. REFUGE ADMINISTRATION

Provide administrative support and resources to ensure that the goals and objectives for refuge habitats, fish and wildlife populations, land conservation, and visitor services are achieved.

Discussion: The administrative functions associated with the refuge include a wide array of activities that are critical to the mission of the National Wildlife Refuge System and the purposes of the refuge. These functions include staffing, training, budgeting, planning, law enforcement, community relations, partnering, facilities construction, and maintenance. Refuges must have appropriate staff, facilities, equipment, and resources in order to accomplish their overall goals and objectives. Protecting the natural resources of the refuge and ensuring the safety of refuge visitors are fundamental responsibilities of the National Wildlife Refuge System. The refuge accomplishes this responsibility with one full-time and two collateral duty officers.

The refuge is currently managed by 21 permanent and 3 temporary park ranger positions. The permanent personnel include a project leader, deputy project leader, enforcement staff, natural resource planner, administrative staff, 2 biological staff, 2 public use staff, 6 foresters or forestry technicians, 2 equipment operators and 2 maintenance mechanics.

In Fiscal Year 2006, the refuge has a budget of \$2,069,725 for payroll, operation needs, special funding to address the maintenance backlog, and for Wildland and Urban Interface projects. An additional \$2,296,973 was allocated to the refuge for repairs to the levees that were affected by Hurricane Dennis in July 2005.

There is an interagency effort within the Federal Government attempting to provide a common planning and budgeting process across the five federal wildland firefighting agencies. This effort is called Fire Program Analysis. To accomplish this effort, a team of wildland fire staff members began working in 2003 to create an Initial Response module to guide in the development of the new interagency fire program. This system will restructure Federal fire programs to comply with direction from Departments, Congress and the Office of Management and Budget to identify cost-effective collaborative programs at the local level and improve the formulation of wildland fire budget requests. These collaborative programs could be made up of not only federal but also state and county fire equipment and personnel. A more efficient and effective use of fire dollars is the intent of this consolidation. Project completion is expected by the end of fiscal year 2008, with implementation by the end of 2009.

Objective 1: Develop appropriate office space and maintenance facilities to ensure safe and efficient refuge operations.

Strategies:

- By 2010, expand the equipment storage shed at the maintenance yard to provide storage for heavy equipment.
- By 2010, construct a new crew quarters (bunkhouse) for temporary fire crews and volunteers.
- By 2011, construct a refuge office with appropriate utilities and floor plan to accommodate staff, storage, and safety needs.
- By 2012, retrofit the existing office to an expanded visitor center.
- By 2010, construct a new storage facility to replace the facility at Mounds and demolish or restore existing buildings. Restore the habitat at the Mounds site.
- By 2017, construct a new environmental education building to include a wet laboratory and classroom/meeting room.
- By 2021, restore the St. Marks Lighthouse, grounds, and parking areas.

Objective 2: Develop staff resources to accomplish a comprehensive refuge management program.

Strategy:

- To fulfill the work need identified in this plan, increase staff by a total of 17.5 positions. Since law enforcement is a critical need, three new officer positions are proposed. One of the law enforcement positions would be shared with St. Vincent National Wildlife Refuge. See Table 15 for a list of positions.

Objective 3: Procure and maintain equipment and vehicles needed to perform refuge operations.

Strategies:

- Provide appropriate equipment to conduct proposed biological inventories and monitoring.
- Provide appropriate equipment to facilitate maintenance of grounds, buildings, facilities, and vehicles.
- Provide appropriate equipment to conduct habitat enhancement and restoration functions.
- Provide vehicles for refuge operations—fire response, maintenance, staff, transportation, etc.

Objective 4: Maintain a safe environment for staff and visitors.

Strategies:

- Provide continuing education and training opportunities to all staff to ensure a highly competent and motivated team and safe work conditions.
- Procure and maintain safe and efficient equipment and vehicles to perform operations and maintenance.
- Repair or replace faulty and old equipment.
- Maintain and implement safety and contingency plans on refuge to ensure a safe environment for staff and visitors. Review and update the refuge Safety Plan approved in 1987 by 2008.

Objective 5: Maintain a law enforcement program that will ensure the safety of visitors, physical property, and the natural and cultural resources of the refuge.

Strategies:

- By 2008, update the Law Enforcement Plan.
- Provide up-to-date training and equipment to all full-time and collateral duty officers.
- Develop Memorandums of Understanding with state and county law enforcement agencies to facilitate cooperation and assistance in law enforcement activities.
- Continue to be a detail site for law enforcement trainees.
- Serve as the host station for a zone officer.

Objective 6: Continue developing internal Service and external partnerships to share equipment, manpower and expertise in all aspects of refuge administration.

Strategy:

- Foster and maintain partnerships with Florida Fish and Wildlife Conservation Commission, Florida Department of Environmental Protection (Greenways and Trails), Florida Trails Association, and The Nature Conservancy on issues, such as prescribed fire, upland restoration, GIS, and public use.

V. Plan Implementation

INTRODUCTION

The future of this and most national wildlife refuges is dependent upon a public constituency that is knowledgeable of refuge resources and mandates, as well as environmental issues, and that is willing to work toward resolving them. To build and maintain this needed constituency, this plan not only provides actions to protect, restore, and conserve wildlife habitat, but it also expands wildlife-dependent recreational opportunities. Promoting the refuge as an asset to Taylor, Franklin, Jefferson and Wakulla Counties will enhance the refuge's image and help to expand local support. To achieve the proposed management plan for the refuge, this section identifies 21 projects, staff development and equipment needs, staffing and funding needs, partnership opportunities, step-down management plans, and a biological monitoring and evaluation plan.

PROJECT SUMMARIES

Listed below are project summaries and their associated costs for facility development and maintenance, baseline biological data collection and interpretation, exotic plant control, species management, habitat restoration, visitor services, and land conservation during the next 15 years. The cost of each project in is shown in Table 14. The approximate annual cost of each proposed staff position is shown in Table 15. Cost estimates were made when this plan was first drafted and they are in Fiscal Year 2004 dollars. Since costs will vary during the 15-year implementation period of this plan, these figures have not been updated. An exception is project 8, which was revised following Hurricane Dennis in 2005. While this project list is not all inclusive, it does reflect the basic needs supporting the outlined goals, objectives, and strategies contained in this comprehensive conservation plan. A description of each project grouped according to its respective goal is listed.

WILDLIFE HABITAT POPULATION MANAGEMENT

1. Longleaf Pine Ecosystem Restoration and Management

This project will develop a Land Management Research and Demonstration Area for the restoration and management of the longleaf pine ecosystem. The refuge has been a leader in the management of longleaf pine forests since the late 1980s. The project will enable the refuge to expand research and application of innovative management techniques and provide public and private landowners the information needed to develop effective longleaf pine restoration and management programs on their lands.

This project includes the initial funding of a biologist (RONS 02001) to develop the program with an associated \$190,000 first-year cost and \$115,000 recurring cost plus support costs (RONS 02002; \$35,000 first-year cost and recurring costs). In future years an additional biological technician (RONS 03007) will entail a \$136,000 first-year cost and \$61,000 recurring cost. This project also includes a study of the impacts of season of burn on priority birds in longleaf pine forests (RONS 98010; \$84,000 one-time contract) and wiregrass and other groundcover seed collection and restoration equipment (RONS 01001; \$37,000 first-year and \$7,000 recurring costs). Although the components of this project will be phased in over several years, the estimated total first-year cost is \$482,000, with a recurring cost of \$218,000 per year (Linkages: Goal 1, Objectives 2 and 9; Goal 2, Objectives 1, 2, 6-9, 11, and 15; Goal 3, Objectives 1 and 6; Goal 4, Objective 8; Goal 5, Objective 1; and Goal 7, Objectives 2, 3, and 6).

2. Fire Management Program

Fire is a natural part of the northern Florida ecosystem. To improve migratory bird habitat and out of concern for threatened and endangered species, it is better to restore and mimic natural fire regimes by moving toward growing season burns. This requires, in many cases, preparation of stands by low impact, dormant season burns followed by a growing season treatment the consecutive summer. To effectively carry out this program, there is a need to bring in and house more people and equipment. This will require space for fire crews on detail and facilities and dollars to base a helicopter at the refuge during the peak burning season. The crew quarters facility is projected to cost \$330,000 (SAMMS 04124153) initially, with a recurring cost of \$12,000 per year. Funding of \$5,000 is required for development of a helipad to house the helicopter safely overnight. The total cost for these projects is \$335 initial cost and \$12,000 recurring costs (Linkage: Goal 7, Objective 1).

3. Habitat Management

In addition to the longleaf pine habitats, the refuge and administered easements contain a wide variety of other natural upland, wetland, forested, and marsh habitats important to wildlife. Management actions in these habitats (other than prescribed burning) have ranged from nonexistent to sporadic. This project will improve the management of these habitats by reestablishing and improving regular habitat inventories, evaluating wildlife habitat needs, and prescribing treatments on the refuge, as well as developing and implementing habitat management plans on the easements. The project includes the addition of a biologist (RONS 02003; \$146,000 first-year cost/ \$71,000 recurring cost), and a forester (RONS 98017; \$146,000 first-year cost/ \$71,000 recurring cost), as well as \$25,000 of first- year and \$25,000 recurring support (RONS 00003). The estimated first-year cost for this project is \$317,000, with a recurring cost of \$167,000 per year (Linkages: Goal 1, Objectives 2, 9, 10, and 11; Goal 2, Objectives 1- 4, 6-11, and 15; Goal 3, Objectives 1-5; Goal 5, Objective 1; and Goal 7, Objectives 2, 3, and 6).

4. Science-based Inventory and Monitoring of Plant and Animal Populations

Science-based inventorying and monitoring of plant and animal populations are critical to ensuring the biological integrity of the refuge. The information collected through a systematic inventorying and monitoring program forms the basis for developing, revising, and evaluating management plans, enables informed decisions, and influences all refuge management activities. Unfortunately, the number of these inventories and censuses has declined dramatically over the years due to the shortage of biological staff. Currently, very few of the refuge's important trust species are adequately monitored. This project will address this shortfall by expanding the inventorying and monitoring of target species through the addition of a biologist and the funding of several important surveys. As a result, the refuge will improve management and provide valuable long-term contributions to national and regional objectives for endangered and imperiled species, waterfowl, shorebirds, wading birds, secretive marsh birds, and neotropical migratory birds.

The project consists of employing a biologist (RONS 98001; \$159,000 first-year cost/\$94,000 recurring cost) (plus RONS 00001; \$43,000 first-year cost/\$43,000 recurring support) and funding of the following: an inventory of imperiled and rare mussels and fish in water on and adjacent to the refuge (RONS 00007; \$65,000 one-time contract); bald eagle and swallow-tailed kite nest surveys (RONS 99014; \$27,000 first-year cost/\$27,000 recurring cost); an inventory and genetic analysis of the refuge black bear population (RONS 99011; \$53,000 first-year cost/\$11,000 recurring cost); and the inventorying and monitoring of reptiles and amphibians (RONS 99010; \$25,000 first-year cost/\$15,000 recurring costs). Overall costs total \$372,000 in the first year and \$190,000 in subsequent years (Linkages: Goal 1, Objectives 2, 8, 10, and 11; Goal 2, Objectives 1-11, and 13-15; Goal 3, Objectives 1- 5; Goal 7, Objectives 2, 3, and 6).

5. Survey, Document, Monitor, and Enhance Populations of Rare, Threatened, and Endangered Plants and their Native Habitats

The refuge hosts a number state-listed threatened and endangered or rare and declining species of plants, as tracked by the Florida Natural Areas Inventory. Of the 29 plant species known from the refuge that are included on this list, basic distribution and monitoring surveys have been initiated for only an estimated 4 percent. Many additional rare/declining species likely occur on the refuge. This project will greatly expand the inventoring and monitoring of these rare and declining plants and incorporate their needs into management plans designed to enhance native ecosystems. The project includes the botanist identified in Project 9 (RONS 99012; \$146,000 first-year cost/\$71,000 recurring cost) (plus RONS 00005; \$25,000 first-year cost and recurring support), and a contracted rare plant survey (\$75,000 one-time cost). Provided the botanist position is funded under Project 9, the total (one-time) cost is \$75,000 (Linkages: Goal 1, Objectives 2, and 9-11; Goal 2, Objectives 1 and 15; Goal 7, Objectives 2, 3, and 6).

6. Enhance GIS Resources to Improve and Guide Sound Ecosystem Management of Refuge Resources

Employ permanent GIS staff to manage and analyze data. This position will support all refuge management programs by providing the tools to document natural and cultural refuge resources, and analyze and portray refuge resource data funding. This will help implement the comprehensive conservation plan objectives and strategies using a sound science basis. Mapped data will include current conditions and historical vegetation data and treatments, as well as cultural resource and threatened and endangered species data layers. Restoration and maintenance of refuge forested habitats, particularly globally important remnants of longleaf pine-wiregrass communities on refuge lands, will be enhanced and made possible by this project, a direct link to the Longleaf Pine Land Management Research and Demonstration Area designation, as well as project 2. Prescribed fire and timber management for wildlife objectives, prioritization of resources and long-term results will be quantifiable and immediately available to resource managers through implementation of this program.

This project includes (1) a refuge vegetation mapping and forest stand inventory conversion to GIS format (RONS 03003; \$70,000 one-time contract); (2) an analysis of refuge burn history, current conditions, and prescribed fire prioritization (RONS 03004; \$68,000 one-time contract); and (3) the employment of a resource specialist at the refuge to manage and analyze data (RONS 98006; \$146,000 first-year cost/\$71,000 recurring cost) (plus RONS 00011; \$42,000 first-year cost/\$42,000 recurring cost). The total estimated first-year cost of this project is \$326,000 with a recurring cost of \$113,000 per year (Linkages: Goal 1, Objectives 1, 2 and 9-11; Goal 2, Objective 1; Goal 5, Objectives 1 and 6; Goal 7, Objective 2).

7. Hydrological Restoration

The management of the impoundments has been limited in recent years due to road building and other alterations of the East River Watershed on private lands to the north of the refuge boundary. In other areas, past refuge road building and the development of the Aucilla Tram prior to the establishment of the refuge have altered the natural drainage and hydroperiods of the refuge's plant and animal communities.

This project consists of a hydrological study to map the extent of the East River Watershed, determine the natural drainage patterns in the watershed and throughout the refuge, identify alterations to these natural drainage patterns, evaluate the impacts to plant communities, and outline a plan to restore the natural hydroperiods as deemed desirable. An estimated one-time cost is \$50,000. This project will also provide a series of restoration projects for future funding. In addition to the study, this project includes the one-time restoration of an old grass airstrip near Shell Point to appropriate wetlands and uplands at an estimated cost of \$105,000 (RONS 99009). The total project cost is \$155,000 (Linkages: Goal 1, Objective 7; Goal 2, Objective 6; Goal 3, Objective 4; Goal 7, Objective 6).

8. Impoundment Management

This project involves repairing the currently funded underground breach of East River Levee (SAMMS 02120439; estimated at \$104,000 one-time cost), repairs of additional breaches in East River Levee and East River Diversion Canal Levee (estimated at \$250,000 one-time cost), repairs to East River Spillway (estimated at \$100,000), riprap of eroding levees (SAMMS 00110177; \$97,000), and the purchase of a large portable pump (estimated at \$100,000). Ongoing management costs are \$20,000 first year and \$20,000 recurring for herbicide treatment of cattails and pumping salt water for enhancement of submerged aquatic plants and cattail control. Overall costs total \$671,000 first year and \$20,000 recurring, although the projects can easily be staggered so that one-year costs will be no more than \$175,000 (Linkages: Goal 1, Objective 4; Goal 3, Objectives 1-4; Goal 7, Objective 6).

9. Eradicate or Control Nonindigenous and Invasive Plants and Animals

In order to eliminate or control populations of nonindigenous invasive or disruptive plant and animal species, more emphasis must be placed on detecting and monitoring the presence, spread, and damage caused by these species, particularly upon listed native plant and wildlife species and their habitats. This project combines a botanist position (RONS 99012; \$146,000 first-year cost/ \$71,000 recurring cost) (plus RONS 00005; \$25,000 first-year cost/\$25,000 recurring support) with funding for invasive exotic plant control and native plant restoration (RONS 00009; \$105,000 first-year cost/\$95,000 recurring cost). Estimated first-year cost for this project is \$276,000, with a recurring cost of \$191,000 per year (Linkages: Goal 1, Objectives 3-5; Goal 7, Objective 2).

10. Monitor Contaminants and Air Quality

Mercury contamination of fish in refuge and adjacent waters poses a risk to wildlife, as well as public health. Elevated levels of mercury have been found in a past study, but sample sizes were too small to allow for an accurate assessment of risk. Additionally, the St. Marks Wilderness requires the maintenance of Class 1 air quality under the Clean Air Act. Air quality monitoring is especially important due to an expansion of a power plant within a few hundred feet of the designated Wilderness Area. Currently, some monitoring of fine particulate does occur, but there is a need to expand the monitoring to include additional visibility parameters, wet and dry pollutant deposition (including mercury), and impacts to vegetation and water quality. This project consists of two components: a study of mercury levels of fish, other wildlife, and sediments (RONS 98012; \$65,000 first-year cost/\$39,000 recurring cost) and the expansion of air quality monitoring (RONS 98013; \$102,000 first-year cost/\$9,000 recurring cost). Total cost is \$167,000 for the first year and \$48,000 in subsequent years (Linkages: Goal 1, Objective 6; Goal 7, Objective 6).

11. Land Acquisition

The State of Florida is actively pursuing acquisition of some of the lands within the conservation focus area described in this plan. Within the existing acquisition boundary, there are still about 3,764 acres of privately owned land. If these lands are developed before we are able to purchase them, the resulting habitat degradation within and adjacent to current refuge lands will threaten our ability to effectively manage existing wildlife habitat. Wakulla County is one of the fastest growing counties in the State of Florida, making habitat protected by the refuge increasingly important as privately owned habitat falls under development. The estimated cost of acquiring the remaining acreage within the existing acquisition boundary is approximately \$6,180,361 (Linkages: Goal 1, Objectives 1 and 7; Goal 3, Objective 3).

12. Land Protection Partnerships

This is a refuge manager trainee position to assume responsibility for property and facilities management, recurring reporting and administrative requirements, safety and environmental compliance programs, easement enforcement, and coordination with local governments and conservation partners to address landscape level resource problems. This position will free needed

personnel from routine duties to address more complex wildlife and habitat management problems (RONS 99005; \$146,000 first-year cost/\$71,000 recurring cost) (Linkages: Goal 1, Objectives 1 and 7; Goal 7, Objectives 2 and 6).

REFUGE ADMINISTRATION, SAFETY, AND RESOURCE PROTECTION

13. Administrative Support

The refuge headquarters and administrative office currently occupy one-half of a building that doubles as the refuge visitor center and Refuge Association bookstore. Refuge staffing has increased by 10 positions since the building was built and visitation has increased by 100,000 visitors per year. We currently house 9 permanent staff, occasional interns, and varying numbers of volunteers in 2,250 square feet of office space. A third of this space is allocated to a conference/file/lunch room, a copier/fax/mail room, and a utility room. There is a need to construct a new headquarters and administrative office large enough to house existing and new positions, including managers, programmatic leads, and administrative and support staff. This is an existing project (SAMMS 99110176) with \$1,709,000 first-year cost/\$35,000 recurring cost (Linkage: Goal 7, Objective 1).

To meet the requirements of the new Service Asset and Maintenance Management System, an administrative technician is needed to enter data and do basic accounting tasks. This is a RONS 02004 position with \$136,000 first-year cost/\$61,000 recurring cost (Linkage: Goal 7, Objective 2).

Total cost of implementing this project will be \$1,845,000 for the first year, with \$96,000 in recurring expenses.

14. Safety and Resource Protection

In the past, the refuge relied on one full-time and up to five dual-function law enforcement officers to protect the refuge's resources and ensure public safety. Development and population growth near the refuge and ever-increasing public use have overburdened the existing law enforcement staff (one full-time and two dual-function officers) and left the refuge unable to adequately address threats to the public and the wildlife and habitats it was created to protect. Furthermore, the refuge system is gradually moving away from dual-function officers in favor of full-time officers. There is a need for two additional full-time refuge law enforcement officers to meet new needs and replace the dual-function officers when they lose their law enforcement authority (RONS 98018; \$159,000 first-year cost/\$84,000 recurring cost for each officer) (Linkage: Goal 7, Objective 2).

There is a need to expand the maintenance yard to create additional maneuvering space and parking areas, extend the pole barn to protect vehicles and equipment, and renovate the shop building. Expansion of the maintenance yard is estimated to cost \$100,000. The cost of the pole barn (SAMMS 99123369) is estimated at \$115,000. The shop renovation (SAMMS 98103831) is estimated at \$79,000 (Linkage: Goal 7, Objective 1).

There is a need for an excavator to more efficiently carry out needed maintenance and construction projects that will improve visitor services, maintain wildlife habitat, and enhance management. The excavator, RONS 99023, is estimated at \$216,000 first-year cost/\$11,000 recurring cost. The project establishes a position (RONS 99001; \$136,000 first year/\$61,000 recurring) for a heavy equipment operator to help increase the frequency of cyclical maintenance for all refuge facilities, property, and equipment (Linkage: Goal 7, Objectives 3 and 4).

Total costs of implementing this project are estimated at \$915,000 one-time/\$183,000 recurring.

15. Cultural Resources

The primary recommendation from the 2003 cultural resources review was for the refuge to undertake a comprehensive survey of existing and potential archaeological and historic sites. The refuge is rich in archaeological and historic resources, with over 80 sites documented, including Civil War, early Spanish exploration, Native American, and Paleoindian sites. A comprehensive survey for the entire upland portion of the refuge is estimated to cost \$1.5 million. The refuge proposes to survey about 2,500 acres under contract with a state or private university for the first year of the project. In subsequent years, the refuge will conduct additional land surveys and secure consulting services to ensure cultural resource protection during refuge operations, such as construction, infrastructure maintenance, and prescribed fire activities (RONS 03002; \$100,000 first-year cost/\$25,000 recurring cost). The refuge staff proposes to modify the recurring expenses of this project to \$100,000 to achieve the full \$1,500,000 project over the 15-year span of this plan (Linkage: Goal 5, Objective 6).

The refuge is rich in cultural resources, but has severely limited ability to protect them. Limited law enforcement capabilities leave the refuge barely able to address natural resource issues. A shared law enforcement position with St. Vincent National Wildlife Refuge, spending roughly half time on each refuge, will enable all officers to provide added cultural resource protection. Estimated costs are \$158,000 first-year and \$84,000 recurring, split with St. Vincent Refuge (Linkages: Goal 5, Objective 2; Goal 7, Objective 2).

A project to provide professional surveys, required by law under various acts, on Service lands associated with management projects such as silviculture, trail development, or other ground-disturbing management or public use activities is needed. This project will fund an archaeologist who would survey the refuge for cultural sites and help investigate widespread pot hunting and grave site disturbance in the St. Marks Wilderness Area. Documented finds include artifacts from Spanish explorers, multiple Native American burial sites, shell mounds, Paleoindian sites dating to circa 10,000 B.C., Civil War skirmish sites, and a National Historic Register Site (St. Marks Lighthouse). This project, RONS 99002, involves \$146,000 first-year cost/\$71,000 recurring cost (Linkages: Goal 5, Objectives 3 and 6-8; Goal 7, Objective 2).

Full implementation of this project will require first-year expenditures of \$404,000 and recurring annual costs of \$255,000.

VISITOR SERVICES, WILDLIFE-DEPENDENT RECREATION, AND ENVIRONMENTAL EDUCATION

16. Improve Education and Research Opportunities

An environmental education specialist is needed to annually plan themes and learning objectives tied to resource management and educational needs and to direct educational volunteers (RONS 00006; \$169,000 first-year cost/\$94,000 recurring cost). A park ranger will also be hired for environmental education (RONS 04010; \$122,000 first-year cost/\$52 recurring). This project ties into the construction of a new on-site education classroom and laboratory to better serve on-site students (SAMMS 99123371; \$298,000 first-year cost/\$5,000 recurring cost), as well as the construction of a residential facility that could be used by students and researchers to meet resource and education needs (SAMMS 99123370; \$371,000 first-year cost/\$5,000 recurring cost). The refuge is the site of the Land Management Research and Demonstration Area for longleaf pine/wiregrass and needs expanded educational and residential facilities to partner with other agencies and schools. The estimated first-year cost for these projects is \$960,000, with a recurring cost of \$156,000 per year (Linkages: Goal 4, Objectives 2 and 8; Goal 7, Objective 2).

17. Enhance Interpretation and Outreach

When the new administrative building is completed, the existing office/visitor center will be renovated (SAMMS 02120425; \$31,000 first-year cost/\$5,000 recurring cost) to include improved exhibits, especially on cultural resources (SAMMS 99103836, \$31,000 first-year cost), and the facility will be dedicated to visitor services. At this time, two full-time professional staff members (\$300,000 first-year cost/\$150,000 recurring cost) are needed to manage the visitor center and interpretation and outreach programs. One ranger (RONS 04008) will take the lead for on-site activities, working on interpretation, hunting, fishing, and wildlife observation opportunities. The second ranger (RONS 04007) will work on special events, including off-site outreach and festivals, talk to civic groups, and support partnering goals, such as the Land Management Research and Demonstration Area. Both rangers will work with the education team, headed up by the Environmental Education Specialist. The estimated first-year cost for these projects is \$362,000 with a recurring cost of \$155,000 (Linkages: Goal 4, Objectives 2 and 9; Goal 5, Objective 7; and Goal 7, Objective 2).

18. Enhance Wildlife Observation and Photography Opportunities

From the public use review and recent facilities assessment, strategies have been developed to improve access and wildlife observation and photography opportunities. Improvements will include formal trailheads with information kiosks and parking at Carraway Cutoff, Otter Lake, Abe Trull, and East River, plus signage for all outdoor recreation across the refuge (SAMMS 05138119; \$31,000); repairing existing observation decks with improved accessibility and shade covers (Tower Pond - SAMMS 99103830; \$37,000); Headquarters Pond tower (SAMMS 99103839; \$34,000); constructing a large observation tower with built-in photography blind at Mounds Pool #3 (SAMMS 98124019; \$87,000); renovating the Picnic Pond/Tower Pond recreation node (SAMMS 99103835; \$30,000); improving Otter Lake's facilities (MMS 99123372; \$40,000); and improving universal accessibility along the Plum Orchard Pond Trail (SAMMS 04143427; \$48,000). Costs for these projects will be \$307,000 (Linkage: Goal 4, Objectives 4, 5, and 10).

19. Restore the Historic St. Marks Lighthouse

The St. Marks Lighthouse has been part of the local history of the area for over 170 years and is on the National Register of Historic Sites. Once the lighthouse is transferred to the Fish and Wildlife Service from the Bureau of Land Management, it will need to be restored and opened to the public as an icon for the rich cultural resources and people's stewardship with natural resources in Wakulla County. The St. Marks Refuge Association, Inc., with grants from the state, has contracted for an assessment of the lighthouse's current condition and proposed renovations to establish a museum and educational facility within the structure. The cost to complete renovations and exhibits is \$750,000 (SAMMS 00124018), with a recurring cost of \$20,000 (Linkage: Goal 4, Objective 3).

20. Assess Current Visitor Use, its Impacts, and Future Desired Condition

Before implementing additions to current visitor services programs and facilities, an in-depth assessment of current visitor use and its impacts is needed. This study would be contracted to document uses and impacts on refuge resources, and to predict future uses and impacts to determine a carrying capacity for the refuge. Visitor use can be shifted around seasonally and geographically, and access methods can be changed to protect resources. This study will guide enhancements and improvements to the visitor services program and facilities to best serve the wildlife resource and the visitor. The estimated cost is \$75,000 (RONS 04006, \$45,000 and RONS 04009, \$30,000) (Linkage: Goal 4, Objective 9).

21. Enhance Fishing and Hunting Opportunities

To improve access, parking areas will be renovated (SAMMS 04134273; \$40,000). To better provide information about fishing on the refuge to visitors, three kiosks will be produced and placed at the saltwater boat ramps located at the lighthouse, the Aucilla River, and the Wakulla Beach areas. The saltwater boat ramp, basin, and canal at the lighthouse will also need to be maintained for safe access by boaters and fishermen (SAMMS 90103834; \$110,000). Also, repairs are needed at the entrance road and parking area at the Aucilla River boat ramp, which are estimated to cost \$94,000 (SAMMS 99103826-A, \$62,000 and 99133089-B, \$32,000). Furthermore, the Otter Lake Recreation Area and ponds on the Panacea Unit need to be evaluated for fishing facility enhancements. Currently, more than 15,000 visitors use the Panacea Unit yearly and improvements are needed for parking, signage, and access with new construction of a small loading pier and a fishing pier. A project to assess and improve sport fishing (RONS 99006; \$49,000) will provide current data on the status of fish populations in refuge impoundments on the St. Marks Unit and four large lakes on the Panacea Unit. The refuge will continue to partner with state and community organizations to host a youth fishing program (\$500). Staff will examine the feasibility of conducting a youth hunting program (\$1,000). Initial costs for all these projects will be \$294,500, with recurring costs for maintenance and printing of \$5,000 (Linkage: Goal 4, Objectives 3 and 4).

STAFFING AND FUNDING

The refuge is currently managed by 21 permanent and 3 temporary park ranger positions. The permanent positions include a project leader, deputy project leader, enforcement staff, natural resource planner, administrative staff, 2 biological staff, 2 visitor services staff, 6 foresters or forestry technicians, 2 equipment operators and 2 maintenance mechanics. See Figure 25 for an organization chart of current and proposed staff.

The staff needed to implement the proposed management program includes (1) officers and resource specialists for resource protection and enhanced visitor safety; (2) environmental education specialists and rangers for increased outreach and educational programs; and (3) biologists, a botanist, a forester, and a GIS position to increase monitoring, inventorying, and protecting wildlife and to increase habitat management.

PARTNERSHIP OPPORTUNITIES

To achieve the goals and objectives of this plan, maintaining existing partnerships and developing new ones with a variety of resource agencies, organizations, and individuals are essential. For a list of existing and potential partnerships see Section B, Appendix IX. The use of partnerships not only helps the refuge achieve its vision and carry out various programs, but it also can lessen refuge operation costs considerably. Partnerships are necessary to implement this comprehensive conservation plan via the development and implementation of the various step-down management plans and projects.

Refuge personnel need to develop Memorandums of Understanding with various partners to enhance coordination and cooperation on resource management issues. These include the Office of Greenways and Trails (Florida Department of Environmental Protection), Water Management Districts, the Florida Division of Forestry, and the Florida Fish and Wildlife Conservation Commission (Linkages: Goal 1, Objective 1; Goal 7, Objective 5).

Table 14. Summary of project costs (in Fiscal Year 2004dollars)

Projects	Initial Project Cost	Recurring Costs
1. Longleaf Pine Ecosystem Management and Restoration	\$482,000	\$218,000
2. Fire Management Program	335,000	12,000
3. Habitat Management	317,000	167,000
4. Science-based Inventory and Monitoring of Plant and Animal Populations	372,000	190,000
5. Survey, Document, Monitor and Enhance Populations of Rare, Threatened and Endangered Plants and Their Native Habitats	75,000	NA
6. Enhance GIS Resources to Improve and Guide Sound Ecosystem Management of Refuge Resources	326,000	113,000
7. Hydrological Restoration	155,000	NA
8. Impoundment Management	671,000	20,000
9. Eradicate or Control Nonindigenous and Invasive Plants and Animals	276,000	191,000
10. Monitor Contaminants and Air Quality	167,000	48,000
11. Land Acquisition	6,180,361	NA
12. Land Protection Partnerships	146,000	71,000
13. Administrative Support	1,845,000	96,000
14. Safety and Resource Protection	805,000	156,000
15. Cultural Resources	404,000	255,000
16. Improve Education and Research Opportunities	960,000	156,000
17. Enhance Interpretation and Outreach	362,000	155,000
18. Enhance Wildlife Observation and Photography Opportunities	307,000	NA
19. Restore the Historic St. Marks Lighthouse	750,000	20,000
20. Assess Current Visitor Use, its Impacts and Desired Future Condition	75,000	NA
21. Enhance fishing and hunting opportunities	294,500	5,000
Grand Totals: without approved land acquisition	\$9,124,861	\$1,873,000
with approved land acquisition	\$15,956,861	

Table 15. Approximate annual costs of proposed staff positions in Fiscal Year 2004 dollars

Title	Responsibility	RONS Project No.	Grade	Annual Cost
Law Enforcement Officer	Refuge Safety	980018	GS 5/7/9	84,000
Law Enforcement Officer	Resource Protection		GS 5/7/9	84,000
Law Enforcement Officer	Resource Protection		GS 5/7/9	84,000
Biologist	Habitat Restoration-LMRD	20001	GS-13	115,000
Biologist/Technician	Habitat Restoration-LMRD	03007	GS-07	61,000
Biologist	Habitat Management	02003	GS-09	71,000
Botanist	Invasive and Rare Plants	99012	GS-09	71,000
Biologist	Wildlife Monitoring	98001	GS-11	94,000
Resource Specialist	GIS (mapping & data analysis)	98006	GS-09	71,000
Resource Specialist	Archaeologist	99002	GS-09	71,000
Forester	Forest Management	98017	GS-09	71,000
SAMMS position	Administrative Accounting	02004	GS-07	61,000
Refuge Manager Trainee	Administrative Reporting	99005	GS-5/7/9	71,000
Refuge Ranger	Interpretive Specialist	04008	GS 7/9	75,000
Refuge Ranger	Visitor Services	04007	GS 7/9	75,000
Environmental Education Specialist	Environmental Education	00006	GS-11	94,000
Environmental Education Specialist	Environmental Education	04010	GS-05	52,000
Equipment Operator	Equipment Operation	99001	WG-08	61,000
Total yearly cost:				\$1,336,000

Note: These figures are also incorporated into the project descriptions and costs associated with Table 14.

STEP-DOWN MANAGEMENT PLANS

A comprehensive conservation plan is a strategic plan that guides the direction of the refuge. A step-down management plan provides specific guidance on activities, such as habitat, fire, and visitor services management. Step-down plans are also developed in accordance with the National Environmental Policy Act, which requires the identification and evaluation of alternatives and public review prior to their implementation.

The refuge proposes to initiate, update, revise, and/or implement 15 step-down plans within the 15-year time frame of the comprehensive conservation plan. A list of these plans and associated completion dates is presented in Table 16. The following describes the proposed step-down plans:

Hunt Plan

Completed in 1983, the revision of this plan will direct the refuge hunt program and will reflect guidelines that take into consideration changing biological and administrative objectives. Hunting is a priority wildlife-dependent public use and is used as a tool to maintain wildlife populations at a level compatible with the habitat and to provide quality recreational opportunities.

Law Enforcement Plan

This plan will provide a ready reference to Service, regional, and local law enforcement resources regarding refuge policies, procedures, and programs concerning refuge law enforcement. It will describe the objectives of the law enforcement function on the refuge. It will address the type of jurisdiction, active Memorandums of Understanding and authorities of refuge officers both on and off refuge. It will describe current assets that are available (e.g., vehicles, boats, all-terrain vehicles). This plan will discuss the procedures for addressing crimes on refuge lands. This will include patrols, traffic control, plain clothes operations, surveillance, and investigations. This plan will include procedures for documentation of serious incidents, routine incidents, warnings, and violation notices. It will outline procedures for custodial arrests, execution of warrants, intrusion alarm responses, searches and rescues, medical emergencies, and crowd control. The plan will show procedures for physical security of refuge personnel and assets.

Safety and Emergency Preparedness Plan

This plan will address all procedures required by law or policy or otherwise needed to provide for the personal safety of employees and visitors and to protect property from loss due to accidents. It will address staff responsibilities for safe operations, employee training requirements, required safety equipment, and industrial hygiene. Though the plan will emphasize prevention of accident or injury, it will also include special response procedures and contact information for a number of specific threats, problems, or incidents. Such threats include hurricanes, fires, spills of hazardous chemicals, and responses to serious accidents.

Fishery Management Plan

This plan will include the inventorying, monitoring, and managing of the fishery resource in lakes, ponds, and impoundments on the refuge for listed species, migratory birds, other wildlife, and the public. It will supplement the Habitat Management Plan by addressing contaminant issues in the fishery, occasional die-offs (natural and those associated with drawdowns or salinity increases), stocking parameters, producing and concentrating forage fish for wading birds and other wildlife, and strategies for maintaining a healthy fishery by managing the public harvest. This plan will be prepared in collaboration with the Service's Panama City Ecological Services Field Office.

Table 16. St. Marks National Wildlife Refuge step-down management plans and completion dates

Plan (Year Written)	Revision or Completion Date
Law Enforcement Plan (1983)	2008
Safety and Emergency Preparedness Plan (1993/2001)	2008
Sign Plan (1984)	2009
Fire Management Plan (2001)	2009
Wilderness Management Plan (1980)	2009
Animal Control Plan (1984 and 1987)	2009
Red-cockaded Woodpecker Management Plan (2003)	2009
Biological Inventory and Monitoring Plan (1984)	2010
Habitat Management Plan	2011
Hunt Plan (1983)	2011
Visitor Services Management Plan	2011
Cultural Resource Protection Plan	2012
Fishery Management Plan (1984)	2012
Land Protection Plan (2000)	2021

Visitor Services Management Plan

This plan will guide the Visitor Services program on the refuge for the next 15 years. It will address priority issues raised during the comprehensive conservation planning process and the recommendations of the public use review team, the refuge’s comprehensive conservation planning team, and comments made by the public. The plan will also address wildlife and habitat needs, trail development, the six wildlife-dependent recreation priorities, recreation in the Wilderness Area and valuable cultural resources. It will provide quality visitor opportunities for present and future visitors. Specific emphasis will be placed on assessing and enhancing the environmental education program for target audiences to strengthen visitor’s relationship with wildlife and the environment.

Sign Plan

Revised in 1984, this plan identifies the size, message, format, and location of all refuge signs currently installed. This revision will clarify signage needed to improve communication of information and regulations to the visitor.

Fire Management Plan

The purpose of this plan is to implement the policies, objectives, and standards for fire management presented in the Fire Management Handbook (621 FW 1-5), Department Manual (620 DM), and Service Manuals (095 FW 3, 232 FW6, 241 FW 3, and 241 FW 7). It will provide guidance for

achieving the resource management objectives defined in refuge resource management plans and the comprehensive conservation plan. Guidance will be provided to staff for carrying-out fire management operations.

Wilderness Management Plan

This plan will guide refuge operations and land management in designated wilderness areas in accordance with the mandates of the Wilderness Act. It will address the following: activities permitted and how they will be managed; public use facilities, activities, and improvements; historic and archaeological sites; public health and safety; and research and resource protection. It will also include strategies for assessing new acquisitions for wilderness designation, evaluating the threat of invasive exotic species, and monitoring air quality in Class I airsheds.

Animal Control Plan

Native and nonnative animal species on the refuge may require direct management strategies and intervention to control their presence, distribution, and effect upon refuge resources, particularly trust resources. Examples of animal species this plan will focus on include: feral hogs and escaped and feral domestic animals, as well as insect pests, such as imported cactus moths and native pine beetles. The Animal Control Plan will outline management strategies incorporating integrated pest management techniques to monitor and control these species, and allow assessment of new or emerging threats.

Red-cockaded Woodpecker Management Plan

The refuge has an interim red-cockaded woodpecker management plan (2003). Final revision will result in a plan that details management and recovery actions to be taken at the refuge level in support of the Red-cockaded Woodpecker Recovery Plan, Second Revision (2003), and Strategies and Guidelines for the Recovery and Management of the Red-cockaded Woodpecker and its Habitats on National Wildlife Refuges (1998). This revision will outline actions to be taken to expand the refuge red-cockaded woodpecker population within the 15-year planning cycle as part of the long-term recovery goal of 71 potential active clusters within the refuge.

Biological Inventory and Monitoring Plan

A priority issue and critical need is for data collecting in order to guide wildlife habitat management on the refuge. Wildlife populations need to be adequately monitored to properly determine population trends, identify management needs, and evaluate the impacts of management actions. This plan will describe inventory and monitoring techniques and methodologies for surveys of priority species or species groups. Priority will be set considering trust and listed species. Plant communities will also be addressed. The plan will designate key species to be inventoried and their population trends or habitats to be monitored. A timetable for inventorying and monitoring will be developed.

Habitat Management Plan

This plan will guide all habitat management activities on the refuge, including forest management and restoration, impoundment and other wetland management, watershed restoration, exotic and invasive plant control, and road and levee maintenance. The plan will identify the wildlife habitat needs and outline the appropriate application of management tools, such as commercial and noncommercial forest tree manipulation, prescribed fire, water level manipulation, herbicide and pesticide treatments, groundcover manipulation, soils disturbance, seeding, and planting. Wildlife and habitat monitoring will be incorporated into the plan, as well as parameters to use adaptive management principles to fine-tune management and improve results to target wildlife species, species groups, and habitat.

Cultural Resource Protection Plan

This plan will focus on the protection of historic or archaeological sites. To be written by the Service's Regional Archaeologist, it will present goals, objectives, and strategies to inventory, research, and interpret historic and cultural sites and themes.

Land Protection Plan

The existing land protection plan was completed, reviewed by the public, and approved in 2000. It proposed acquisition of 8,439 acres within a specified boundary. A total of 3,368 remain to be acquired. This plan describes the affected environment within and adjacent to the refuge and threats to refuge resources. It provides alternatives for land protection, including various levels of fee acquisition, leases, cooperative agreements, and conservation easements. Environmental consequences for these alternatives are described and a preferred course of action is identified. Implementation of this plan is proposed over the 15-year time frame of the comprehensive conservation plan.

MONITORING AND EVALUATION

Adaptive management is a flexible approach to long-term management of biotic resources that is directed over time by the results of ongoing monitoring activities and other information. It is a process by which projects are implemented within a framework of scientifically driven experiments to test the predictions and assumptions outlined within a plan.

To apply adaptive management, specific surveying, inventorying, and monitoring protocols will be adopted by the refuge. The habitat management strategies will be systematically evaluated to determine management effects on wildlife populations. This information will be used to refine approaches and to determine how effectively the management objectives are being accomplished. Evaluations will include ecosystem team and other appropriate partner participation. If monitoring and evaluating indicate undesirable effects on target and non-target species and/or communities, then alterations to the management projects or techniques will be made. Subsequently, the refuge's comprehensive conservation plan, or appropriate step-down management plan(s), will be revised. Specific monitoring and evaluating activities will be described in the step-down management plans.

PLAN REVIEW AND REVISION

This comprehensive conservation plan will be reviewed every year in development of the refuge's annual work plans and budget. Each 5 years it will be reviewed to determine if there is a need for revision. A revision will occur if and when substantive information becomes available, ecological conditions change, or there is a major refuge expansion. The plan will be augmented by detailed step-down management plans to address the completion of specific strategies in support of the refuge's goals and objectives. Revisions to this plan and the step-down management plans are subject to public review and compliance with the National Environmental Policy Act.

SECTION B. APPENDICES

Appendix I. Glossary

<i>Adaptive management</i>	The rigorous application of management, research, and monitoring to gain information and experience necessary to assess and modify management activities. A process that uses feedback from refuge research and monitoring and evaluation of management actions to support or modify objectives and strategies at all planning levels.
<i>Alternative</i>	A set of objectives and strategies needed to achieve refuge goals and the desired future condition.
<i>Anadromous</i>	Fish that move from salt water to fresh water for reproduction.
<i>Approved acquisition boundary</i>	A project boundary which the Director of the Fish and Wildlife Service approves upon completion of the detailed planning and environmental compliance process.
<i>Basal area</i>	The cross section area of the stem or stems of a plant or of all plants in a stand, generally expressed as square units per unit area. The cross section area of a tree stem in square feet commonly measured at breast height (4.5' above ground) and inclusive of bark, usually computed by using diameter at breast height or tallied through the use of a basal area factor angle gauge.
<i>Bio-accumulation</i>	The process in which industrial waste, toxic chemicals or pesticides gradually accumulates in living tissue, or in the food web/chain.
<i>Biomass</i>	The total mass, or the amount of living material, in a particular area.
<i>Biological diversity</i>	The variety of life forms and its processes, including the variety and relative abundances of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur.
<i>Biological integrity</i>	The biotic composition, structure, and functioning at genetic, organism, and community levels comparable with historic conditions, including the natural biological processes that shape genomes, organisms, and communities.

<i>Biota</i>	The plant and animal life of a region.
<i>Buffer</i>	A multi-use transitional area designed and managed to protect core reserves and critical corridors from increased development and human activities that are incompatible with habitat and/or wildlife values. In this document, agricultural lands are also considered buffer lands.
<i>Canopy</i>	A layer of foliage; generally the upper-most layer in a forest stand. It can be used to refer to mid- or under-story vegetation in multi-layered stands. Canopy closure is an estimate of the amount of overhead tree cover (also canopy cover).
<i>Category I</i>	The Florida Exotic Pest Plant Council has developed ranking categories to classify the threat of exotic plants to the natural environment. Category I species are those that have caused ecological damage by invading and disrupting native plant communities in Florida.
<i>Category II</i>	Invasive exotics that have increased in abundance or frequency, but have not yet altered Florida plant communities to the extent shown by Category I species.
<i>Commensal species</i>	A close union or relationship between organisms or species where one is benefited by the relationship and the other is neither benefited nor harmed.
<i>Compatible use</i>	An appropriate wildlife-dependent recreational use or any other use on a refuge that is within the mandates laid down in the National Wildlife Refuge System Improvement Act of 1997; the intent of the Congress in the Act of 1997 or in the "Final Internal Draft" document of appropriate uses on a national wildlife refuge. The refuge manager may also determine if an activity will or will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuge.
<i>Comprehensive Conservation Plan</i>	A document that describes the desired future conditions of a refuge or other planning unit. It provides long-range guidance and management direction in order to promote the purposes of the refuge, contribute to the mission of the refuge system, and to meet other relevant mandates.
<i>Conservation Easement</i>	A legal agreement between a landowner and a land trust (a private, nonprofit conservation organization) or government agency that permanently limits a property's uses in order to protect its conservation value.

<i>Cooperative Agreement</i>	A legal instrument used when the principle purpose of the transaction is the transfer of money, property, services, or anything of value to a recipient in order to accomplish a public purpose authorized by federal statute.
<i>Cultural resources</i>	The physical remains of human activity (e.g., artifacts, ruins, and burial mounds) and conceptual content or context (as a setting for legendary, historic, or prehistoric events, such as a sacred area of native peoples) of an area. It includes historically, archaeologically, and/or architecturally significant resources.
<i>Diameter at breast height (DBH)</i>	Tree diameter at breast height (4.5 feet above ground).
<i>Ecosystem</i>	A dynamic and interrelated complex of plant and animal communities and their associated non-living environment.
<i>Ecosystem management</i>	The practice of wildlife and habitat management in the context of the natural ecosystem or ecosystems being managed, with the goal of conserving or restoring the system to its natural state. Management of an ecosystem that includes all ecological, social, and economic components which make up the whole of the system.
<i>Endangered species</i>	Any species of plant or animal defined through the federal Endangered Species Act as being in danger of extinction throughout all or a significant portion of its range. The State of Florida has its own designation and list under the Florida Wildlife Code Title 68A, Florida Administrative Code.
<i>Endemic species</i>	Plants or animals that occur naturally in a certain region and whose distribution is relatively limited to a particular locality.
<i>Environmental Assessment</i>	A systematic analysis to determine if proposed actions will result in a significant effect on the quality of the environment.
<i>Environmental health</i>	The composition, structure, and functioning of soil, water, air, and other abiotic (non-living) features compared with historic conditions, including the natural abiotic processes that shape the environment.
<i>Estuarine</i>	Pertaining to an estuary, a semi-enclosed body of water with a significant freshwater source and a free connection with the ocean.
<i>Executive Order</i>	A legally binding edict issued by the executive branch of the government.
<i>Extirpation</i>	The abolishment or extermination of a species.

<i>Exotic species</i>	A non-indigenous or alien plant or animal species, or one introduced to this state, either purposefully (horticulture trade) or accidentally that escaped into the wild where it reproduces on its own, either sexually or asexually. Any introduced plant or animal species that is not native to the area and may be considered a nuisance.
<i>Fee title acquisition</i>	The acquisition of most or all of the rights to a tract of land. There is a total transfer of property rights with the formal conveyance of a title. While a fee title acquisition involves most rights to a property, certain rights may be reserved or not purchased, including water rights, mineral rights, or use reservation (the ability to continue using the land for a specified time period, or the remainder of the owner's life).
<i>Feral</i>	A wild, free-roaming domestic animal which has become established as a breeding population.
<i>Finding of No Significant Impact</i>	A document prepared in compliance with the National Environmental Policy Act, supported by an environmental assessment that describes why a federal action will have no significant effect on the human environment.
<i>Flatwoods</i>	A transitional pine forested ecological community which typically occupies low, flat topography between sandhill forests and low elevation wetlands.
<i>Forbs</i>	Broad-leafed, flowering plants as distinguished from the grasses and sedges.
<i>Fuel</i>	Living and dead plant material that is capable of burning.
<i>Geographic Information System (GIS)</i>	A computer-based system for the collection, processing and managing of spatially referenced data. GIS allows for the overlay of many data layers and provides a valuable tool for addressing resource management issues.
<i>Goal</i>	A descriptive, open-ended and often broad statement of desired future conditions that conveys a purpose, but does not define measurable units.
<i>Habitat</i>	The native environment of a plant or animal.
<i>Herbicide</i>	A chemical agent used to kill plants or inhibit plant growth.
<i>Hydric</i>	A term used to define a habitat based on soil moisture conditions. Hydric habitats are those which regularly flood for at least a portion of a typical year.

<i>Hydrological</i>	Involving water flows or their distributions as related to evaporation, or flow to wetlands, springs, aquifers, seas, estuaries, etc.
<i>Hydrology</i>	The scientific study of the properties, distribution, and effects of water in the atmosphere, on the earth's surface, and in soil and rocks.
<i>Hydroperiod</i>	The seasonal pattern of the water level typical for a given wetland. The residence (retention) time that water spends in a wetland.
<i>Karst</i>	A geologic term for an area of limestone formations characterized by sinkholes and underground streams.
<i>In-holding</i>	Privately owned land inside the boundary of the refuge.
<i>Invasive exotic species</i>	Nonnative species which have been introduced into an ecosystem, and, because of their aggressive growth habits and lack of natural predators, displace native species.
<i>Keystone species</i>	A species whose presence is important to the health and proper functioning of a biotic community or ecosystem.
<i>Listed species</i>	Any species of fish, wildlife, or plant that has been determined to be "at risk" by a state or the federal government. In this document, at risk may include threatened, endangered, species of special concern, species of management concern, or species included in the Convention on International Trade in Endangered Species.
<i>LOOT</i>	LOOT is the acronym for the Listing of Outlaw Treachery Information Clearinghouse, which is maintained by the National Park Service. It contains voluntarily submitted summary records of prosecuted cases in hardcopy files and computerized database formats. Any federal agency may adopt the LOOT form as part of its program to comply with Section 14 (c) of the Archaeological Resources Protection Act.
<i>Marshbirds</i>	A term that encompasses non-colonial, non-waterfowl aquatic species including loons, bitterns, non-colonial grebes, rails, gallinules, coots, limpkins, and cranes. They are often secretive and feed primarily in fresh waters.
<i>Memorandum of Understanding</i>	A voluntary agreement between two partnering agencies.
<i>Mesic</i>	Pertaining to habitat requiring moderate amounts of moisture in the soil. Moisture is readily available for use by vegetation and the sites may flood in short durations.

<i>Midden</i>	A slightly elevated mound composed of shell fragments and other debris left as waste by Native Americans; shell mounds found throughout the ecosystem constructed by Native Americans.
<i>Migrant passerine</i>	Of or relating to the order of Passeriformes of small or medium-sized, chiefly perching songbirds having grasping feet with the first toe directed backwards.
<i>Migration</i>	The seasonal movement of an animal from one area to another and back.
<i>Mitigation</i>	Avoiding or minimizing the impacts of an action.
<i>Monitoring</i>	The process of collecting information to track changes of selected parameters over time.
<i>National Environmental Policy Act</i>	Requires all federal agencies, including the Service, to examine the environmental impacts of their actions, incorporate environmental information, and use public participation in the planning and implementation of all actions. Federal agencies must integrate this Act with other planning requirements, and prepare appropriate policy documents to facilitate better environmental decision-making.
<i>National Wildlife Refuge</i>	A designated area of land or water, or and interest in land or water, within the National Wildlife Refuge System.
<i>National Wildlife Refuge System</i>	A national network of lands and waters administered for the conservation, management, and, where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.
<i>Native Species</i>	A species already occurring in Florida at the time of European contact (1500 AD). With respect to a particular ecosystem, a species that, other than as a result of an introduction, historically occurred or currently occurs in that ecosystem.
<i>Naturalized exotic species</i>	An exotic that sustains itself outside cultivation.
<i>Neotropical migratory birds</i>	Birds that migrate from North America back and forth to South or Central America. These birds usually breed in the United States or Canada and “winter” in Mexico, the Caribbean, or Central or South America.

<i>Objective</i>	A concise statement of what we want to achieve, how much we want to achieve, when and where we want to achieve it, and who is responsible for the work. Objectives derive from goals and provide the basis for determining strategies, monitoring refuge accomplishments and evaluating the success of strategies.
<i>Partnership</i>	A mutually beneficial, joint relationship between two agencies or an agency and a landowner, etc.
<i>Preferred alternative</i>	The Service's alternative identified in an environmental assessment that best achieves the refuge purpose and vision, contributes to the refuge system mission, addresses significant issues and is consistent with sound wildlife and habitat management.
<i>Prescribed fire</i>	A planned or intentional fire set by resource land managers to improve or restore wildlife habitat and reduce potentially dangerous fire fuel loads. It is also known as a "controlled burn."
<i>Refuge Operating Needs System (RONS)</i>	A national database which contains the unfunded operational needs of each refuge. Projects included are those required to implement approved plans and meet goals, objectives, and legal mandates.
<i>Refuge Purposes</i>	The purposes specified in or derived from the laws, proclamations, executive orders, or administrative memorandums establishing, authorizing, or expanding a refuge.
<i>Restoration</i>	Management actions to return a vegetative community or ecosystem to its original natural condition. To bring a disturbed site or an area changed from its native state back to its historic structure, including water regimes, plant community, and wildlife components. In this document, restoration can refer to exotic plant removal, planting native plants, and/or reintroductions of native plants or animals.
<i>Service Asset Maintenance and Management Systems (SAMMS)</i>	A national database and accounting system used by refuges to document expenditures for the maintenance and management of facilities and equipment.
<i>Sandhills</i>	An upland forested ecological community type with well-drained, sandy soils and characterized by an overstory of longleaf pine and oaks and perennial ground cover.
<i>Scoping</i>	A process for determining the scope of issues to be addressed by a comprehensive conservation plan and for identifying priority issues. Involved in the scoping process are federal, state, and local agencies, private organizations, and individuals.

<i>Service</i>	Fish and Wildlife Service; the federal agency, under the U.S. Department of the Interior, which guides the management of the refuge.
<i>Shorebirds</i>	Any of a large group of birds commonly called sandpipers and plovers, but also including others, such as gulls, terns, skimmers, oystercatchers, avocets and stilts. Typically found along the shorelines of oceans, rivers and lakes, they are commonly characterized by long bills, legs, and toes.
<i>Silvicultural</i>	Pertaining to the cultivation of forests.
<i>Species</i>	A group of organisms all of which have a high degree of physical and genetic similarity, generally interbreed only among themselves, and show persistent differences from members of allied groups of organisms. Species have an independent evolutionary lineage.
<i>Step-down management plans</i>	Plans which provide the details necessary to implement management strategies and projects identified in the comprehensive conservation plan.
<i>Strategy</i>	A specific action, tool, technique, or combination of these used to meet objectives.
<i>Threatened species</i>	Those plant or animal species listed under the federal Endangered Species Act that are likely to become endangered throughout all or a significant portion of their range within the foreseeable future. The State of Florida has its own designation and list under Chapters 68A-27 (animals) and 5B-40 (plants), Florida Administrative Code.
<i>Trust species</i>	Animal and plant species that are federal responsibility and include migratory birds, threatened and endangered species, anadromous fish, and certain marine mammals. The term is broadly used in this document to include federal, state, and internationally listed species, including threatened and endangered species, species of special concern, and species of management concern.
<i>Vegetation</i>	Plants in general, or the sum total of the plant life in an area.
<i>Wading birds</i>	Long-legged birds that wade in fresh or brackish water in search of food, including herons, egrets, bitterns, ibis, storks, spoonbills, flamingos, and cranes.
<i>Waterfowl</i>	Ducks, geese, and coots.

<i>Watershed</i>	The area over which surface water and surficial groundwater collects and drains into a surface water body, such as a river, lake or stream.
<i>Wetland</i>	Areas such as lakes, marshes, and streams that are inundated by surface or ground water for a long enough period of time each year to support, and do support under natural conditions, plants and animals that require saturated or seasonally saturated soils.
<i>Wilderness area</i>	Congress defined Wilderness in the Wilderness Act as “an area where the earth and its community of life are untrammled by man, where man himself is a visitor who does not remain.” It is further defined as an area “without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man’s work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation....”
<i>Wildfire</i>	An uncontrolled fire started naturally by lightning or accidentally/intentionally by man.
<i>Wildlife-dependent recreation</i>	The public uses of hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation.
<i>Wildlife management</i>	The art and science of producing, maintaining, benefiting, and/or enhancing wildlife populations and their associated habitats.
<i>Wildland-urban interface</i>	The condition that develops as residential development expands into rural (primarily forested) landscapes, creating special fire hazards and fire management problems.
<i>Xeric</i>	Xeric habitats have deep, well-drained sands where water percolates rapidly to a relatively deep water table. The vegetation is adapted to dry or arid conditions.

Appendix II. References and Literature Cited

- Allen, Glenn T. 1954. Archaeological Excavations in the Northwest Gulf Coast of Florida. Florida State University Studies, No. 16. Tallahassee, Florida.
- Allen, William Jeffrey. 1991. Soil Survey of Wakulla County, Florida.
- Aucilla River Times. 1999. Final Issue, Vol. XII, No.1 Archeological Discovery with the Aucilla River Prehistory Project.
- Avery, George. 1992. Northwest Florida, 2,500 BP to AD 1000. In Historic Contexts, Part II, Archaeological Contexts, directed by Jerald T. Milanich, Chapter 4. On file at the Division of Historical Resources, Department of State. Tallahassee, Florida.
- Bateman, D. R. Jarvis, G. Carmody. 1994. Mercury Concentrations in Fishes of the St. Marks National Wildlife Refuge. Publication No. PCFO-EC-94-07. U.S. Fish and Wildlife Service, Panama City Field Office, Panama City, Florida.
- Beecher, Hal A., John R. Stone and Thomas C. Lewis, eds. 1978. Fishes of the St. Marks National Wildlife Refuge. Department of Biological Science, Florida State University, Tallahassee, Florida.
- Bellis, Vincent J. 1995. Ecology of Maritime Forests of the Southern Atlantic Coast: A Community Profile. U. S. Department of the Interior National Biological Service, Biological Report 30. Washington, D.C.
- Bense, Judith A. 1969. Excavations at the Bird Hammock Site (8Wa30), Wakulla County, Florida. Unpublished M. S. Thesis, Department of Anthropology, Florida State University. Tallahassee, Florida.
- Bense, Judith A. 1977. Cultural Resource Reconnaissance in the St. Marks National Wildlife Refuge Florida (2 Volumes). University of West Florida. Pensacola, Florida.
- Bense, Judith A. 1978a. Mounds Archaeological District. National Register of Historic Places Inventory - Nomination Form. In Cultural Resource Reconnaissance in the St. Marks National Wildlife Refuge, Florida, Vol. 2, Appendix B. University of West Florida. Pensacola, Florida.
- Bense, Judith A. 1978b. Stoney Bayou Salt Works. National Register of Historic Places Inventory - Nomination Form. In Cultural Resource Reconnaissance in the St. Marks National Wildlife Refuge, Florida, Vol. 2, Appendix B. University of West Florida. Pensacola, Florida.
- Borremans, Nina T. and Michael Russo. 1990. The Paleoindian Period. In Historic Contexts, Part II, Archaeological Contexts, directed by Jerald T. Milanich, Chapter 2. On file at the Division of Historical Resources, Department of State. Tallahassee, Florida.
- Chafin, Linda G. 2000. Field Guide to the Rare Plants of Florida. Florida Natural Areas Inventory. Tallahassee, Florida.

-
- Clewell, Andre F. 1981. Natural Setting and Vegetation of the Florida Panhandle; An Account of the Environments and Plant Communities of Northern Florida West of the Suwannee River. U.S. Army Corps of Engineers. Mobile, Alabama.
- Coultas, Charles L. and Yuch-Ping Hsieh. 1997. Ecology and Management of Tidal Marshes. A Model from the Gulf of Mexico. St. Lucie Press. Delray Beach, Florida.
- Cox, James A., Randy S. Kautz. 2000. Habitat Conservation Needs of Rare and Imperiled Wildlife in Florida. Florida Fish and Wildlife Conservation Commission. Tallahassee, Florida.
- Cox, James A., Randy S. Kautz, Maureen MacLaughlin, and Terry Gilbert. 1994. Closing the Gaps in Florida's Wildlife Habitat Conservation System: Recommendations to Meet Minimum Conservation Goals for Declining Wildlife Species and Rare Plant and Animal Communities. Florida Game and Fresh Water Fish Commission. Tallahassee, Florida.
- Dailey, Robert et al., The St. Marks Cemetery (8Wa108), Florida Department of State, Bureau of Historic Sites and Properties, Bulletin No. 2.
- Davis, Hal. 1995. Hydrogeologic Investigation and Simulation of Ground-Water Flow in the Upper Floridan Aquifer of North-Central Florida and Southwestern Georgia and Delineation of Contributing Areas for Selected City of Tallahassee, Florida, Water Supply Wells. Water Resources Investigations Report 95-4296. U.S. Geological Survey. Tallahassee, Florida.
- Dunbar, Jim. 1994. Notes Relating to the Discovery of Human Remains Near the St. Marks Lighthouse at the Williams Site (8Wa549), Wakulla County, Florida, May 1, 1994. Report on File at the Office of the Regional Archaeologist, Savannah Coastal Refuges. Savannah, Georgia.
- Edminsten, Joe Allen. 1963. The Ecology of the Florida Pine Flatwoods. Ph.D. Thesis, University of Florida, Gainesville.
- Edminston, H. Lee, and Holly A. Tuck. 1987. Resource Inventory of the Apalachicola River and Bay Drainage Basin. Florida Game and Fresh Water Fish Commission, Apalachicola, Florida.
- Engstrom, R. Todd. 1993. Avian Communities in Florida Habitats: Analysis and Review. Florida Game and Fresh Water Fish Commission. Nongame Wildlife Program Final Report. Tallahassee, Florida.
- Farrar, Robert M., Jr. 1990. Proceedings of the Symposium on the Management of Longleaf Pine. U.S. Department of Agriculture, Forest Service Southern Forest Experiment Station. New Orleans, Louisiana.
- Florida Department of Environmental Regulation, Bureau of Laboratories and Special Programs. 1986. Proposed Designation of the Big Bend Sea Grasses Aquatic Preserve as Outstanding Florida Waters. Tallahassee, Florida.
- Florida Department of Environmental Protection, Division of Water Resource Management. 2001. Basin Status Report for Ochlockonee and St. Marks. Tallahassee, Florida.

-
- Florida Exotic Pest Plant Council. 2003. List of Florida's Invasive Species. Internet: <http://www.fleppc.org/03list.htm>.
- Florida First: Base Papers Natural Resources Excerpts. April 1999. University of Florida, Institute of Food and Agricultural Services. Gainesville, Florida.
- Florida Fish and Wildlife Conservation Commission. 2003. The 2001 Economic Benefits of Watchable Wildlife Recreation in Florida. Southwick Associates. Fernandina Beach, Florida.
- Florida Natural Areas Inventory and Florida Department of Natural Resources. 1990. Guide to the Natural Communities of Florida. Tallahassee, Florida.
- Florida Natural Areas Inventory. 2000a. Florida Forever Conservation Needs Assessment Summary Report to the Florida Forever Advisory Council. Florida Natural Areas Inventory. Tallahassee, Florida.
- Florida Natural Areas Inventory. 2000b. Tracking List of Rare, Threatened, and Endangered Plants and Animals and Exemplary Natural Communities in Florida. Tallahassee, Florida.
- Folkerts, George W. 1982. The Gulf Coast Pitcher Plant Bogs. *American Scientist* 70:260-267.
- Gidden, Culver. S. 1986. Marsh and Water Management Plan. St. Marks National Wildlife Refuge. St. Marks, Florida.
- Givens, Lawrence S. 1942. St. Marks National Wildlife Refuge Quarterly Narrative Report February, March, April, 1942. St. Marks National Wildlife Refuge. St. Marks, Florida.
- Godfrey, Robert K. 1988. Trees, Shrubs, and Woody Vines of Northern Florida and Adjacent Georgia and Alabama. University of Georgia Press. Athens, Georgia.
- Hamel, Paul B. 1992. Land Manager's Guide to the Birds of the South. The Nature Conservancy. Chapel Hill, North Carolina.
- Hart, R., James R. Newman. 1995. The Importance of Isolated Wetlands to Fish and Wildlife in Florida. Florida Game and Fresh Water Fish Commission. Nongame Wildlife Program Project Report. Tallahassee, Florida.
- Harper, Roland M. 1914. Geography and Vegetation of Northern Florida. Florida State Geological Survey. 6th Annual Report.
- Hays, J. Craig. 1961. St. Marks National Wildlife Refuge Narrative Report: May, June, July and August 1961. U.S. Fish and Wildlife Service, St. Marks, Florida.
- Hemming, J. M., M. Brim and R. Jarvis. 2002. Sediment Contamination Survey on St. Marks National Wildlife Refuge. Publication No. PCFO-EC- 02-02. U.S. Fish and Wildlife Service. Panama City, Florida.
- Hemming, Jon M., Michael S. Brim and Robert B. Jarvis. 2002. Survey of Dioxin and Furan Compounds in Sediment of Florida Panhandle Bay Systems. U.S. Fish and Wildlife Service. Panama City, Florida.

-
- Hendee, John C., George H. Stankey and Robert C. Lucas. 1990. *Wilderness Management*. International Wilderness Leadership Foundation. Golden, Colorado.
- Holland, F. Ross, Jr. 1994. *Great American Lighthouses*. John Wiley and Sons, Inc. New York, New York.
- Husted, Wilfred M. 1987. *Archaeological Survey at St. Marks National Wildlife Refuge, Wakulla County, Florida*. Report on file at the Office of the Regional Archaeologist, Savannah Coastal Refuges. Savannah, Georgia.
- Huston, Clifton A. 1980. *Archeological Investigations in the Stoney Bayou Pool, St. Marks National Wildlife Refuge*. Archeological Research Reports No. 11. Southeast Conservation Archeology Center, Florida State University. Tallahassee, Florida.
- Jones, Calvin. 1985. *Notes on the Survey and Significance of the Aucilla Bar Site (8Ta124) in Taylor County, Florida*. Report attached to Florida Division of Historic Resources' letter dated October 15, 1985.
- Kreager, Paul T. 1961. *St. Marks National Wildlife Refuge Narrative Report: January, February, March, and April 1961*. U.S. Fish and Wildlife Service, St. Marks, Florida.
- Kulhavy, David L., Robert G. Hooper and Ralph Costa, eds. 1995. *Red-cockaded Woodpecker: Recovery, Ecology and Management*. Center for Applied Studies, College of Forestry, Stephen F. Austin State University. Nacogdoches, Texas.
- Kush, John S., compiler. 1996. *Longleaf Pine: A Regional Perspective of Challenges and Opportunities*. Longleaf Alliance Report No. 1. Mobile, Alabama.
- Kush, John S., compiler. 1999. *Longleaf Pine: A Forward Look, Proceedings of the Second Longleaf Alliance Conference*. Longleaf Alliance Report No. 4. Charleston, South Carolina.
- Langeland, Ken A. and Kathy C. Burks, eds. 1998. *Identification and Biology of Nonnative Plants in Florida's Natural Areas*. University of Florida. Gainesville, Florida.
- Langeland, Ken A. and R. K. Stocker. 2000. *Control of Nonnative Plants in Natural Areas of Florida*. University of Florida. Gainesville, Florida.
- Light, Helen M., Maureen T. MacLaughlin and Stephen W. Sprecher. 1993. *Hydrology, Vegetation, and Soils of Four North Florida River Flood Plains with an Evaluation of State and Federal Wetland Determinations*. U.S. Geological Survey, Water Resources Investigation Report 93-4033. Tallahassee, Florida.
- McEwan, Bonnie G., ed. 1993. *The Spanish Missions of La Florida*. University Press of Florida. Gainesville, Florida.
- Milanich, Jerald T. and Charles H. Fairbanks. 1980. *Florida Archaeology*. Academic Press. Orlando, Florida.

-
- Milanich, Jerald T. 1990. Northwest Florida. In Historic Contexts, Part II, Archaeological Contexts, directed by Jerald T. Milanich, Chapter 4. On file at the Division of Historical Resources, Department of State. Tallahassee, Florida.
- Milanich, Jerald T. 1995. Florida Indians and the Invasion from Europe. University of Florida Press. Gainesville, Florida.
- Moore, Clarence B. 1903. Certain Aboriginal Remains of the Florida West Coast. Journal of the Academy of Natural Sciences of Philadelphia, Vol. 12, Part 3: 362-438.
- Muller, James W., Dennis E. Hardin, Dale R. Jackson, Stephen E. Gatewood and Nancy Caire. 1989. Summary Report on the Vascular Plants, Animals and Plant Communities Endemic to Florida. Florida Game and Fresh Water Fish Commission. Nongame Wildlife Program Technical Report No. 7. Tallahassee, Florida.
- Murphy, Thomas M. 1984. Southeastern States Bald Eagle Recovery Plan. U.S. Fish and Wildlife Service. Atlanta, Georgia.
- Myers, Ronald L. and John J. Ewel, eds. 1990. Ecosystems of Florida. University of Central Florida Press. Orlando, Florida.
- Nelson, Gil. 1996. The Shrubs and Woody Vines of Florida: A Reference and Field Guide. Pineapple Press, Inc. Sarasota, Florida.
- Neil, W. T. 1977. Another Look at the Jaguarundi. Florida Wildlife (30(8):2-5).
- Nesbitt, Stephen A., Martin J. Folk and Don A. Wood. 1993. Effectiveness of Bald Eagle Habitat Protection Guidelines in Florida. Proceedings, Annual Conference of the Southeast Association of Fish and Wildlife Agencies (47:333-338).
- Noel, J. M., W. J. Platt and E. B. Moser. 1998. Structural Characteristics of Old- and Second-Growth Stands of Longleaf Pine (*Pinus palustris*) in the Gulf Coastal Region of the U.S. A. Conservation Biology (12(3):533-548).
- Northwest Florida Water Management District. 1995. GIS Landcover Analysis, Digital Data Layer. Quincy, Florida.
- Northwest Florida Water Management District. 1996. Hydrology of the Northwest Florida Water Management District. Water Resources Special Report 96-4. Havana, Florida.
- Northwest Florida Water Management District. 1997. St. Marks River Watershed Surface Water Improvement and Management Plan, including Wakulla River and Apalachee Bay. Havana, Florida.
- Northwest Florida Water Management District. 2001. The Big Picture: St. Marks River Watershed. Havana, Florida.
- Noss, R. F., E. T. LaRoe and J. M. Scott. 1995. Endangered Ecosystems of the United States: A Preliminary Assessment of Loss and Degradation. Biological Report 28. U.S. Department of Interior, National Biological Service. Washington, D.C.

-
- Odum, William E., et al. 1984. The Ecology of Tidal Freshwater Marshes of the United States East Coast: A Community Profile. U.S. Fish and Wildlife Service, Biological Services Program. FWS/OBS-83/17. Washington, D.C.
- Outcalt, Kenneth W. and Patricia A. Outcalt. 1994. The Longleaf Pine Ecosystem: A Research Assessment. U.S. Department of Agriculture, Forest Service, Southeastern and Southern Forest Experiment Stations. Asheville, North Carolina.
- Outcalt, Kenneth W. and Raymond M. Sheffield. 1996. The Longleaf Pine Forest: Trends and Current Conditions. Resource Bulletin SRS-9. U.S. Department of Agriculture, Forest Service Southern Research Station. Asheville, North Carolina.
- Palik, Thomas F. and J. Thomas Kunneke. 1984. Northwestern Florida Ecological Characterization: An Ecological Atlas. St. Petersburg, Florida.
- Penton, Daniel Troy. 1970. Excavations in the Early Swift Creek Component at Bird Hammock (8Wa30). Unpublished Masters Thesis, Department of Anthropology, Florida State University. Tallahassee, Florida.
- Phelps, David Sutton. 1965. The Norwood Series of Fiber-tempered Ceramics. Southeastern Archaeological Bulletin No. 2.
- Phelps, David Sutton. 1969. Swift Creek and Santa Rosa in Northwest Florida. Notebook, 1(6-9): 14-24. The Institute of Archaeology and Anthropology, University of South Carolina. Columbia, South Carolina.
- Pratt, Thomas, R. and Brian G. Katz. 2002. Nitrate Loading as an Indicator of Nonpoint Source Pollution in the Lower St. Marks - Wakulla Rivers Watershed. Water Resources Special Report 02-1. Tallahassee, Florida.
- Price, Raymond S., Jr. 1952. An Archaeological Site in the St. Marks Wildlife Refuge. Notes in Anthropology 1(1). Department of Anthropology and Archaeology, Florida State University. Tallahassee, Florida.
- Randazzo, Anthony F. and Douglas S. Jones, eds. 1997. The Geology of Florida. University Press of Florida. Gainesville, Florida.
- Reinman, Joseph P. 1985. A Survey of the Understory Vegetation Communities of the St. Marks National Wildlife Refuge Pinelands. St. Marks National Wildlife Refuge. St. Marks, Florida.
- Reinman, Joseph P. 1989. A Wildlife Management Plan for the Forested Uplands of St. Marks National Wildlife Refuge. St. Marks National Wildlife Refuge. St. Marks, Florida.
- Roberts, James H. 1962. St. Marks National Wildlife Refuge Narrative Report: September, October, November, and December 1961. U.S. Fish and Wildlife Service, St. Marks, Florida.
- Roberts, James H., and J. Craig Hays. 1962. St. Marks National Wildlife Refuge Narrative Report: January, February, March, and April 1962. U.S. Fish and Wildlife Service, St. Marks, Florida.

-
- Russo, Michael. 1990. The Archaic Period. In *Historic Contexts, Part II, Archaeological Contexts* directed by Jerald T. Milanich, Chapter 3. On file at the Division of Historical Resources, Department of State. Tallahassee, Florida.
- Schwarz, G. F. 1907. *The Longleaf Pine in Virgin Forest: a Silvical Study*. John Wiley and Sons. New York, New York.
- Sharitz, Rebecca R. and J. W. Gibbons. 1982. *The Ecology of Southeastern Shrub Bogs (Pocosins) and Carolina Bays: A Community Profile*. U.S. Fish and Wildlife Service, Biological Services Program (FWS/OBS-82-04). Washington, D.C.
- Simons, Robert W., S. W. Vince and S. R. Humphrey. 1989. *Hydric Hammocks: A Guide to Management*. U.S. Fish and Wildlife Service, Biological Report 85 (7.26 Supplement). Washington, D.C.
- Smith, Julia Floyd. 1973. *Slavery and Plantation Growth in Antebellum Florida, 1821-1860*. University of Florida Press. Gainesville, Florida.
- Smith, R. L. 1968. *Test Excavations at the Lock Site (8Je57)*. Unpublished Masters Thesis. Department of Anthropology, University of North Carolina. Chapel Hill, North Carolina.
- Stein, Bruce A., Lynn S. Kutner and Jonathan S. Adams. 2000. *Precious Heritage: The Status of Biodiversity in the United States*. The Nature Conservancy and Association for Biodiversity Information. Oxford University Press, New York.
- Suwannee River Water Management District. 1991. *Aucilla River System Surface Water Improvement and Management Plan*. Live Oak, Florida.
- Suwannee River Water Management District. 1995. *GIS Landcover Analysis, Digital Data Layer*. Live Oak, Florida.
- Tesar, Louis D., ed. 1992. *Historical/Architectural Contexts*. In *Historic Contexts, Part II, Archeological Contexts*, directed by Jerald T. Milanich. Chapters 1-15. On file at the Division of Cultural Resources, Department of State. Tallahassee, Florida.
- Tesar, Louis D. and B. Calvin Jones. 1989. In Search of the 1539-40 De Soto Expedition Wintering Site in Apalache. *The Florida Anthropologist* 42(4): 340-360).
- Thompson, Sandra K. S. 1980. *Hammock Vegetation in the Northern Gulf Hammock Region of Florida*. M.S. Thesis, Florida State University, Tallahassee, Florida.
- Tobe, John D., et al., eds. 1998. *Florida Wetland Plants: An Identification Manual*. Florida Department of Environmental Protection. Tallahassee, Florida.
- U.S. Bureau of Biological Survey. 1932. *Annual Plan for Administration of St. Marks Refuge for 1933 F.Y.* St. Marks Migratory Bird Refuge. St. Marks, Florida.
- U.S. Bureau of Biological Survey. 1933. *Five Year Management Plan of St. Marks Migratory Bird Refuge*. St. Marks Migratory Bird Refuge. St. Marks, Florida.

-
- U.S. Department of Agriculture. 1996. Florida Native Plant Collection, Production and Direct Seeding. Techniques: Interim Report. Brooksville, Florida.
- U.S. Department of Commerce, Bureau of the Census. 2000 Census. Internet: <http://factfinder.census.gov>.
- U.S. Department of the Interior, Fish and Wildlife Service and U.S. Department of Commerce, Bureau of the Census. March, 2003. 2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. Washington D.C.
- U.S. Fish and Wildlife Service. 1980a. A Wildlife Management Plan for the Forested Uplands of the St. Marks National Wildlife Refuge. St. Marks National Wildlife Refuge, St. Marks, Florida.
- U.S. Fish and Wildlife Service. 1980b. Final Report. St. Marks National Wildlife Refuge: Forestry Management and Non-Game Wildlife. U.S. Fish and Wildlife Service, National Fish and Wildlife Laboratory. Gainesville, Florida.
- U.S. Fish and Wildlife Service. 1982. Eastern Indigo Snake Recovery Plan. U.S. Fish and Wildlife Service. Atlanta, Georgia.
- U.S. Fish and Wildlife Service. 1984. Fishery Management Plan for St. Marks National Wildlife Refuge, St. Marks, Florida.
- U.S. Fish and Wildlife Service. 1991. Protecting and Restoring Environmental Quality for Fish and Wildlife Resources: Strategic Plan for the Environmental Contaminants Program, 1991-1995.
- U.S. Fish and Wildlife Service. 1994. Mercury Concentrations in Fishes of the St. Marks National Wildlife Refuge. U.S. Fish and Wildlife Service. Panama City, Florida.
- U.S. Fish and Wildlife Service. 1996. Revised Recovery Plan for the U.S. Breeding Population of the Wood Stork. U.S. Fish and Wildlife Service. Atlanta, Georgia.
- U.S. Fish and Wildlife Service. 1998. Strategy and Guidelines for the Recovery and Management of the Red-cockaded Woodpecker and its Habitats on National Wildlife Refuges. U.S. Fish and Wildlife Service. Atlanta, Georgia.
- U.S. Fish and Wildlife Service. 1999. Fulfilling the Promise: The National Wildlife Refuge System, Visions for Wildlife, Habitat, People and Leadership. U.S. Fish and Wildlife Service, Division of Refuges. Arlington, Virginia.
- U.S. Fish and Wildlife Service. 2000a. Final Environmental Assessment and Land Protection Plan, Proposed Expansion of St. Marks National Wildlife Refuge. U.S. Fish and Wildlife Service, Division of Realty. Atlanta, Georgia.
- U.S. Fish and Wildlife Service. 2000b. St. Marks National Wildlife Refuge Annual Narrative Calendar Year 1999. St. Marks, Florida.
- U.S. Fish and Wildlife Service. 2001. Florida Manatee Recovery Plan, (*Trichechus manatus latirostris*), Third Revision. U.S. Fish and Wildlife Service. Atlanta, Georgia.

-
- U.S. Fish and Wildlife Service. 2003a. Banking on Nature 2002: The Economic Benefits to Local Communities of National Wildlife Refuge Visitation. Washington, D.C.
- U.S. Fish and Wildlife Service. 2003b. National Wildlife Refuge System Visitor Satisfaction Survey, Rebecca Halbe and Karen Malkin, Survey Coordinators. Washington, D.C.
- U.S. Fish and Wildlife Service. 2003c. Recovery Plan for Endangered Fat Threeridge (*Amblema neislerii*), Shinyrayed Pocketbook (*Lamslis subangulata*), Gulf Moccasinshell (*Medionidus pennicillatus*), Ochlockonee Moccasinshell (*Medionidus simpsonianus*), and Oval Pigtoe (*Pleurobema pyriforme*); and Threatened Chipola Slabshell (*Elliptio chipolaensis*), and Purple Bankclimber (*Elliptoideus sloatianus*). Atlanta, Georgia.
- U.S. Fish and Wildlife Service. 2003d. Red-cockaded Woodpecker (*Picoides borealis*) Recovery Plan: Second Revision. U.S. Fish and Wildlife Service. Atlanta, Georgia.
- U.S. Geological Survey. 1993. Hydrology, Vegetation, and Soils of Four North Florida River Flood Plains with an Evaluation of State and Federal Wetland Determinations. Water Resources Investigation Report 93-4033. Tallahassee, Florida.
- University of Florida, Institute of Food and Agricultural Sciences. 1999. Putting Florida First. Gainesville, Florida.
- University of Florida, School of Forest Resources, County Extension website, updated March, 2002, Internet: <http://www.sfrc.ufl.edu/Extension/county>.
- Vince, Susan W., S. R. Humphrey and R. W. Simmons. 1989. The Ecology of Hydric Hammocks: A Community Profile. U.S. Fish and Wildlife Service, Biological Report 85(7.26). Washington, D.C.
- Wahlenberg, W. G. 1946. Longleaf Pine: Its Use, Ecology, Regeneration, Protection, Growth, and Management. C. Lathrop Pack Forestry Foundation. Washington, D.C.
- Wakulla County Tourist Development Council. 2002. Proposed Big Bend Scenic Byway, Initial Steps of Phase One, Wakulla County. Panacea, Florida.
- Wakulla Springs State Park. State Park System Direct Economic Impact Assessment, Fiscal Year 2000-2001, District 1. Wakulla Springs, Florida.
- Walker, H. Jesse, and James M. Coleman. 1987. Atlantic and Gulf Coastal Province. Geomorphic Systems of North America edited by William L. Graf. Centennial Special Volume 2: 51-110. Geological Society of America, Inc. Boulder, Colorado.
- Wharton, Charles H., Wiley M. Kitchens., E. C. Pendleton and T. W. Sipe. 1982. The Ecology of Bottomland Hardwood Swamps of the Southeast: A Community Profile. U.S. Fish and Wildlife Service, Biological Services Program (FWS/OBS-81/37). Washington, D.C.
- Wiegert, Richard G. and Byron J. Freeman. 1990. Tidal Salt Marshes of the Southeastern Atlantic Coast: A Community Profile. U.S. Fish and Wildlife Service, Biological Report 85(7.29). Washington, D.C.

-
- Willey, Gordon R. 1949. Archeology of the Florida Gulf Coast. Smithsonian Miscellaneous Collections, Volume 13. Smithsonian Institution. Washington, D.C.
- Williams, Mark, and Daniel T. Elliott, eds. 1993. A World Engraved: Archaeology of the Swift Creek Culture. University of Alabama Press. Tuscaloosa, Alabama.
- Wilson, James R., ed. 2001. The Fire Forest Longleaf Pine-Wiregrass Ecosystem. Georgia Wildlife Press. Covington, Georgia.
- Wise, Stephen R. 1988. Lifeline of the Confederacy: Blockade Running During the Civil War. University of South Carolina Press. Columbia, South Carolina.
- Wolfe, Steven H., Jeffery A. Reidenauer and D. Bruce Means. 1988. An Ecological Characterization of the Florida Panhandle. U.S. Fish and Wildlife Service and Minerals Management Service. Washington, D.C. and New Orleans, Louisiana.
- Wood, Petra B. and Michael W. Collopy. 1995. Population Ecology of Subadult Southern Bald Eagles in Florida: Post-Fledging Ecology, Migration Patterns, Habitat Use, and Survival. Tallahassee, Florida.
- Wood, Petra B., Thomas C. Edwards, Jr. and Michael W. Collopy. 1989. Distribution, Ownership, Status, and Habitat Characteristics of Bald Eagle Nest Sites in Florida. Nongame Wildlife Program Final Report. University of Florida. Gainesville, Florida.
- Zieman and Zieman. 1989. The Ecology of the Seagrass Meadows of the West Coast of Florida: A Community Profile. U.S. Fish and Wildlife Service. Biological Report 85(7.25).

Appendix III. Legal Mandates

NATIONAL WILDLIFE REFUGE SYSTEM AUTHORITIES

The mission of the Fish and Wildlife Service is to conserve, protect, and enhance the nation's fish and wildlife and their habitats for the continuing benefit of the American people. The Service is the primary federal agency responsible for migratory birds, endangered plants and animals, certain marine mammals, and anadromous fish. This responsibility to conserve our nation's fish and wildlife resources is shared with other federal agencies and state and tribal governments.

As part of this responsibility, the Service manages the National Wildlife Refuge System. The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

St. Marks National Wildlife Refuge is managed as part of this system in accordance with the National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, the Refuge Recreation Act of 1962, Executive Order 12996 (Management and General Public Use of the National Wildlife Refuge System), and other relevant legislation, executive orders, regulations, and policies.

FEDERAL LAWS AND MANDATES

The following list includes statutes and executive orders that are relevant to the acquisition, administration, and management of national wildlife refuges. The brief descriptions provided highlight some aspects of these laws and policies that are relevant to comprehensive conservation planning; however, they are not legal interpretations. The entire act or executive order should be referenced for additional detail. Further information can be obtained from the following website: <http://laws.fws.gov/lawsdigest>.

1906--Antiquities Act (16 USC 431 - 433) (34 Stat. 225). Provides penalties for unauthorized collection, excavation, or destruction of historic or prehistoric ruins, monuments or objects of antiquity on lands owned or controlled by the United States. It authorizes the President to designate as national monuments objects, or areas of historic or scientific interest, on lands owned or controlled by the United States.

1918--Migratory Bird Treaty Act. Designates the protection of migratory birds as a federal responsibility. This act enables the setting of seasons and regulations including the closing of areas, federal or nonfederal, to the hunting of migratory birds.

1929--Migratory Bird Conservation Act. Establishes procedures for acquisition by purchase, rental, or gift of areas approved by the Migratory Bird Conservation Commission.

1934--Migratory Bird Hunting and Conservation Stamp Act (16 U.S.C.718-718j, 48 Stat. 452), as amended. Requires each waterfowl hunter, 16 years of age or older, to possess a valid federal hunting stamp. Receipts from the sale of the stamp are deposited in a special Treasury account known as the Migratory Bird Conservation Fund and are not subject to appropriations.

1935--Refuge Revenue Sharing Act (16 U.S.C. 715s)-Section 401 of the Act of June 15, 1935 (49 Stat. 383). Provides for payments to counties in lieu of taxes, using revenues derived from the sale of products from refuges. Public Law 88-523, approved August 30, 1964 (78 Stat. 701), made major revisions by requiring that all revenues received from refuge products, such as animals, timber and minerals, or from leases or other privileges, be deposited in a special Treasury account and net receipts distributed to counties for public schools and roads. Public Law 93-509, approved December 3, 1974 (88 Stat. 1603), required that moneys remaining in the fund after payments be transferred to the Migratory Bird Conservation Fund for land acquisition under provisions of the Migratory Bird Conservation Act.

1935--Historic Sites, Buildings and Antiquities Act (16 U.S.C. 461-462, 464-467) (49 Stat. 666). Popularly known as the Historic Sites Act, as amended by Public Law 89-249, approved October 9, 1965 (79 Stat. 971), declares it a national policy to preserve historic sites and objects of national significance, including those located on refuges. It provides procedures for designation, acquisition, administration, and protection of such sites. National Historic and Natural Landmarks are designated under authority of this act.

1956--Fish and Wildlife Act. Established a comprehensive national fish, shellfish, and wildlife resources policy with emphasis on the commercial fishing industry, but also included the inherent right of every citizen and resident to fish for pleasure, enjoyment, and betterment and to maintain and increase public opportunities for recreational use of fish and wildlife resources. It authorized the Secretary of the Interior to develop, advance, manage, conserve and protect fish and wildlife resources through research, development of existing facilities, and acquisition by purchase or exchange of land and water or interests therein.

1958--Fish and Wildlife Coordination Act. Allows the Fish and Wildlife Service to enter into agreements with private landowners for wildlife management purposes.

1960--Archaeological and Historic Preservation Act (16 U.S.C. 469-469c) – Public Law 86-523, approved June 27, 1960 (74 Stat. 220), and amended by Public Law 93-291, approved May 24, 1974 (88 Stat. 174). Directed federal agencies to notify the Secretary of the Interior whenever a federal, federally assisted, or licensed or permitted project may cause loss or destruction of significant scientific, prehistoric, or archaeological data. The act authorized use of appropriated, donated, and/or transferred funds for the recovery, protection, and preservation of such data. The act established an Advisory Council on Historic Preservation, which was made a permanent independent agency in Public Law 94-422, approved September 28, 1976 (90 Stat. 1319). That act also created the Historic Preservation Fund. Federal agencies are directed to take into account the effects of their actions on items or sites listed in, or eligible for listing in, the National Register of Historic Places.

1960--National and Community Service Act (42 U.S.C. 12401:104 Stat. 3127), Public Law 101-610, signed November 16, 1990. Authorizes several programs to engage citizens of the United States in full- and/or part-time projects designed to combat illiteracy and poverty, provide job skills, enhance educational skills, and fulfill environmental needs.

1962--Refuge Recreation Act. Authorizes the Secretary of the Interior to administer refuges, hatcheries, and other conservation areas for recreational use, when such uses do not interfere with the area's primary purposes. It authorizes construction and maintenance of recreational facilities and the acquisition of land for incidental fish and wildlife oriented recreational development or protection of natural resources. It also authorizes the charging of fees for public uses.

1964--Wilderness Act, as amended. Directed the Secretary of the Interior to review, within ten years, every roadless area of 5,000 acres or more and every roadless island regardless of size within the National Wildlife Refuge System and to recommend suitability of each such area. The act permits certain activities within designated Wilderness Areas that do not alter natural processes. Wilderness values are preserved through a “minimum tool” management approach, which requires managers to use the least intrusive methods, equipment and facilities necessary for administering the areas.

1964--Land and Water Conservation Fund Act. Provides funding through receipts from the sale of surplus federal land, appropriations from oil and gas receipts from the outer continental shelf, and other sources of land acquisition under several authorities. Appropriations from the fund may be used for matching grants to states for outdoor recreation projects and for land acquisition by various federal agencies, including the Fish and Wildlife Service.

1965--Anadromous Fish Conservation Act, as amended. Authorizes the Secretaries of the Interior and Commerce to enter into cooperative agreements with states and other non-federal interests for conservation, development, and enhancement of anadromous fish and contribute up to 50 percent as the federal share of the cost of carrying out such agreements. Reclamation construction programs for water resource projects needed solely for such fish are also authorized.

1966--National Wildlife Refuge System Administration Act. The 1966 Act provides guidelines and directives for administration and management of all areas in the system, including “wildlife refuges, areas for the protection and conservation of fish and wildlife that are threatened with extinction, wildlife ranges, game ranges, wildlife management areas or waterfowl production areas.” The Secretary of the Interior is authorized to permit by regulations the use of any area within the system, provided “such uses are compatible with the major provisions for which such areas were established.”

1966--National Historic Preservation Act (16 U.S.C. 470-470b, 470c-470n) – Public Law 89-665, approved October 15, 1966 (80 Stat. 915), as amended. Provided for preservation of significant historical features (buildings, objects, and sites) through a grant-in-aid program to the states. It established a National Register of Historic Places and a program of matching grants under the existing National Trust for Historic Preservation (16 U.S.C. 468-468d).

1968--Architectural Barriers Act. Requires that buildings and facilities designed, constructed, or altered with federal funds, or leased by a federal agency, must comply with standards for physical accessibility.

1969--National Environmental Policy Act (P.L. 91-190, 42 U.S.C. 4321-4347, January 1, 1970, 83 Stat. 852) as amended by Public Law 94-52, July 3, 1975, 89 Stat. 258, and Public Law 94-83, August 9, 1975, 89 Stat. 424. Requires that all federal agencies prepare detailed environmental impact statements for “every recommendation or report on proposals for legislation and other major federal actions significantly affecting the quality of the human environment.” The 1969 statute stipulated the factors to be considered in environmental impact statements, and required that federal agencies employ an interdisciplinary approach in related decision-making and develop means to ensure that unquantified environmental values are given appropriate consideration, along with economic and technical considerations.

1970--Youth Conservation Corps Act. Within the Fish and Wildlife Service, participants perform various conservation and maintenance tasks on refuges, national fish hatcheries, research stations, and other facilities. The legislation also authorizes the Secretaries of Interior and Agriculture to

establish a joint grant program to assist States employing young adults on non-federal public lands and waters throughout the United States.

1970--Clean Air Act. A comprehensive federal law that regulates emissions from stationary and mobile sources. This act and its amendments charge federal land managers with direct responsibility to protect the “air quality and related values” of lands under their control. These values include fish, wildlife, and their habitats.

1972--Coastal Zone Management Act, as amended. Established a voluntary national program within the Department of Commerce to encourage coastal states to develop and implement coastal zone management plans. Any federal activity within or outside of the coastal zone that affects any land or water use or natural resource of the coastal zone shall be consistent to the maximum extent practicable with the enforceable policies of a State’s coastal zone management plan.

1973--Endangered Species Act (16 U.S.C. 1531-1544, 87 Stat. 884), as amended. Public Law 93-205, approved December 28, 1973, repealed the Endangered Species Conservation Act of December 5, 1969 (P.L. 91-135, 83 Stat. 275). The 1969 act amended the Endangered Species Preservation Act of October 15, 1966 (P.L. 89-669, 80 Stat. 926). The 1973 Endangered Species Act provided for the conservation of ecosystems upon which threatened and endangered species of fish, wildlife, and plants depend, both through federal action and by encouraging the establishment of state programs. The act authorizes the determination and listing of species as threatened and endangered; prohibits unauthorized taking, possession, sale, and transport of endangered species; provides authority to acquire land for the conservation of listed species, using land and water conservation funds; authorizes establishment of cooperative agreements and grants-in-aid to states that establish and maintain active and adequate programs for threatened and endangered wildlife and plants; authorizes the assessment of civil and criminal penalties for violating the act or regulations; and authorizes the payment of rewards to anyone furnishing information leading to arrest and conviction of anyone violating the act and any regulation issued thereunder.

1973--Rehabilitation Act. Requires that programmatic and physical accessibility be made available in any facility funded by the federal government, ensuring that anyone can participate in any program.

1974--Clean Water Act, as amended. This act and its amendments have as its objective the restoration and maintenance of the chemical, physical, and biological integrity of the nation’s waters. Section 401 of the Act requires that federally permitted activities comply with the Clean Water Act standards, state water quality laws, and any other appropriate state laws. Section 404 charges the U.S. Army Corps of Engineers with regulating discharge of dredge or fill materials into waters of the United States, including wetlands.

1975--Public Law 93-632, dated January 3, 1975. This law designated 17,446 acres of St. Marks National Wildlife Refuge as Wilderness Areas for inclusion within the National Wilderness Preservation system.

1978--Fish and Wildlife Improvement Act. This act was passed to improve the administration of fish and wildlife programs and amends several earlier laws, including the Refuge Recreation Act, the National Wildlife Refuge System Administration Act, and the Fish and Wildlife Act of 1956. It authorizes the Secretary of the Interior to accept gifts and bequests of real and personal property on behalf of the United States. It also authorizes the use of volunteers on Service projects and appropriations to carry out volunteer programs.

1978--American Indian Religious Act. Protects the inherent right of Native Americans to believe, express, and exercise their traditional religions, including access to important sites, use and possession of sacred objects, and the freedom to worship through ceremonial and traditional rites.

1979--Archaeological Resources Protection Act (16 U.S.C. 470aa - 47011), Public Law 96-95, approved October 31, 1979 (93 Stat. 721). Largely supplanted the resource protection provisions of the Antiquities Act for archaeological items. This act established detailed requirements for issuance of permits for any excavation for or removal of archaeological resources from federal and Native American lands. It also established civil and criminal penalties for the unauthorized excavation, removal, or damage of any such resources; for any trafficking in such resources removed from federal and Native American lands in violation of any provision of federal law; and for interstate and foreign commerce in such resources acquired, transported, or received in violation of any state or local law.

1981--Farmland Protection Policy Act, as amended. Minimizes the extent to which federal programs contribute to the unnecessary conversion of farmland to nonagricultural uses. Federal programs include construction projects and the management of federal lands.

1982--Coastal Barrier Resources Act. Identified undeveloped coastal barriers along the Atlantic and Gulf coasts and included them in the John H. Chafee Coastal Barrier Resources System (CBRS). The objectives of the act are to minimize the loss of human life, reduce wasteful federal expenditures, and minimize the damage to natural resources by restricting most federal expenditures that encourage development within the CBRS.

1986--Emergency Wetlands Resources Act. Authorized the purchase of wetlands from Land and Water Conservation Fund moneys, removing a prior prohibition on such acquisitions. The act required the Secretary to establish a National Wetlands Priority Conservation Plan, required the States to include wetlands in their Comprehensive Outdoor Recreation Plans, and transferred to the Migratory Bird Conservation Fund amounts equal to import duties on arms and ammunition. It also established entrance fees at National Wildlife Refuges.

1988--Public Law 100-588, approved November 3, 1988 (102 Stat. 2983). Lowered the threshold value of artifacts triggering the felony provisions of the act from \$5,000 to \$500, made attempting to commit an action prohibited by the act a violation, and required the land managing agencies to establish public awareness programs regarding the value of archaeological resources to the nation.

1989--North American Wetlands Conservation Act (103 Stat. 1968; 16 U.S.C. 4401-4412), Public Law 101-233. Enacted December 13, 1989, provides funding and administrative direction for implementation of the North American Waterfowl Management Plan and the Tripartite Agreement on Wetlands between Canada, the United States and Mexico.

1990--Environmental Education Act (20 USC 5501-5510; 104 Stat. 3325). Public Law 101-619, signed November 16, 1990, established the Office of Environmental Education within the Environmental Protection Agency to develop and administer a federal environmental education program in consultation with other federal natural resource management agencies, including the Fish and Wildlife Service.

1990--Federal Noxious Weed Act. The Secretary of Agriculture was given the authority to designate plants as noxious weeds and to cooperate with other federal, state and local agencies, farmers associations, and private individuals in measures to control, eradicate, prevent, or retard the spread of such weeds. The act requires each federal land-managing agency to designate an office or

person to coordinate a program to control such plants on the agency's land and to implement cooperative agreements with the states.

1990--Americans with Disabilities Act. Requires reasonable accommodations to be made in employment, public services, public accommodations, and telecommunications for persons with disabilities.

1990--Native American Graves Protection and Repatriation Act. Requires federal agencies and museums to inventory, determine ownership of, and repatriate certain cultural items and human remains under their control or possession. The act also addressed the repatriation of cultural items inadvertently discovered by construction activities on lands managed by the agency.

1997--National Wildlife Refuge System Improvement Act. Public Law 105-57, amended the National Wildlife Refuge System Act of 1966 (16 U.S.C. 668dd-ee). The Act's main components include: a strong, singular wildlife conservation mission for the refuge system; a requirement for the Secretary of the Interior to maintain the biological integrity, diversity and environmental health of the Refuge System; a new process for determining compatible uses of refuges; a priority for certain wildlife-dependent public uses; and a requirement that by 2012 each refuge will prepare a comprehensive conservation Plan.

1998--Transportation Equity Act for the 21st Century. Established the Refuge Roads Program, requires transportation planning that includes public involvement, and provides funding for approved public use roads and trails and associated parking lots, comfort stations and bicycle/pedestrian facilities.

EXECUTIVE ORDERS

1931--EO 5740. Established the St. Marks Migratory Bird Refuge on October 31, 1931.

1935--EO 7222. Added acreage to St. Marks Migratory Bird Refuge on November 1, 1935.

1937--EO 7749. Added acreage to St. Marks Migratory Bird Refuge on November 22, 1937.

1938--EO 7977. Added acreage to St. Marks Migratory Bird Refuge on September 19, 1938.

1942--EO 9119. Added acreage to St. Marks National Wildlife Refuge on April 1, 1942.

1966--EO11593, Protection and Enhancement of the Cultural Environment. States that if the Service proposes any development activities that may affect archaeological or historical sites, the Service will consult with Federal and State Historic Preservation Officers to comply with Section 106 of the National Historic Preservation Act of 1966, as amended.

1977--EO 11988, Floodplain Management. Prevents federal agencies from contributing to the "adverse impacts associated with occupancy and modification of floodplains" and the "direct or indirect support of floodplain development." In the course of fulfilling their respective authorities, federal agencies "shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains."

1977--EO 11990, Protection of Wetlands. Federal agencies are directed to provide leadership and take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands.

1994--EO 12906, Geographic Data Standards. Directs federal agencies to utilize the National Vegetation Classification System when mapping vegetation.

1995--EO 12962, Recreational Fisheries. Federal agencies are directed to improve the quantity, function, sustainable productivity, and distribution of United States aquatic resources for increased recreational fishing opportunities in cooperation with states and tribes.

1996--EO 12996, Management and General Public Use of the National Wildlife Refuge System. Identifies the mission of the National Wildlife Refuge System and recognizes compatible wildlife-dependent recreation uses, such as hunting, fishing, wildlife observation, and photography, environmental education and interpretation as priority public uses.

1996--EO 13007, Indian Sacred Sites. Directs federal land management agencies to accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners, avoid adversely affecting the physical integrity of such sacred sites, and where appropriate, maintain the confidentiality of sacred sites.

1999--EO 13112, Invasive Species. Federal agencies whose actions may affect the status of invasive species shall, to the extent practicable and permitted by law, use relevant programs and authorities to: prevent the introduction of invasive species; detect and respond rapidly to and control populations of such species in a cost effective and environmentally sound manner; accurately monitor invasive species; provide for restoration of native species and habitat conditions; conduct research to prevent introductions and to control invasive species; and promote public education on invasive species and the means to address them.

2000--EO 13175, Consultation and Coordination with Indian Tribal Governments. Provides a mechanism for establishing regular and meaningful consultation and collaboration with tribal officials in the development of federal policies that have tribal implications.

2001--EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds. Instructs federal agencies to conserve migratory birds by several means, including the incorporation of strategies and recommendations found in Partners In Flight bird conservation plans, the North American Waterfowl Plan, the North American Waterbird Conservation Plan, and the United States Shorebird Conservation Plan, into agency management plans and guidance documents.

PRESIDENTIAL PROCLAMATIONS

1931--PP 1982. Established the Executive Closure Area on St. Marks Migratory Bird Refuge on December 24, 1931.

1937--PP 2264. Expanded the Executive Closure Area on St. Marks Migratory Bird Refuge on December 13, 1937.

1940--PP 2416. Changed the name of the refuge to St. Marks National Wildlife Refuge.

SECRETARY'S ORDERS

1953--Secretary's Order. Modified the Executive Closure Area on St. Marks National Wildlife Refuge on October 22, 1953.

1960--Secretary's Order. Enlarged and established a new closure order boundary on St. Marks National Wildlife Refuge on October 15, 1960.

PRIMARY STATE WILDLIFE REGULATIONS

The primary state wildlife regulations are found in Chapter 327.072, Florida Statutes and Chapter 68A-27, Florida Administrative Code (FAC). The Florida Fish and Wildlife Conservation Commission maintains the state list of animals designated as endangered, threatened, or species of special concern, in accordance with Rules 68A-27.003 to .005, FAC. See also <http://fac.dos.state.fl.us/>. This list is also found on the Commission's website: <http://myfwc.com>. The state list of plants, which are designated as endangered, threatened, and commercially exploited, are administered and maintained by the Florida Department of Agriculture and Consumer Services via Chapter 5B-40, FAC. This list of plants can be obtained at the Department's website: <http://www.doacs.state.fl.us/~pi/index.html>.

Appendix IV. Flora and Fauna

The following table contains a list of federal and state threatened and endangered species as well as selected Florida Natural Areas Inventory (FNAI)-tracked vertebrate species. The Conservation Rank and Legal Status Explanations are adapted from Florida Natural Areas Inventory, 2000. The list also includes global and state rankings system.

Global Rank Definitions

- G1:** Critically imperiled globally because of extreme rarity (5 or fewer occurrences or less than 1000 individuals) or because of extreme vulnerability to extinction due to some natural or man-made factor.
- G2:** Imperiled globally because of rarity (6 to 20 occurrences or less than 3000 individuals) or because of vulnerability to extinction due to some natural or man-made factor.
- G3:** Either very rare and local throughout its range (21-100 occurrences or less than 10,000 individuals) or found locally in a restricted range or vulnerable to extinction from other factors.
- G4:** Apparently secure globally (may be rare in parts of range).
- G5:** Demonstrably secure globally.
- T:** Refers to status of taxa (subspecies or geographically distinct race, convention follows G rankings).

State Rank Definitions

- S1:** Critically imperiled in Florida because of extreme rarity (5 or fewer occurrences or less than 1000 individuals) or because of extreme vulnerability to extinction due to some natural or man-made factor.
- S2:** Imperiled in Florida because of rarity (6 to 20 occurrences or less than 3000 individuals) or because of vulnerability to extinction due to some natural or man-made factor.
- S3:** Either very rare and local throughout its range (21-100 occurrences or less than 10,000 individuals) or found locally in a restricted range or vulnerable to extinction from other factors.
- S4:** Apparently secure in Florida (may be rare in parts of range).
- S5:** Demonstrably secure in Florida.
- SH:** Of historical occurrence throughout its range, may be rediscovered (e.g., Ivory-billed Woodpecker).

Federal Legal Statutes

Definitions derived from U.S. Endangered Species Act of 1973, Section 3. Listings available at <http://endangered.fws.gov/wildlife.html#Species>

Note that the federal status refers only to Florida populations and that federal status may differ elsewhere.

E - Endangered: Species in danger of extinction throughout all or a significant portion of its range.

T - Threatened: Species likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

E(S/A) - Endangered: Due to similarity of appearance to a species which is federally listed such that enforcement personnel have difficulty in attempting to differentiate between the listed and unlisted species.

T(S/A) - Threatened: Due to similarity of appearance (see above).

MC - Not currently listed, but of management concern to the Fish and Wildlife Service.

N - Not currently listed.

State Of Florida Legal Statutes

Animals: Definitions derived from Florida's Endangered Species and Species of Special Concern, Official Lists, published by Florida Fish and Wildlife Conservation Commission, January, 2004. See also, <http://myfwc.com/imperiled/pdf/Endangered-Threatened-Special-Concern-2004.pdf>

E - Endangered: Species, subspecies, or isolated population so few or depleted in number or so restricted in range that it is in imminent danger of extinction.

T - Threatened: Species, subspecies, or isolated population facing a very high risk of extinction in the future.

SSC - Species of Special Concern: Species, subspecies, or isolated population which is facing a moderate risk of extinction in the future.

N - Not currently listed.

Plants: Definitions derived from Florida's "Regulated Plant Index," as amended September 20, 2000, containing 415 endangered species, 113 threatened species, and eight commercially exploited species. See also, <http://www.virtualherbarium.org/EPAC/>

E - Endangered: Species of plants native to Florida that are in imminent danger of extinction within the state, the survival of which is unlikely if the causes of a decline in the number of plants continue; includes all species determined to be threatened or endangered pursuant to the Endangered Species Act.

T - Threatened: Species native to the state that are in rapid decline in the number of plants within the state, but which have not so decreased in number as to cause them to be endangered.

N - Not currently listed.

IMPERILED SPECIES' CONSERVATION RANK AND LEGAL STATUS

Federal and State threatened and endangered and selected Florida Natural Areas Inventory (FNAI) vertebrate species

Includes Global and State ranking system scores from St. Marks National Wildlife Refuge

Common Name	Scientific Name	Global Rank	State Rank	Federal Status	State Status
Fish					
Gulf sturgeon	<i>Acipenser oxyrinchus desotoi</i>	G3, T2	S2	T	SSC
Suwannee bass	<i>Micropterus notius</i>	G3	S3	N	SSC
Amphibians					
Flatwoods salamander	<i>Ambystoma cingulatum</i>	G2, G3	S2, S3	T	SSC
Gopher frog	<i>Rana capito</i>	G3, G4	S3	N	SSC
Striped newt	<i>Notophthalmus perstriatus</i>	G2, G3	S2, S3	N	N
Reptiles					
American alligator	<i>Alligator mississippiensis</i>	G5	S4	T (S/A)	SSC
Loggerhead sea turtle	<i>Caretta caretta</i>	G3	S3	T	T
Green sea turtle	<i>Chelonia mydas</i>	G3	S2	E	E
Leatherback sea turtle	<i>Dermodochelys coriacea</i>	G3	S2	E	E
Eastern indigo snake	<i>Drymarchon corais couperi</i>	G4, T3	S3	T	T
Gopher tortoise	<i>Gopherus polyphemus</i>	G3	S3	N	SSC

Common Name	Scientific Name	Global Rank	State Rank	Federal Status	State Status
Southern hognose snake	<i>Heterodon simus</i>	G2	S2	N	N
Kemp's ridley sea turtle	<i>Lepidochelys kempii</i>	G1	S1	E	E
Alligator snapping turtle	<i>Macroclemys temminckii</i>	G3, G4	S3	N	SSC
Florida pine snake	<i>Pituophus melanoleucus mugitus</i>	G4, T3?	S3	N	SSC
Suwannee cooter	<i>Pseudemys suwanniensis</i>	G5, T3	S3	N	SSC
Florida ribbon snake	<i>Thamnophis sauritus sackeni</i>	G5	S?	N	SSC
Birds					
Scott's seaside sparrow	<i>Ammodramus maritimus peninsulae</i>	G4, T2	S2	N	SSC
Piping plover	<i>Charadrius melodus</i>	G3	S2	T	T
Marian's marsh wren	<i>Cistothorus palustris marianae</i>	G5, T3	S3	N	SSC
Little blue heron	<i>Egretta caerulea</i>	G5	S4	N	SSC
Reddish egret	<i>Egretta rufescens</i>	G4	S2	N	SSC
Snowy egret	<i>Egretta thula</i>	G5	S3	N	N
Tricolored heron	<i>Egretta tricolor</i>	G5	S4	N	SSC
White ibis	<i>Eudocimus albus</i>	G5	S4	N	SSC
Southeastern American kestrel	<i>Falco sparverius paulus</i>	G5, T3, T4	S3	N	T
Peregrin Falcon	<i>Falco peregrinus</i>				E
Least Tern	<i>Sterna antillarum</i>				T

Common Name	Scientific Name	Global Rank	State Rank	Federal Status	State Status
American oystercatcher	<i>Haematopus palliatus</i>	G5	S2	N	SSC
Bald eagle	<i>Haliaeetus leucocephalus</i>	G4	S3	T	T
Wood stork	<i>Mycteria americana</i>	G4	S2	E	E
Red-cockaded woodpecker	<i>Picoides borealis</i>	G3	S2	E	SSC
Roseate spoonbill	<i>Platalea ajaja</i>	G5	S2	N	SSC
Mammals					
Florida manatee	<i>Trichechus manatus latirostris</i>	G2	S2	E	E
Florida black bear	<i>Ursus americanus floridanus</i>	G5, T2	S2	N	T
Sherman's fox squirrel	<i>Sciurus niger shermani</i>	G5, T3	S3	N	SSC
Invertebrates					
Purple bankclimber	<i>Elliptoideus sloatianus</i>	G2	S?	T	N
Ochlockonee moccasinshell	<i>Medionidus simpsonianus</i>	G1	S1	E	N
Florida cave amphipod	<i>Crangonyx grandimanus</i>	G2, G3	S2	N	N
Hobbs' cave amphipod	<i>Crangonyx hobbsi</i>	G2, G3	S2, S3	N	N
Big blue spring cave crayfish	<i>Procambarus horsti</i>	G1, G2	S1	N	N

BIRD LIST, ST. MARKS NATIONAL WILDLIFE REFUGE

There are 278 species of birds that are considered part of the refuge's fauna. The listing below is in accordance with the American Ornithologists' Union checklist, as amended. The list depicts the seasons that birds are present or nesting on the refuge and classifies occurrences as abundant, common, uncommon, occasional, and rare according to the following legend symbols.

- * Nests on refuge
- a Abundant - A common species which is very numerous
- c Common - Certain to be seen or heard in suitable habitat
- u Uncommon - Present, but not certain to be seen
- o Occasional - Seen only a few times during a season
- r Rare - Seen at interval of 2 to 5 years
- Sp Spring - March through May
- S Summer - June through August
- F Fall - September through November
- W Winter - December through February
- NTM Neotropical Migratory Species
- y Yes
- n No

Seasons/Occurrences	Sp	S	F	W	NTM
Loons					
Red-throated loon				r	n
Common loon	c		u	c	n
Grebes					
Pied-billed grebe*	c	c	a	a	y
Horned grebe	c	r	u	c	n
Red-necked grebe			r	r	n
Pelicans and their allies					
Northern Gannet	o		o	o	y
American White Pelican	u	r	u	u	y
Brown Pelican*	c	c	c	c	Y
Double-crested Cormorant*	a	a	a	a	y
Anhinga*	c	c	c	c	y

Seasons/Occurrences	Sp	S	F	W	NTM
Magnificent Frigatebird		r			n
Herons, egrets, and their allies					
American Bittern	o		o	o	y
Least Bittern*	c	c	u	r	y
Great Blue Heron*	c	c	c	c	y
Great Egret*	a	a	a	a	y
Snowy Egret*	a	a	a	a	y
Little Blue Heron*	a	a	a	a	y
Tricolored Heron*	a	a	a	a	y
Reddish Egret	o	u	u	o	y
Cattle Egret*	c	c	c	r	y
Green Heron*	c	c	u	u	y
Black-crowned Night-Heron*	c	u	u	c	y
Yellow-crowned Night-Heron*	u	u	r	r	y
Ibises, Spoonbill, Stork					
Glossy Ibis*	u	u	u	c	y
White Ibis*	a	a	c	c	y
Roseate Spoonbill	r	r	r		y
Wood Stork	u	u	u	r	Y
Waterfowl					
Fulvous Whistling-Duck	r		r	r	n
Tundra Swan			r	r	n
Greater White-fronted Goose			r	r	y

Seasons/Occurrences	Sp	S	F	W	NTM
Snow Goose			u	o	y
Canada Goose	r		r	r	n
Wood Duck*	c	c	a	a	y
Green-winged Teal	c		c	c	y
American Black Duck	u		u	u	n
Mallard	u		u	c	y
Northern Pintail	c		c	c	y
Blue-winged Teal	c	u	c	c	y
Cinnamon Teal			r	r	y
Northern Shoveler	c	r	c	c	y
Gadwall	c		c	c	y
Eurasian Wigeon			r	r	n
American Wigeon	c	r	c	c	y
Canvasback	u		u	u	y
Redhead	u	r	a	a	y
Ring-necked Duck	c		c	c	y
Greater Scaup	u	o	c	c	n
Lesser Scaup	c	o	c	c	n
Long-tailed Duck			r	r	n
Black Scoter	r		r	r	n
Surf Scoter	r		r	r	n
Common Goldeneye	u		u	u	n
Bufflehead	u		c	c	n

Seasons/Occurrences	Sp	S	F	W	NTM
Hooded Merganser			c	c	y
Common Merganser	r			r	n
Red-breasted Merganser	c	r	c	c	y
Ruddy Duck	u	r	u	u	y
Vultures, hawks, and allies					
Black Vulture*	u	u	c	c	n
Turkey Vulture*	c	c	c	c	y
Osprey*	c	c	u	o	y
Swallow-tailed Kite*	u	u			y
Mississippi Kite*	u	u			y
Bald Eagle*	u	o	u	c	n
Northern Harrier	c	r	c	c	y
Sharp-shinned Hawk	r		u	u	y
Cooper's Hawk	r		u	o	y
Red-shouldered Hawk*	c	c	c	c	n
Broad-winged Hawk*	u	u	u		y
Red-tailed Hawk*	u	u	c	c	y
Golden Eagle	r			r	n
American Kestrel	u		u	u	y
Merlin	o		o	o	y
Peregrine Falcon	r		o	o	y
Gallinaceous birds (Quail, Turkey, and Allies)					
Wild Turkey*	u	u	u	u	n

Seasons/Occurrences	Sp	S	F	W	NTM
Northern Bobwhite*	u	u	u	u	n
Rails, Gallinules, Coots, and Cranes					
Yellow Rail	r		r	r	n
Black Rail*	o	o	o		y
Clapper Rail*	c	c	c	c	n
King Rail*	u	u	u	u	y
Virginia Rail	u		u	u	y
Sora	c		c	u	y
Purple Gallinule*	u	c	u	r	y
Common Moorhen*	c	a	a	u	y
American Coot	a	o	a	a	y
Limpkin	r	r	r	r	n
Sandhill Crane			r	r	y
Shorebirds					
Black-bellied Plover	c	u	c	c	y
American Golden-Plover	r		r		y
Wilson's Plover*	u	u	u	u	y
Semipalmated Plover*	c	u	c	c	y
Piping Plover	r	r	r		y
Killdeer*	c	r	c	u	y
American Oystercatcher*	u	u	u	u	y
Black-necked Stilt*	o	o	o		y
American Avocet		o	o	o	y

Seasons/Occurrences	Sp	S	F	W	NTM
Greater Yellowlegs	c	u	c	u	y
Lesser Yellowlegs	u	u	u	u	y
Solitary Sandpiper	o	o	o		y
Willet*	c	c	a	a	y
Spotted Sandpiper	u	u	u	o	y
Upland Sandpiper	r	r	r		y
Whimbrel	u	u	u	u	y
Long-billed Curlew	r		r		y
Marbled Godwit	o	r	o	r	y
Ruddy Turnstone	c	u	c	u	y
Red Knot	o	r	o		y
Sanderling	u	u	u	u	y
Semipalmated Sandpiper	c	u	c		y
Least Sandpiper	c	c	c	c	y
White-rumped Sandpiper		o	r		y
Pectoral Sandpiper	o		o		y
Dunlin	a	r	c	a	n
Stilt Sandpiper	o		o		y
Short-billed Dowitcher	c	c	a	a	y
Long-billed Dowitcher	r		r	r	y
Wilson's Snipe	u		c	u	n
American Woodcock	u		u	u	n
Wilson's Phalarope	r	r			y

Seasons/Occurrences	Sp	S	F	W	NTM
Gulls, Terns, and Skimmers					
Laughing Gull*	c	a	c	o	y
Bonaparte's Gull	o		o	o	y
Ring-billed Gull	a	o	a	a	y
Herring Gull	c	o	c	c	y
Great Black-backed Gull	r				n
Gull-billed Tern	r	r	r		y
Caspian Tern	r	r	r	r	y
Royal Tern	o	o	o	o	y
Sandwich Tern	o	o	o		y
Common Tern	u	u	u		y
Foster's Tern	c	c	c	c	y
Black Tern	o	u	o		y
Black Skimmer	o	o	o	o	y
Pigeons and Doves					
Rock Pigeon	r	r	r	r	n
Eurasian Collared-Dove	o	o	o	o	n
White-winged Dove			o		y
Mourning Dove*	u	u	c	u	y
Common Ground-Dove*	u	u	u	u	n
Cuckoos					
Black-billed Cuckoo	r	r	r		y
Yellow-billed Cuckoo*	c	c	c		y

Seasons/Occurrences	Sp	S	F	W	NTM
Grove-billed Ani			r	r	n
Owls					
Barn Owl*	r	r	r	r	n
Eastern Screech-Owl*	u	u	u	u	n
Great Horned Owl*	u	u	u	u	n
Barred Owl*	u	u	u	u	n
Nightjars					
Common Nighthawk*	c	c	c		y
Chuck-will's-widow*	c	c	u		y
Whip-poor-will	o		o	r	y
Swifts and Hummingbirds					
Chimney Swift*	u	u	u		y
Ruby-throated Hummingbird*	u	o	u		y
Kingfishers					
Belted Kingfisher*	c	c	c	c	y
Woodpeckers					
Red-headed Woodpecker*	o	o	o	o	n
Red-bellied Woodpecker*	c	c	c	c	n
Yellow-bellied Sapsucker	u		u	u	y
Downy Woodpecker*	u	u	u	u	n
Hairy Woodpecker*	o	o	o	o	n
Red-cockaded Woodpecker*	u	u	u	u	n
Northern Flicker*	c	u	c	c	n

Seasons/Occurrences	Sp	S	F	W	NTM
Pileated Woodpecker*	u	u	u	u	n
Flycatchers					
Eastern Wood-Pewee*	u	u	u		y
Acadian Flycatcher*	c	c	u		y
Eastern Phoebe	u		c	c	y
Vermilion Flycatcher	r		o	o	y
Great Crested Flycatcher*	c	c	o		y
Western Kingbird	r		o		y
Eastern Kingbird*	c	c	c		y
Gray Kingbird*	c	c	u		y
Scissor-tailed Flycatcher	r		r		y
Martins and Swallows					
Purple Martin*	c	c	u	u	y
Tree Swallow	a	u	a	a	y
Northern Rough-winged Swallow	c	u	u	r	y
Bank Swallow	o	o	o		y
Cliff Swallow			r		y
Barn Swallow	c	c	c	r	y
Jays and Crows					
Blue Jay*	c	c	c	c	n
American Crow*	c	c	c	c	n
Fish Crow*	c	c	c	u	n

Seasons/Occurrences	Sp	S	F	W	NTM
Chickadees and Titmice					
Carolina Chickadee*	c	c	c	c	n
Tufted Titmouse*	c	c	c	c	n
Nuthatches					
Red-breasted Nuthatch				r	n
Brown-headed Nuthatch*	u	u	u	u	n
Creepers					
Brown Creeper	r		r	r	n
Wrens					
Carolina Wren*	c	c	c	c	n
House Wren	u		c	u	y
Winter Wren	u		u	u	n
Sedge Wren	u		c	c	y
Marsh Wren*	c	c	c	c	y
Kinglets and Gnatcatchers					
Golden-crowned Kinglet	u		u	u	n
Ruby-crowned Kinglet	c		c	c	y
Blue-gray Gnatcatcher*	c	c	c	u	y
Bluebirds, Thrushes, and Robins					
Eastern Bluebird*	u	r	u	u	y
Veery	o		u		y
Gray-cheeked Thrush	o		u		y
Swainson's Thrush	o		u		y

Seasons/Occurrences	Sp	S	F	W	NTM
Hermit Thrush	o		u	u	y
Wood Thrush	o		u		y
American Robin	a		c	a	y
Thrashers					
Gray Catbird	c		a	c	y
Northern Mockingbird*	c	c	c	c	n
Brown Thrasher*	c	c	a	c	n
Pipits					
American Pipit	u		u	u	y
Waxwings					
Cedar Waxwing	u		u	u	y
Starling					
Starling*	u	u	u	c	n
Shrike					
Loggerhead Shrike*	u	u	u	u	y
Vireos					
White-eyed Vireo*	c	c	c	u	y
Blue-headed Vireo	u		u	u	y
Yellow-throated Vireo*	u	u	u		y
Red-eyed Vireo*	c	u	c		y

Seasons/Occurrences	Sp	S	F	W	NTM
Warblers					
Blue-winged Warbler	r	r	r		y
Golden-winged Warbler		r	r		y
Tennessee Warbler	r		u		y
Orange-crowned Warbler	u		u	u	y
Northern Parula*	c	c	u		y
Yellow Warbler	o	c	c		y
Chestnut-sided Warbler	r		o		y
Magnolia Warbler	r		u		y
Cape May Warbler	u				y
Black-throated Blue Warbler	r		r		y
Blackburnian Warbler	r		r		y
Yellow-throated Warbler*	c	c	u	o	y
Pine Warbler*	c	c	c	c	n
Prairie Warbler	c	c	c	r	y
Palm Warbler	c		c	r	y
Blackpoll Warbler	u				y
Cerulean Warbler		r	r		y
Black-and-white Warbler	u	u	u	u	y
American Redstart	o	r	o		y
Prothonotary Warbler*	c	c	u		y
Worm-eating Warbler	r	r	r		y
Swainson's Warbler*	r	r	r		y

Seasons/Occurrences	Sp	S	F	W	NTM
Ovenbird	r		r		y
Northern Waterthrush	r	r	r		y
Louisiana Waterthrush	r	r	r		y
Kentucky Warbler*	u	u	r		y
Common Yellowthroat*	c	c	c	c	y
Hooded Warbler*	u	u	u		y
Wilson's Warbler			r	r	y
Yellow-breasted Chat*	c	c	r	r	y
Tanagers					
Summer Tanager*	c	c	c		y
Scarlet Tanager	r		o		y
New World Finches					
Northern Cardinal*	c	c	c	c	n
Rose-breasted Grosbeak	r		o		y
Blue Grosbeak*	u	u	u		y
Indigo Bunting*	c	u	c		y
Painted Bunting	r		r		y
Dickcissel	r		r		y
Sparrows					
Eastern Towhee*	a	a	a	a	n
Bachman's Sparrow*	u	u	u	u	n
Chipping Sparrow	u		u	u	y
Field Sparrow	u		u	u	n

Seasons/Occurrences	Sp	S	F	W	NTM
Vesper Sparrow	u		u	u	y
Savannah Sparrow	u		u	u	y
Henslow's Sparrow				r	n
Saltmarsh Sharp-tailed Sparrow	u		u	u	n
Nelson's Sharp-tailed Sparrow	u		u	u	n
Song Sparrow	c		c	c	n
Swamp Sparrow	c		c	c	y
White-throated Sparrow	c		c	c	y
White-crowned Sparrow			r		y
Dark-eyed Junco	r		o	o	n
Grasshopper Sparrow	r		r		y
Seaside Sparrow	u		u	u	n
Lark Sparrow			r		y
Blackbirds, Grackles, Cowbirds, and Orioles					
Bobolink	c		u		y
Red-winged Blackbird*	a	a	a	a	y
Eastern Meadowlark*	c	u	c	c	y
Rusty Blackbird	u		u	u	n
Boat-tailed Grackle*	a	a	a	a	n
Common Grackle*	c	c	c	c	n
Shiny Cowbird	r	r			n
Brown-headed Cowbird	c	u	u	u	y
Orchard Oriole*	c	u	o		y

Seasons/Occurrences	Sp	S	F	W	NTM
Baltimore Oriole	r		u		y
Old World Finches					
Purple Finch	r		r	u	n
American Goldfinch	c		c	c	y
Weaver Finch					
House Sparrow	r	r	r	r	n

The following species are of such accidental or rare occurrence on the refuge that they have been recorded only once or a few times, and are generally considered out of their normal range.

Brown Booby	Eared Grebe
Cory's Shearwater	Horned Lark
White-breasted Nuthatch	Brant
Mottled Duck	Bell's Vireo
Warbling Vireo	Connecticut Warbler
Clay-colored Sparrow	Hudsonian Godwit
Buff-breasted Sandpiper	LeConte's Sparrow
Fox Sparrow	Bridled Tern
Sooty Tern	Yellow-headed Blackbird
Pine Siskin	Budgerigar
Short-eared Owl	White-faced Ibis
Cave Swallow	Baird's Sandpiper
American Flamingo	Lapland Longspur
Sprague's Pipit	Inca Dove
White-winged Scoter	Evening Grosbeak
Short-tailed Hawk	Bronzed Cowbird
Lark Bunting	Tropical Kingbird

REPTILE, AMPHIBIAN, AND MAMMAL LIST, ST. MARKS NATIONAL WILDLIFE REFUGE

This list contains the 50 species of mammals, 40 species of amphibians, and 68 species of reptiles compiled from observations, consultations with experts in respective fields, and literature research. Some species are more common seasonally and some are nocturnal.

Scientific and Standard English names for all herptiles follow guidelines set forth in <http://www.herplit.com/SSAR/circulars/HC29/Crother.html> and <http://ssarherps.org/pdf/Crotherupdate.pdf>

Common Name	Scientific Name
Amphibians	
Anura – Frogs	
Florida Cricket Frog	<i>Acris gryllus dorsalis</i>
Oak Toad	<i>Bufo quercicus</i>
Southern Toad	<i>Bufo terrestris</i>
Greenhouse Frog	<i>Eleutherodactylus planirostris</i>
Eastern Narrow-mouthed Toad	<i>Gastrophryne carolinensis</i>
Cope's Gray Treefrog	<i>Hyla chrysoscelis</i>
Green Treefrog	<i>Hyla cinerea</i>
Pine Woods Treefrog	<i>Hyla femoralis</i>
Barking Treefrog	<i>Hyla gratiosa</i>
Squirrel Treefrog	<i>Hyla squirella</i>
Southern Spring Peeper	<i>Pseudacris crucifer bartramiana</i>
Striped Southern Chorus Frog	<i>Pseudacris nigrita nigrita</i>
Little Grass Frog	<i>Pseudacris ocularis</i>
Ornate Chorus Frog	<i>Pseudacris ornate</i>
Gopher Frog	<i>Rana capito</i>
American Bullfrog	<i>Rana catesbeiana</i>

Common Name	Scientific Name
Bronze Frog	<i>Rana clamitans clamitans</i>
Pig frog	<i>Rana grylio</i>
River Frog	<i>Rana heckscheri</i>
Southern Leopard Frog	<i>Rana sphenoccephala</i>
Eastern Spadefoot	<i>Scaphiopus holbrookii</i>
Caudata – Salamanders	
Flatwoods Salamander	<i>Ambystoma cingulatum</i>
Marbled Salamander	<i>Ambystoma opacum</i>
Mole Salamander	<i>Ambystoma talpoideum</i>
Tiger Salamander	<i>Ambystoma tigrinum</i>
Two-toed Amphiuma	<i>Amphiuma means</i>
One-toed Amphiuma	<i>Amphiuma pholeter</i>
Southern Dusky Salamander	<i>Desmognathus auriculatus</i>
Southern Two-lined Salamander	<i>Eurycea cirrigera</i>
Three-lined Salamander	<i>Eurycea guttolineata</i>
Dwarf Salamander	<i>Eurycea quadridigitata</i>
Blackwarrior Waterdog	<i>Necturus alabamensis</i>
Striped Newt	<i>Notophthalmus perstriatus</i>
Central Newt	<i>Notophthalmus viridescens louisianensis</i>
Southeastern Slimy Salamander	<i>Plethodon grobmani</i>
Slender Dwarf Siren	<i>Pseudobranchius striatus spheniscus</i>
Rusty Mud Salamander	<i>Pseudotriton montanus floridanus</i>
Southern Red Salamander	<i>Pseudotriton ruber vioscai</i>

Common Name	Scientific Name
Eastern Lesser Siren	<i>Siren intermedia intermedia</i>
Greater Siren	<i>Siren lacertian</i>
Reptiles	
Squamata – Lizards	
Northern Green Anole	<i>Anolis carolinensis</i>
Eastern Six-lined Racerunner	<i>Cnemidophorus sexlineatus sexlineatus</i>
Southern Coal Skink	<i>Eumeces anthracinus pluvialis</i>
Northern Mole Skink	<i>Eumeces egregius similes</i>
Common Five-lined Skink	<i>Eumeces fasciatus</i>
Southeastern Five-lined Skink	<i>Eumeces inexpectatus</i>
Broad-headed Skink	<i>Eumeces laticeps</i>
Eastern Slender Glass Lizard	<i>Ophisaurus attenuatus longicaudus</i>
Island Glass Lizard	<i>Ophisaurus compressus</i>
Mimic Glass Lizard	<i>Ophisaurus mimicus</i>
Eastern Glass Lizard	<i>Ophisaurus ventralis</i>
Eastern Fence Lizard	<i>Sceloporus undulates</i>
Little Brown Skink	<i>Scincella lateralis</i>
Squamata – Snakes	
Florida Cottonmouth	<i>Agkistrodon piscivorus conanti</i>
Northern Scarletsnake	<i>Cemophora coccinea copei</i>
Southern Black Racer	<i>Coluber constrictor priapus</i>
Eastern Diamond-backed Rattlesnake	<i>Crotalus admanteus</i>
Southern Ring-necked Snake	<i>Diadophis punctatus punctatus</i>

Common Name	Scientific Name
Eastern Indigo Snake	<i>Drymarchon corais couperi</i>
Cornsnake	<i>Elaphe guttata</i>
Gray Ratsnake	<i>Elaphe obsoleta spiloides</i>
Eastern Mudsnake	<i>Farancia abacura abacura</i>
Common Rainbow Snake	<i>Farancia erytrogramma erytrogramma</i>
Eastern Hog-nosed Snake	<i>Heterodon platirhinos</i>
Southern Hog-nosed Snake	<i>Heterodon simus</i>
Eastern Kingsnake	<i>Lampropeltis getula getula</i>
Scarlet Kingsnake	<i>Lampropeltis triangulum elapsoides</i>
Eastern Coachwhip	<i>Masticophis flagellum flagellum</i>
Coralsnake	<i>Micrurus fulvius</i>
Gulf Saltmarsh Snake	<i>Nerodia clarkii clarkia</i>
Red-Bellied Watersnake	<i>Nerodia erythogaster erythogaster</i>
Banded Watersnake	<i>Nerodia fasciata fasciata</i>
Florida Green Watersnake	<i>Nerodia floridana</i>
Brown Watersnake	<i>Nerodia taxispilota</i>
Northern Rough Greensnake	<i>Opheodrys aestivus aestivus</i>
Florida Pinesnake	<i>Pituophis melanoleucus mugitus</i>
Striped Crayfish Snake	<i>Regina alleni</i>
Glossy Crayfish Snake	<i>Regina rigida rigida</i>
Pine Woods Littersnake	<i>Rhadinaea flavilata</i>
Northern Florida Swampsnake	<i>Seminatrix pygaea pygaea</i>
Dusky Pygmy Rattlesnake	<i>Sistrurus miliarius barbouri</i>

Common Name	Scientific Name
Midland Brownsnake	<i>Storeria dekayi wrightorum</i>
Florida Red-bellied Snake	<i>Storeria occipitomaculata obscura</i>
Blue-striped Ribbonsnake	<i>Thamnophis sauritus nitae</i>
Peninsula Ribbonsnake	<i>Thamnophis sauritus sackenii</i>
Blue-striped Gartersnake	<i>Thamnophis sirtalis similes</i>
Eastern Gartersnake	<i>Thamnophis sirtalis sirtalis</i>
Rough Earthsnake	<i>Virginia striatula</i>
Eastern Smooth Earthsnake	<i>Virginia valeriae valeriae</i>
Crocodylia – Crocodylians	
American alligator	<i>Alligator mississippiensis</i>
Testudines – Turtles	
Florida Softshell	<i>Apalone ferox</i>
Loggerhead Seaturtle	<i>Caretta caretta</i>
Green Seaturtle	<i>Chelonia mydas</i>
Florida Snapping Turtle	<i>Chelydra serpentina Osceola</i>
Spotted Turtle	<i>Clemmys gutatta</i>
Eastern Chicken Turtle	<i>Deirochelys reticularia reticularia</i>
Leatherback Seaturtle	<i>Dermochelys coriacea</i>
Gopher Tortoise	<i>Gopherus polyphemus</i>
Striped Mud Turtle	<i>Kinosternon baurii</i>
Kemp's Ridley Seaturtle	<i>Lepidochelys kempii</i>
Alligator Snapping Turtle	<i>Macrochelys temminckii</i>
Ornate Diamond-backed Terrapin	<i>Malaclemys terrapin macrospilota</i>

Common Name	Scientific Name
Florida Red-bellied Cooter	<i>Pseudemys nelsoni</i>
Suwannee Cooter	<i>Pseudemys suwanniensis</i>
Loggerhead Musk Turtle	<i>Sternotherus minor minor</i>
Stinkpot	<i>Sternotherus odoratus</i>
Gulf Coast Box Turtle	<i>Terrapene Carolina major</i>
Yellow-bellied Slider	<i>Trachemys scripta scripta</i>
Mammals	
Small-sized Mammals	
Southeastern Shrew	<i>Sorex longirostris</i>
Southern Short-tailed Shrew	<i>Blarina carolinensis</i>
Least Shrew	<i>Cryptotis parva</i>
Eastern Mole	<i>Scalopus aquaticus</i>
Southeastern Bat	<i>Myotis austroriparius</i>
Eastern Pipistrelle	<i>Pipistrellus subflavus</i>
Big Brown Bat	<i>Eptesicus fuscus</i>
Red Bat	<i>Lasiurus borealis</i>
Seminole Bat	<i>Lasiurus seminolus</i>
Hoary Bat	<i>Lasiurus cinereus</i>
Yellow Bat	<i>Lasiurus intermedius</i>
Evening Bat	<i>Nycticeius humeralis</i>
Rafinesque's Big-Eared Bat	<i>Plecotus rafinesqueii</i>
Brazilian Free-tailed Bat	<i>Tadarida brasiliensis</i>
Marsh Rice Rat	<i>Oryzomys palustris</i>
Cotton Mouse	<i>Peromyscus gossypinus</i>

Common Name	Scientific Name
Golden Mouse	<i>Ochrotomys nuttalli</i>
Hispid Cotton Rat	<i>Sigmodon hispidus</i>
Eastern Woodrat	<i>Neotoma floridana</i>
Pine Vole	<i>Microtus pinetorum</i>
Black Rat	<i>Rattus rattus</i>
Norway Rat	<i>Rattus norvegicus</i>
House Mouse	<i>Mus musculus</i>
Mammals	
Medium-sized Mammals	
Virginia opossum	<i>Didelphis virginiana</i>
Nine-banded armadillo	<i>Dasypus novemcinctus</i>
Marsh rabbit	<i>Sylvilagus palustris</i>
Eastern cottontail	<i>Sylvilagus floridanus</i>
Eastern gray squirrel	<i>Sciurus carolinensis</i>
Fox squirrel	<i>Sciurus niger</i>
Southern flying squirrel	<i>Glaucomys volans</i>
Beaver	<i>Castor Canadensis</i>
Round-tailed muskrat	<i>Neofiber alleni</i>
Red fox	<i>Vulpes vulpes</i>
Gray fox	<i>Urocyon cinereoargenteus</i>
Raccoon	<i>Procyon lotor</i>
Striped skunk	<i>Mephitis mephitis</i>
River otter	<i>Lutra Canadensis</i>

Common Name	Scientific Name
Mammals Large-sized Mammals	
Coyote	<i>Canis latrans</i>
Florida black bear	<i>Ursus americanus floridanus</i>
Bobcat	<i>lynx rufus</i>
Jaguarundi cat	<i>Felis yagouarundi</i>
Feral hog	<i>Sus scrofa</i>
White-tailed deer	<i>Odocoileus virginianus</i>
Florida Manatee	<i>Trichechus manatus latirostrus</i>
Bottlenose dolphin	<i>Tursiops truncates</i>

FISH LIST, ST. MARKS NATIONAL WILDLIFE REFUGE

(From Beecher 1978)

Key to Habitat:

f = fresh

s = brackish

m = marine

Common Name	Scientific Name	Habitat
Scrawled cowfish	<i>Acanthostracion quadricornis</i>	m
Lined sole	<i>Achirus lineatus</i>	m
Gulf sturgeon	<i>Acipenser oxyrinchus desotoi</i>	f, m
Diamond killifish	<i>Adinia xenica</i>	s
Alabama shad	<i>Alosa alabamae</i>	f, m
Orange filefish	<i>Aluterus schoepfii</i>	m
Bowfin	<i>Amia calva</i>	f
Fringed pipefish	<i>Anarchopteris criniger</i>	m
Broad-striped anchovy	<i>Anchoa hepsetus</i>	s, m
Bay anchovy	<i>Anchoa mitchilli</i>	f, m
Three-eye flounder	<i>Ancylopsetta dilecta</i>	m
Pirate perch	<i>Aphredoderus sayanus</i>	f
Sheepshead seabream	<i>Archosargus probatocephalus</i>	f, s, m
Hardhead sea catfish	<i>Arius felis</i>	m
Southern stargazer	<i>Astroscopus y-graecum</i>	m
Gafftopsail sea catfish	<i>Bagre marinus</i>	m
Silver croaker	<i>Bairdiella chrysura</i>	s, m
Frillfin goby	<i>Bathygobius soporator</i>	f, m
Gulf menhaden	<i>Brevoortia patronus</i>	m

Common Name	Scientific Name	Habitat
Crevalle jack	<i>Caranx hippos</i>	s, m
Bull shark	<i>Carcharinus leucas</i>	s, m
Blacktip shark	<i>Carcharinus limbatus</i>	m
Flier	<i>Centrarchus macropterus</i>	f
Black sea bass	<i>Centropristis striata</i>	m
Atlantic spadefish	<i>Chaetodipterus faber</i>	m
Florida blenny	<i>Chasmodes saburrae</i>	m
Striped burrfish	<i>Chilomycterus schoepfi</i>	m
Atlantic bumper	<i>Chloroscombrus chrysurus</i>	m
Bay whiff	<i>Citharichthys spilopterus</i>	s, m
Sand weakfish	<i>Cynoscion arenarius</i>	m
Spotted seatrout	<i>Cynoscion nebulosus</i>	s, m
Sheepshead minnow	<i>Cyprinodon variegates</i>	s, m
Atlantic stingray	<i>Dasyatis Sabina</i>	s, m
Bluntnose stingray	<i>Dasyatis say</i>	s, m
Sand perch	<i>Diplectrum formosum</i>	m
Spottail pinfish	<i>Diplodus holbrooki</i>	m
Threadfin shad	<i>Dorosoma petenense</i>	f
Everglades pygmy sunfish	<i>Elassoma evergladei</i>	f
Okefenokee pygmy sunfish	<i>Elassoma okefenokee</i>	f
Banded pygmy sunfish	<i>Elassoma zonatum</i>	f
Ladyfish	<i>Elops saurus</i>	f, m
Bluespotted sunfish	<i>Enneacanthus gloriosus</i>	f

Common Name	Scientific Name	Habitat
Lake Chubsucker	<i>Erimyzon sucetta</i>	f
Redfin pickerel	<i>Esox americanus</i>	f
Chain pickerel	<i>Esox niger</i>	f
Swamp darter	<i>Etheostoma fusiforme</i>	f
Silver mojarra	<i>Eucinostomus argenteus</i>	f, s, m
Jenny mojarra	<i>Eucinostomus gula</i>	s, m
Goldspotted killifish	<i>Floridichthys carpio</i>	m
Golden topminnow	<i>Fundulus chrysotus</i>	f
Banded topminnow	<i>Fundulus cingulatus</i>	f
Marsh killifish	<i>Fundulus confluentus</i>	f, s
Gulf killifish	<i>Fundulus grandis</i>	s, m
Southern starhead topminnow	<i>Fundulus notti</i>	f
Seminole killifish	<i>Fundulus seminolis</i>	f
Mosquitofish	<i>Gambusia affinis</i>	f, s
Nurse shark	<i>Ginglymostoma cirratum</i>	m
Violet goby	<i>Gobioides broussonnetii</i>	m
Darter goby	<i>Gobionellus boleosoma</i>	s, m
Naked goby	<i>Gobiosoma bosci</i>	f, m
Code goby	<i>Gobiosoma robustum</i>	m
White grunt	<i>Haemulon plumierii</i>	m
Scaled herring	<i>Harengula jaguana</i>	s, m
Ballyhoo	<i>Hemiramphus brasiliensis</i>	m
Least killifish	<i>Heterandria formosa</i>	f

Common Name	Scientific Name	Habitat
Lined seahorse	<i>Hippocampus erectus</i>	m
Dwarf seahorse	<i>Hippocampus zosterae</i>	m
Redeye chub	<i>Hybopsis harperi</i>	f
Crested blenny	<i>Hypleurochilus geminatus</i>	m
Common halfbeak	<i>Hyporhamphus unifasciatus</i>	m
Feather blenny	<i>Hypsoblennius hentzi</i>	m
White catfish	<i>Ictalurus catus</i>	f
Yellow bullhead	<i>Ictalurus natalis</i>	f
Channel catfish	<i>Ictalurus punctatus</i>	f
Flagfish	<i>Jordanella floridae</i>	f, s
Brook silverside	<i>Labidesthes sicculus</i>	f
Pinfish	<i>Lagodon rhomboids</i>	f, s, m
Longnose gar	<i>Lepisosteus osseus</i>	f
Florida gar	<i>Lepisosteus platyrhincus</i>	f
Redbreast sunfish	<i>Lepomis auritus</i>	f
Warmouth	<i>Lepomis gulosus</i>	f
Bluegill	<i>Lepomis macrochirus</i>	f
Dollar sunfish	<i>Lepomis marginatus</i>	f
Redear sunfish	<i>Lepomis microlophus</i>	f, s
Spotted sunfish	<i>Lepomis punctatus</i>	f
Pygmy killfish	<i>Leptolucania ommata</i>	f
Spot	<i>Loiostomus xanthurus</i>	s, m
Bluefin killifish	<i>Lucania goodie</i>	f

Common Name	Scientific Name	Habitat
Rainwater killifish	<i>Lucania parva</i>	f, s, m
Gray snapper	<i>Lutjanus griseus</i>	f, m
Tarpon	<i>Megalops atlantica</i>	f, m
Rough silverside	<i>Membras martinica</i>	m
Tidewater silverside	<i>Menidia beryllina</i>	f, s, m
Southern kingcroaker	<i>Menticirrhus americanus</i>	m
Clown goby	<i>Microgobius gulosus</i>	f, s, m
Atlantic croaker	<i>Micropogonias undulatus</i>	m
Suwanee bass	<i>Micropterus notinus</i>	f
Largemouth bass	<i>Micropterus salmoides</i>	f, s
Spotted sucker	<i>Minytrema melanops</i>	F
Fringed filefish	<i>Monacanthus ciliatus</i>	m
Planehead filefish	<i>Monacanthus hispidus</i>	m
Striped bass	<i>Morone saxatilis</i>	f
Striped mullet	<i>Mugil cephalus</i>	f, s, m
White mullet	<i>Mugil curema</i>	s, m
Speckled worm eel	<i>Myrophis punctatus</i>	s, m
Golden shiner	<i>Notemigonus crysoleucas</i>	f
Coastal shiner	<i>Notropis petersoni</i>	f
Batfish (rare)	<i>Ogcocephalus cubifrons</i>	m
Polka-dot batfish	<i>Ogcocephalus radiatus</i>	m
Leatherjack	<i>Oligoplites saurus</i>	s, m
Crested cusk-eel	<i>Ophidion welshi</i>	m

Common Name	Scientific Name	Habitat
Gulf toadfish	<i>Osanus beta</i>	m
Pigfish	<i>Orthopristis chrysoptera</i>	s, m
Banded blenny	<i>Paraclinus fasciatus</i>	m
Gulf flounder	<i>Paralichthys albigutta</i>	m
Southern flounder	<i>Paralichthys lethostigma</i>	f, s, m
Blackbanded darter	<i>Percina nigrofasciata</i>	f
Sailfin molly	<i>Poecilia latipinna</i>	f, s
Atlantic threadfin	<i>Polydactylus octonemus</i>	m
Bluefish	<i>Pomatomus saltatrix</i>	m
Black crappie	<i>Pomoxis nigromaculatus</i>	f
Atlantic midshipman	<i>Porichthys porosissimus</i>	m
Gulf of Mexico searobin	<i>Prionotus martis</i>	m
Leopard searobin	<i>Prionotus scitulus</i>	m
Bighead searobin	<i>Prionotus tribulus</i>	m
Cobia	<i>Rachycentron canadum</i>	s, m
Roundel skate	<i>Raja texana</i>	m
Cownose ray	<i>Rhinoptera bonasus</i>	s, m
Red fish (red drum)	<i>Sciaenops ocellata</i>	s, m
Spanish mackerel	<i>Scomberomorus maculatus</i>	m
Lookdown	<i>Selene vomer</i>	m
Banded rudderfish	<i>Seriola zonata</i>	m
Belted sandfish	<i>Serranus subligarius</i>	m
Southern puffer	<i>Sphoeroides nephelus</i>	m

Common Name	Scientific Name	Habitat
Bonnethead shark	<i>Sphyrna tiburo</i>	m
Great barracuda	<i>Sphyraena barracuda</i>	m
Atlantic needlefish	<i>Strongylura marina</i>	f, s, m
Redfin needlefish	<i>Strongylura notata</i>	m
Timicu	<i>Strongylura timucu</i>	m
Blackcheek tonguefish	<i>Symphurus plagiusa</i>	s, m
Dusky pipefish	<i>Syngnathus floridae</i>	m
Chain pipefish	<i>Syngnathus louisianae</i>	m
Inshore lizardfish	<i>Synodus foetens</i>	s, m
Permit	<i>Trachinotus falcatus</i>	m
Hogchoker	<i>Trinectes maculatus</i>	f, s, m
Southern hake	<i>Urophycis floridana</i>	m

BUTTERFLY LIST, ST. MARKS NATIONAL WILDLIFE REFUGE

Common Name	Scientific Name	Period at Refuge	Habitat
Swallowtails			
Black swallowtail	<i>Papilio polyxenes</i>	June-November	Open fields, tidal marshes
Eastern tiger swallowtail	<i>Papilio glaucus</i>	April-November	Edge of deciduous woods
Giant swallowtail	<i>Papilio cresphontes</i>	April-November	Woodlands and fields
Palamedes swallowtail	<i>Papilio palamedes</i>	March-October	Wooded, swampy areas
Pipevine swallowtail	<i>Battus philenor</i>	June-October	Open fields, bushy areas
Spicebush swallowtail	<i>Papilio troilus</i>	April-November	Deciduous woods
Zebra swallowtail	<i>Eurytides marcellus</i>	April-September	Woodlands, along streams
Sulphurs and Whites			
Barred yellow	<i>Eurema daira</i>	June-October	Brushy areas, open pine woods
Cabbage white	<i>Pieris rapae</i>	May-July	Open fields, lightly wooded terrain
Cloudless sulphur	<i>Phoebis sennae</i>	March-November	Open areas
Little yellow	<i>Eurema lisa</i>	April-November	Open fields, brushy areas
Orange sulphur	<i>Colias eurytheme</i>	March-October	Open fields, roadsides
Sleepy orange	<i>Eurema nicippe</i>	April-November	Pine woods, open fields
Southern dogface	<i>Colias cesonia</i>	June-September	Near open woodlands
Hairstreaks and Elfins			
Banded hairstreak	<i>Satyrium calanus</i>	April-June	Open deciduous forest
Henry's elfin	<i>Callophrys henrici</i>	March-May	Coastal plain, open fields
Gray hairstreak	<i>Strymon melinus</i>	April-November	Open deciduous woods
Red-banded hairstreak	<i>Calycopis cecrops</i>	April-November	Bush, overgrown fields
Southern hairstreak	<i>Fixsenia favonius</i>	March-July	Woodland edges
Skippers			
Common checkered skipper	<i>Pyrgus communis</i>	April-November	Disturbed open areas

Common Name	Scientific Name	Period at Refuge	Habitat
Common sootywing	<i>Pholisora catullus</i>	May-September	Disturbed open areas
Eufala skipper	<i>Lerodea eufala</i>	March-October	Wide variety of open areas
Least skipper	<i>Ancyloxypha numitor</i>	May-September	Wet marshes, roadside
Long-tailed skipper	<i>Urbanus proteus</i>	May-November	Bushy or disturbed areas
Silver-spotted skipper	<i>Epargyreus clarus</i>	March-October	Open areas
Milkweed			
Monarch	<i>Danaus plexippus</i>	April October-November	Open fields, clusters in trees
Queen	<i>Danaus gilippus</i>	April-September	Open areas, bushy fields, roadsides
Other Butterflies			
American lady	<i>Vanessa virginiensis</i>	March-May September-October	Open spaces
Carolina satyr	<i>Hermeuptychia sosybius</i>	March-November	Open fields, wooded areas
Common buckeye	<i>Junonia coenia</i>	May-November	Open fields, pine woods
Common wood nymph	<i>Cercyonis pegala</i>	May-September	Moist, grassy areas
Gemmed satyr	<i>Cyllopsis gemma</i>	May-November	Moist, grassy areas
Georgia satyr	<i>Neonympha areolata</i>	March-April September-October	Open pine barrens
Gulf fritillary	<i>Agraulis vanillae</i>	May-November	Open scrub, coastal areas
Little metalmark	<i>Calephelis virginiensis</i>	April-October	Sandy pine woods
Little wood satyr	<i>Megisto cymela</i>	April-September	Edges of woodlands
Painted lady	<i>Vanessa cardui</i>	March-May September-November	Open habitat
Pearl crescent	<i>Phyciodes tharos</i>	May-November	Swampy areas, open fields
Phaon crescent	<i>Phyciodes phaon</i>	March-November	Along trails, swampy areas
Question mark	<i>Polygonia interrogationis</i>	May-October	Woods, nearby open areas
Red admiral	<i>Vanessa atalanta</i>	September-November	Open areas or near woodlands
Red-spotted purple	<i>Limenitis arthemis</i>	April-October	Forests, edges, clearings
Southern pearly eye	<i>Enodia portlandia</i>	May-October	Wooded areas, bottomlands

Common Name	Scientific Name	Period at Refuge	Habitat
Twany emperor	<i>Asterocamp clyton</i>	March-November	Wooded areas, riversides
Variiegated fritillary	<i>Euptoirta claudia</i>	May-December	Open fields, coastal scrub
Viceroy	<i>Limenitis archippus</i>	May-November	Brushy fields, marshes, lakeshores
White peacock	<i>Anartia jatrophae</i>	August-October	Edge of roads, weedy fields
Zebra longwing	<i>Heliconius charithonius</i>	May-October	Edges of woods and hammocks

PINELAND PLANT SPECIES, ST. MARKS NATIONAL WILDLIFE REFUGE

This list, compiled from inventory work conducted by Reinman (1985), Carr and Platt (unpublished data), and Glitzenstein and Streng (unpublished data), represents the most comprehensive compilation available of vascular plant species from a sampling of all refuge habitats dominated by one or more pine species; in particular, habitats well represented by these various vegetation plots include longleaf pine sandhills, longleaf pine mesic flatwoods, longleaf pine wet flatwoods, slash pine mesic flatwoods, and coastal slash pine wet flatwoods. This list is not a comprehensive refuge plant list, and does not necessarily include all plant species that might be encountered even in refuge pine-dominated habitats.

Common Name	Scientific Name	State Status: LE - Endangered LT – Threatened
Slender threeseed mercury	<i>Acalypha gracilens</i>	
Red maple	<i>Acer rubrum</i>	
Indian jointvetch	<i>Aeschynomene viscidula</i>	
Scaleleaf false foxglove	<i>Agalinis aphylla</i>	
Pineland false foxglove	<i>Agalinis divaricata</i>	
Tenlobe false foxglove	<i>Agalinis obtusifolia</i>	
Purple false foxglove	<i>Agalinis purpurea</i>	
Threadleaf false foxglove	<i>Agalinis setacea</i>	
Lesser snakeroot	<i>Ageratina aromatica</i>	
Golden colicroot	<i>Aletris aurea</i>	
Yellow colicroot	<i>Aletris lutea</i>	
Southern colicroot	<i>Aletris obovata</i>	
Cuman ragweed	<i>Ambrosia psilostachya</i>	
Fly poison	<i>Amianthium muscitoxicum</i>	
False indigo	<i>Amorpha fruticosa</i>	
Peppervine	<i>Ampelopsis arborea</i>	
Stiff bluestar	<i>Amsonia rigida</i>	

Common Name	Scientific Name	State Status: LE - Endangered LT – Threatened
Eastern bluestar	<i>Amsonia tabernaemontana</i>	
Pinewoods bluestem	<i>Andropogon arctatus</i>	LT
Purpose bluestem	<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>	
Bushy bluestem	<i>Andropogon glomeratus</i> var. <i>glomeratus</i>	
Bushy bluestem	<i>Andropogon glomeratus</i> var. <i>pumilus</i>	
Elliott's bluestem	<i>Andropogon gyrans</i> var. <i>gyrans</i>	
Elliott's bluestem	<i>Andropogon gyrans</i> var. <i>stenophyllus</i>	
Hairy bluestem	<i>Andropogon longiberbis</i>	
Bluestem, no common	<i>Andropogon leibmanii</i> var. <i>pungensis</i>	
Splitbeard bluestem	<i>Andropogon ternarius</i>	
Tracy's bluestem	<i>Andropogon tracyi</i>	
Broomsedge bluestem	<i>Andropogon virginicus</i>	
Broomsedge bluestem	<i>Andropogon virginicus</i> var. <i>decepiens</i>	
Chalky bluestem	<i>Andropogon virginicus</i> var. <i>glaucus</i>	
Broomsedge bluestem	<i>Andropogon virginicus</i> var. <i>virginicus</i>	
Coastalplain angelica	<i>Angelica dentata</i>	
Purple silkyscale	<i>Anthraenantia rufa</i>	
Green silkyscale	<i>Anthraenantia villosa</i>	
Devil's walkingstick	<i>Aralia spinsosa</i>	

Common Name	Scientific Name	State Status: LE - Endangered LT – Threatened
Wiregrass	<i>Aristida beyrichiana</i>	
Big threeawn	<i>Aristida condensata</i>	
Slimspike threeawn	<i>Aristida longispica var. longispica</i>	
Longleaf threeawn	<i>Aristida palustris</i>	
Tall threeawn	<i>Aristida patula</i>	
Arrowfeather threeawn	<i>Aristida purpurascans</i>	
Hillsboro threeawn	<i>Aristida purpurascens var. tenuispica</i>	
Arrowfeather threeawn	<i>Aristida purpurascens var. virgata</i>	
Southern threeawn	<i>Aristida simpliciflora</i>	LE
Bottlebrush threeawn	<i>Aristida spiciformis</i>	
Seaside threeawn	<i>Aristida tuberculosa</i>	
Virginia snakeroot	<i>Aristolochia serpentaria</i>	
Switchcane	<i>Arundinaria gigantea</i>	
Clasping milkweed	<i>Asclepias amplexicaulis</i>	
Carolina milkweed	<i>Asclepias cinerea</i>	
Largeflower milkweed	<i>Asclepias connivens</i>	
Pinewoods milkweed	<i>Asclepias humistrata</i>	
Fewflower milkweed	<i>Asclepias lanceolata</i>	
Michaux's milkweed	<i>Asclepias michauxii</i>	
Butterfly weed	<i>Asclepias tuberosa</i>	
Whorled milkweed	<i>Asclepias verticillata</i>	
Narrowleaf pawpaw	<i>Asimina angustifolia</i>	

Common Name	Scientific Name	State Status: LE - Endangered LT – Threatened
Slimleaf pawpaw	<i>Asimina longifolia</i>	
Rice button aster	<i>Aster dumosus</i>	
Thistleleaf aster	<i>Aster eryngiifolius</i>	
Flaxleaf aster	<i>Aster linariifolius</i>	
Pinebarren aster	<i>Aster reticulatus</i>	
Dixie aster	<i>Aster tortifolius</i>	
Florida milkvetch	<i>Astragalus obcordatus</i>	
Fernleaf yellow false foxglove	<i>Aureolaria pedicularia</i> var. <i>pectinata</i>	
Common carpetgrass	<i>Axonopus fissifolius</i>	
Big carpetgrass	<i>Axonopus furcatus</i>	
Saltwater false willow	<i>Baccharis angustifolia</i>	
Eastern baccharis	<i>Baccharis halimifolia</i>	
Blue waterhyssop	<i>Bacopa caroliniana</i>	
Oneflower honeycombhead	<i>Balduina uniflora</i>	
Largeleaf wild indigo	<i>Baptisia alba macrophylla</i>	
Gopherweed	<i>Baptisia lanceolata</i>	
Pineland wild indigo	<i>Baptisia lecontii</i>	
Scareweed	<i>Baptisia simplicifolia</i>	LT
White screwstem	<i>Bartonia verna</i>	
Alabama supplejack	<i>Berchemia scandens</i>	
Soft greeneyes	<i>Berlandiera pumila</i>	
Spanish needles	<i>Bidens bipinnata</i>	

Common Name	Scientific Name	State Status: LE - Endangered LT – Threatened
Smallfruit beggarticks	<i>Bidens mitis</i>	
Pineland rayless goldenrod	<i>Bigelowia nudata</i>	
Crossvine	<i>Bignonia capreolata</i>	
Lady's nightcap	<i>Bonamia</i>	
American blueheart	<i>Buchnera americana</i>	
Capillary hairsedge	<i>Bulbostylis ciliatifolia</i>	
Sandy field hairsedge	<i>Bulbostylis stenophylla</i>	
Scarlet calamint	<i>Calamintha coccinea</i>	
American beautyberry	<i>Callicarpa americana</i>	
Piedmont roseling	<i>Callisia rosea</i>	
Bearded grasspink	<i>Calopogon barbatus</i>	
Pale grasspink	<i>Calopogon pallidus</i>	
Hedge false bindweed	<i>Calystegia sepium</i>	
Trumpet creeper	<i>Campsis radicans</i>	
Sandywoods sedge	<i>Carex dasycarpa</i>	
Clustered sedge	<i>Carex glaucescens</i>	
Vanillaleaf	<i>Carphephorus odoratissimus</i>	
Hairy chaffhead	<i>Carphephorus paniculatus</i>	
Bristleleaf chaffhead	<i>Carphephorus pseudoliatris</i>	
American hornbeam	<i>Carpinus caroliniana</i>	
Mockernut hickory	<i>Carya alba</i>	
Pignut hickory	<i>Carya glabra</i>	
Chinquapin	<i>Castanea pumila</i>	

Common Name	Scientific Name	State Status: LE - Endangered LT – Threatened
New Jersey tea; redroot	<i>Ceanothus americanus</i>	
Sugarberry	<i>Celtis laevigata</i>	
Coastal sandbur	<i>Cenchrus incertus</i>	
Spadeleaf	<i>Centella asiatica</i>	
Spurred butterfly pea	<i>Centrosema virginianum</i>	
Common buttonbush	<i>Cephalanthus occidentalis</i>	
Partridge pea	<i>Chamaecrista fasciculata</i>	
Sensitive pea	<i>Chamaecrista nictitans</i>	
Wooly sunbonnets	<i>Chaptalia tomentosa</i>	
Slender woodoats	<i>Chasmantium laxum</i>	
Fringetree	<i>Chionanthus virginicus</i>	
Cottony goldenaster	<i>Chrysopsis gossypina hyssopifolia</i>	
Maryland goldenaster	<i>Chrysopsis mariana</i>	
Cottony goldenaster	<i>Chrysopsis gossypina subsp. gossypina</i>	
Camphortree	<i>Cinnamomum camphora</i>	
Le Conte's thistle	<i>Cirsium lecontei</i>	
Sawgrass	<i>Cladium jamaicense</i>	
Rosebud orchid	<i>Cleisthes divaricata</i>	LT
Swamp leather-flower	<i>Clematis crispa</i>	
Coastal sweetpepperbush	<i>Clethra alnifolia</i>	
Black titi	<i>Cliftonia monophylla</i>	
Butterfly-pea	<i>Clitoria mariana</i>	

Common Name	Scientific Name	State Status: LE - Endangered LT – Threatened
Tread-softly	<i>Cnidocolus stimulosus</i>	
Whitemouth dayflower	<i>Commelina erecta</i>	
Canadian horseweed	<i>Conyza canadensis</i>	
Florida tickseed	<i>Coreopsis floridana</i>	
Texas tickseed	<i>Coreopsis linifolia</i>	
Flowering dogwood	<i>Cornus florida</i>	
Swamp dogwood	<i>Cornus foemina</i>	
Hawthorn species	<i>Crataegus</i>	
Slender scratchdaisy	<i>Croptilon divaricatum</i>	
Pursh's rattlebox	<i>Crotalaria purshii</i>	
Rabbitbells	<i>Crotalaria rotundifolia</i>	
Silver croton	<i>Croton argyranthemus</i>	
Hogwort	<i>Croton capitatus</i>	
Rushfoil; Michaux's croton	<i>Croton michauxii</i>	
Rushfoil; Michaux's croton	<i>Crotonopsis linearis</i>	
Toothache grass	<i>Ctenium aromaticum</i>	
Columbian waxweed	<i>Cuphea carthagenensis</i>	
American dodder	<i>Cuscuta americana</i>	
Bigseed alfalfa dodder	<i>Cuscuta indecora</i>	
Bermudagrass	<i>Cynodon dactylon</i>	
Baldwin's flatsedge	<i>Cyperus croceus</i>	
Wiry flatsedge	<i>Cyperus filiculmis</i>	
Plukenet's flatsedge	<i>Cyperus plukenetii</i>	

Common Name	Scientific Name	State Status: LE - Endangered LT – Threatened
Pinebarren flatsedge	<i>Cyperus retrorsus</i>	
Titi	<i>Cyrilla racemiflora</i>	
Whitetassels	<i>Dalea carnea var. albida</i>	
Whitetassels	<i>Dalea carnea var. gracilis</i>	
Cowitch vine	<i>Decumaria barbara</i>	
Hairy small-leaf ticktrefoil	<i>Desmodium ciliare</i>	
Florida ticktrefoil	<i>Desmodium floridanum</i>	
Sand ticktrefoil	<i>Desmodium lineatum</i>	
Nuttall's ticktrefoil	<i>Desmodium nuttallii</i>	
Panicledleaf ticktrefoil	<i>Desmodium paniculatum</i>	
Pinebarren ticktrefoil	<i>Desmodium strictum</i>	
Slimleaf ticktrefoil	<i>Desmodium tenuifolium</i>	
Dixie ticktrefoil	<i>Desmodium tortuosum</i>	
Coastalplain balm	<i>Dicerandra linearifolia</i>	
Needleleaf witchgrass	<i>Dichantherium aciculare</i>	
Tapered witchgrass	<i>Dichantherium acuminatum</i>	
Deertongue witchgrass	<i>Dichantherium clandestinum</i>	
Variable witchgrass	<i>Dichantherium commutatum</i>	
Cypress witchgrass	<i>Dichantherium ensifolium var. ensifolium</i>	
Cypress witchgrass	<i>Dichantherium ensifolium var. unciphyllum</i>	
Erectleaf witchgrass	<i>Dichantherium erectifolium</i>	
Rough witchgrass	<i>Dichantherium leucothrix</i>	

Common Name	Scientific Name	State Status: LE - Endangered LT – Threatened
Heller's witchgrass	<i>Dichanthelium oligosanthes</i>	
Eggleaf witchgrass	<i>Dichanthelium ovale</i>	
Hemlock witchgrass	<i>Dichanthelium portoricense</i>	
Ravenel's witchgrass	<i>Dichanthelium ravenelii</i>	
Roundseed witchgrass	<i>Dichanthelium sphaerocarpon</i>	
Roughhair witchgrass	<i>Dichanthelium strigosum</i>	
Roughhair witchgrass	<i>Dichanthelium strigosum var. leucoblepharis</i>	
Slender crabgrass	<i>Digitaria filiformis</i>	
Poor Joe	<i>Diodia teres</i>	
Virginia buttonweed	<i>Diodia virginiana</i>	
Common persimmon	<i>Diospyros virginiana</i>	
Dwarf sundew	<i>Drosera brevifolia</i>	
Pink sundew	<i>Drosera capillaris</i>	
Tracy's sundew	<i>Drosera tracyi</i>	LE
Oblongleaf twinflower	<i>Dychoriste oblongifolia</i>	
Baldwin's spikerush	<i>Eleocharis baldwinii</i>	
Tall elephantsfoot	<i>Elephantopus elatus</i>	
Smooth elephantsfoot	<i>Elephantopus nudatus</i>	
Elliott's lovegrass	<i>Eragrostis elliottii</i>	
Purple lovegrass	<i>Eragrostis spectabilis</i>	
Coastal lovegrass	<i>Eragrostis virginica</i>	
Burnweed	<i>Erectites hieracifolia</i>	

Common Name	Scientific Name	State Status: LE - Endangered LT – Threatened
Plumegrass	<i>Erianthus spp.</i>	
Early whitetop fleabane	<i>Erigeron vernus</i>	
Pipewort	<i>Eriocaulon compressum</i>	
Tenangle pipewort	<i>Eriocaulon decangulare</i>	
Blueflower eryngo	<i>Eryngium integrifolium</i>	
Button rattlesnakemaster	<i>Eryngium yuccifolium</i>	
Coralbean	<i>Erythrina herbacea</i>	
White thoroughwort	<i>Eupatorium album</i>	
Dogfennel	<i>Eupatorium capillifolium</i>	
Yankeeweed	<i>Eupatorium compositifolium</i>	
Wasy thoroughwort	<i>Eupatorium cuneifolium</i>	
False fennel	<i>Eupatorium leptophyllum</i>	
Justiceweed	<i>Eupatorium leucolepis</i>	
Mohr's thoroughwort	<i>Eupatorium mohrii</i>	
Common boneset	<i>Eupatorium perfoliatum</i>	
Rough boneset	<i>Eupatorium pilosum</i>	
Roundleaf thoroughwort	<i>Eupatorium rotundifolium</i>	
Curtis' spurge	<i>Euphorbia curtisii</i>	
Coastal sand spurge	<i>Euphorbia exserta</i>	
Florida pineland spurge	<i>Euphorbia inundata</i>	
Saltmarsh fingergrass	<i>Eustachys glauca</i>	
Slender goldenrod	<i>Euthamia caroliniana</i>	
Flattop goldenrod	<i>Euthamia graminifolia</i>	

Common Name	Scientific Name	State Status: LE - Endangered LT – Threatened
Slender flattop goldenrod	<i>Euthamia minor</i>	
Marsh frimbry	<i>Fimbristylis castanea</i>	
Hairy fimbry	<i>Fimbristylis puberula</i>	
Pumpkin ash	<i>Fraxinus pennsylvanica</i>	
Southern umbrellasedge	<i>Fuirena scirpoidea</i>	
Lanceleaf blanketflower	<i>Gaillardia aestivalis</i>	
Erect milkpea	<i>Galactia erecta</i>	
Florida milkpea	<i>Galactia floridana</i>	
Soft milkpea	<i>Galactia mollis</i>	
Eastern milkpea	<i>Galactia regularis</i>	
Downy milkpea	<i>Galactia volubilis</i>	
Coastal bedstraw	<i>Galium hipidulum</i>	
Hairy bedstraw	<i>Galium pilosum</i>	
Stiff marsh bedstraw	<i>Galium tinctorium</i>	
Slenderstalk	<i>Gaura filipes</i>	
Dwarf huckleberry	<i>Gaylussacia dumosa</i>	
Blue huckleberry	<i>Gaylussacia frondosa</i>	
Woolly huckleberry	<i>Gaylussacia mosieri</i>	
Evening trumpetflower	<i>Gelsemium sempervirens</i>	
Wiregrass gentian	<i>Gentiana pennelliana</i>	LE
Honeylocust	<i>Gleditsia triacanthos</i>	
Bagpod	<i>Glottidium vesicarium</i>	
Sweet everlasting	<i>Gnaphalium obtusifolium</i>	

Common Name	Scientific Name	State Status: LE - Endangered LT – Threatened
Spoonleaf purple everlasting	<i>Gnaphalium purpureum</i>	
Loblolly bay	<i>Gordonia lasianthus</i>	
Sticky hedgehyssop	<i>Gratiola brevifolia</i>	
Rough hedgehyssop	<i>Gratiola hispida</i>	
Shaggy hedgehyssop	<i>Gratiola pilosa</i>	
Branched hedgehyssop	<i>Gratiola ramosa</i>	
Bearded skeletongrass	<i>Gymnopogon ambiguus</i>	
Shortleaf skeletongrass	<i>Gymnopogon brevifolius</i>	
Chapman's skeletongrass	<i>Gymnopogon chapmanianus</i>	
Bog orchid	<i>Habenaria quinqueseta</i>	
Innocence	<i>Hedyotis procumbens</i>	
Common sneezeweed	<i>Helenium autumnale</i>	
Savannah sneezeweed	<i>Helenium vernale</i>	
Carolina frostweed	<i>Helianthemum carolinianum</i>	
Georgia frostweed	<i>Helianthemum georgianum</i>	
Swamp sunflower	<i>Helianthus angustifolius</i>	
Variableleaf sunflower	<i>Helianthus heterophyllus</i>	
Stiff sunflower	<i>Helianthus radula</i>	
Comfortroot	<i>Hibiscus aculeatus</i>	
Crimsoneyed rosemallow	<i>Hibiscus moscheutos</i>	
Queen-devil	<i>Hieracium gronovii</i>	
Manyflower marshpennywort	<i>Hydrocotyle umbellata</i>	
Coastalplain St. John's-wort	<i>Hypericum brachyphyllum</i>	

Common Name	Scientific Name	State Status: LE - Endangered LT – Threatened
Roundpod St. John's-wort	<i>Hypericum cistifolium</i>	
St. Peter's-wort	<i>Hypericum crux-andreae</i>	
Peelbark St. John's-wort	<i>Hypericum fasciculatum</i>	
St. Andrew's-cross	<i>Hypericum hypericoides</i>	
Flatwoods St. John's-wort	<i>Hypericum microsepalum</i>	
Myrtleleaf St. John's-wort	<i>Hypericum myrtifolium</i>	
Hairy St. John's-wort	<i>Hypericum setosum</i>	
Fourpetal St. John's-wort	<i>Hypericum tetrapetalum</i>	
Common goldstar	<i>Hypoxis hirsuta</i>	
Fringed yellow stargrass	<i>Hypoxis juncea</i>	
Stiff stargrass	<i>Hypoxis rigida</i>	
Glossyseed yellow stargrass	<i>Hypoxis sessilis</i>	
Clustered bushmint	<i>Hyptis alata</i>	
Carolina holly	<i>Ilex ambigua</i>	
Dahoon holly	<i>Ilex cassine</i>	
Large gallberry	<i>Ilex coriacea</i>	
Gallberry	<i>Ilex glabra</i>	
Myrtle dahoon	<i>Ilex myrtifolia</i>	
American holly	<i>Ilex opaca</i>	
Yaupon	<i>Ilex vomitoria</i>	
Carolina indigo	<i>Indigofera caroliniana</i>	
Flaxleaf whitetop aster	<i>Ionactis linariifolius</i>	
Man-of-the-earth	<i>Ipomoea pandurata</i>	

Common Name	Scientific Name	State Status: LE - Endangered LT – Threatened
Saltmarsh morning-flory	<i>Ipomoea sagittata</i>	
Jesuit's bark	<i>Iva frutescens</i>	
Canadian rush	<i>Juncus canadensis</i>	
Forked rush	<i>Juncus dichotomus</i>	
Common rush	<i>Juncus effusus</i>	
Shore rush	<i>Juncus marginatus</i>	
Black needle rush	<i>Juncus roemerianus</i>	
Neelepod rush	<i>Juncus scirpoides</i>	
Redpod rush	<i>Juncus trigonocarpus</i>	
Southern redcedar	<i>Juniperus silicicola</i>	
Wicky; Hairy laurel	<i>Kalmia hirsuta</i>	
Virginia saltmarsh mallow	<i>Kosteletzkya virginica</i>	
False boneset	<i>Kuhnia eupatorioides</i>	
Carolina redroot	<i>Lachnanthes carolina</i>	
Whitehead bogbutton	<i>Lachnocaulon anceps</i>	
Small's bogbutton	<i>Lachnocaulon minus</i>	
Deckert's pinweed	<i>Lechea deckertii</i>	
Thymeleaf pinweed	<i>Lechea minor</i>	
Leggett's pinweed	<i>Lechea pulchella</i>	
Pineland pinweed	<i>Lechea sessiliflora</i>	
Narrowleaf lespedeza	<i>Lespedeza angustifolia</i>	
Hairy lespedeza	<i>Lespedeza hirta</i>	
Trailing lespedeza	<i>Lespedeza procumbens</i>	

Common Name	Scientific Name	State Status: LE - Endangered LT – Threatened
Creeping lespedeza	<i>Lespedeza repens</i>	
Tall lespedeza	<i>Lespedeza stuevei</i>	
Swamp doghobble	<i>Leucothoe racemosa</i>	
Chapman's gayfeather	<i>Liatris chapmanii</i>	
Pinkscale gayfeather	<i>Liatris elegans</i>	
Slender gayfeather	<i>Liatris gracilis</i>	
Fewflower blazing star	<i>Liatris pauciflora</i>	
Godfrey's blazing star	<i>Liatris provincialis</i>	LE
Piedmont blazing star	<i>Liatris secunda</i>	
Dense gayfeather	<i>Liatris spicata</i>	
Shortleaf gayfeather	<i>Liatris tenuifolia</i>	
Gopher apple	<i>Licania michauxii</i>	
Pine lily	<i>Lilium catesbaei</i>	LE
Florida yellow flax	<i>Linum floridanum</i>	
Sweetgum	<i>Liquidambar styraciflua</i>	
Glade lobelia	<i>Lobelia glandulosa</i>	
White lobelia	<i>Lobelia paludosa</i>	
Goldencrest	<i>Lophiola americana</i>	
Spindleroot	<i>Ludwigia hirtella</i>	
Narrow primrose-willow	<i>Ludwigia linearis</i>	
Seaside primrose-willow	<i>Ludwigia maritima</i>	
Smallfruit primrose-willow	<i>Ludwigia microcarpa</i>	
Marsh seedbox	<i>Ludwigia palustris</i>	

Common Name	Scientific Name	State Status: LE - Endangered LT – Threatened
Creeping primrose-willow	<i>Ludwigia repens</i>	
Savannah primrose-willow	<i>Ludwigia virgata</i>	
Sundial lupine	<i>Lupinus perennis</i>	
Lady lupine	<i>Lupinus villosus</i>	
Foxtail club-moss	<i>Lycopodium alopecuroides</i>	
Southern club-moss	<i>Lycopodium appressa</i>	
Slender club-moss	<i>Lycopodium carolinianum</i>	
Rose-rush	<i>Lygodesmia aphylla</i>	
Rusty lyonia	<i>Lyonia ferruginea</i>	
Coastalplain staggerbush	<i>Lyonia fruticosa</i>	
Maleberry	<i>Lyonia ligustrina</i>	
Fetterbush	<i>Lyonia lucida</i>	
Piedmont staggerbush	<i>Lyonia mariana</i>	
Wand lythrum	<i>Lythrum lineare</i>	
Southern magnolia	<i>Magnolia grandiflora</i>	
Sweetbay	<i>Magnolia virginiana</i>	
Florida Adder's-mouth orchid	<i>Malaxis spicata</i>	
Snow sqarestem	<i>Melanthera nivea</i>	
Climbing hempvine	<i>Milkania scandens</i>	
Littleleaf sensitive brier	<i>Mimosa microphylla</i>	
Sensitive brier	<i>Mimosa quadrivalvis var. angustata</i>	
Partridgeberry	<i>Mitchella repens</i>	
Narrowleaf hornpod	<i>Mitreola angustifolia</i>	

Common Name	Scientific Name	State Status: LE - Endangered LT – Threatened
Lax hornpod	<i>Mitreola petiolata</i>	
Swamp hornpod	<i>Mitreola sessilifolia</i>	
Gulf hairawn muhly	<i>Muhlenbergia capillaris</i> var. <i>filipes</i>	
Cutover muhly	<i>Muhlenbergia capillaris</i> var. <i>trichopodes</i>	
Cutover muhly	<i>Muhlenbergia expansa</i>	
Southern bayberry	<i>Myrica caroliniensis</i>	
Wax myrtle	<i>Myrica cerifera</i>	
Tropical puff	<i>Neptunia pubescens</i>	
Black gum	<i>Nyssa sylvatica</i>	
Swamp tupelo	<i>Nyssa sylvatica</i> var. <i>biflora</i>	
Narrowleaf evening-primrose	<i>Oenothera fruticosa</i>	
Clustered mille grains	<i>Oldenlandia uniflora</i>	
Tuna cactus	<i>Opuntia ficus-indica</i>	
Samson's snakeroot	<i>Orbexilum pedunculatum</i>	
Cinnamon fern	<i>Osmunda cinnamomea</i>	
Royal fern	<i>Osmunda regalis</i>	
Woodsorrel species	<i>Oxalis</i>	
Water cowbane	<i>Oxypolis filiformis</i>	
Piedmont cowbane	<i>Oxypolis ternata</i>	
Coastalplain palafox	<i>Palafoxia integrifolia</i>	
Beaked panicum	<i>Panicum anceps</i>	
Maidencane	<i>Panicum hemitomom</i>	

Common Name	Scientific Name	State Status: LE - Endangered LT – Threatened
Panicgrass	<i>Panicum longifolium</i>	
Redtop panicum	<i>Panicum rigidulum</i>	
Bluejoint panicum	<i>Panicum tenerum</i>	
Warty panicgrass	<i>Panicum verrucosum</i>	
Switchgrass	<i>Panicum virgatum</i>	
Pineland nailwort	<i>Paronychia patula</i>	
Virginia creeper	<i>Parthenocissus quinquefolia</i>	
Crowngrass	<i>Paspalum bifidum</i>	
Florida paspalum	<i>Paspalum floridanum</i>	
Bahiagrass	<i>Paspalum notatum var. sauræ</i>	
Early paspalum	<i>Paspalum praecox</i>	
Thin paspalum	<i>Paspalum setaceum</i>	
Buckroot	<i>Pedimelum canescens</i>	
Mayflower beardtongue	<i>Penstemon multiflorus</i>	
Redbay	<i>Persea borbonia</i>	
Swamp bay	<i>Persea palustris</i>	
Summer farewell	<i>Petalostemon pinnatum</i>	
Florida phlox	<i>Phlox floridana</i>	
Red chokeberry	<i>Photinia pyrifolia</i>	
Turkey tangle fogfruit	<i>Phyla nodiflora</i>	
Cypresshead	<i>Physalis arenicola</i>	
Starhair groundcherry	<i>Physalis viscosa</i>	
Walter's groundcherry	<i>Physalis walteri</i>	

Common Name	Scientific Name	State Status: LE - Endangered LT – Threatened
Fevertree	<i>Pinckneya bracteata</i>	LT
Yellow butterwort	<i>Pinguicula lutea</i>	LT
Smaller butterwort	<i>Pinguicula pumila</i>	
Slash pine	<i>Pinus elliotii</i>	
Longleaf pine	<i>Pinus palustris</i>	
Pond pine	<i>Pinus serotina</i>	
Loblolly pine	<i>Pinus taeda</i>	
Pitted stripeseed	<i>Piriqueta caroliniana</i>	
Carolina silkgrass	<i>Pityopsis adenolepis</i>	
Pineland silkgrass	<i>Pityopsis aspera</i>	
Florida golden aster	<i>Pityopsis flexuosa</i>	LE
Narrowleaf silkgrass	<i>Pityopsis graminifolia</i>	
Grassleaf golden aster	<i>Pityopsis oligantha</i>	
Yellow fringed orchid	<i>Platanthera ciliaris</i>	LT
Resurrection fern	<i>Pleopeltis polypodioides</i>	
Stinking camphorweed	<i>Pluchea foetida</i>	
Sweetscent	<i>Pluchea odorata</i>	
Rosy camphorweed	<i>Pluchea rosea</i>	
Rose pogonia	<i>Pogonia ophioglossoides</i>	LT
Scalloped milkwort	<i>Polygala crenata</i>	
Drumheads	<i>Polygala cruciata</i>	
Showy milkwort	<i>Polygala grandiflora</i>	
Orange milkwort	<i>Polygala lutea</i>	

Common Name	Scientific Name	State Status: LE - Endangered LT – Threatened
Candyroot	<i>Polygala nana</i>	
Racemed milkwort	<i>Polygala polygama</i>	
Low pinebarren milkwort	<i>Polygala ramosa</i>	
Coastalplain milkwort	<i>Polygala setacea</i>	
Tall jointweed	<i>Polygonella gracilis</i>	
Octoberflower	<i>Polygonella polygama</i>	
Swamp smartweed	<i>Polygonum hydropiperoides</i>	
Juniper leaf	<i>Polypremum procumbens</i>	
Marsh mermaidweed	<i>Proserpinaca palustris</i>	
Combleaf mermaidweed	<i>Proserpinaca pectinata</i>	
Black cherry	<i>Prunus serotina</i>	
Heller's cudweed	<i>Pseudognaphalium helleri</i>	
Sampson's snakeroot	<i>Psoralea psoralioides</i>	
Tailed bracken	<i>Pteridium aquilinum</i> var. <i>pseudocaudatum</i>	
Blackroot	<i>Pterocaulon pycnostachyum</i>	
Wand blackroot	<i>Pterocaulon virgatum</i>	
Herbwilliam	<i>Ptilimnium capillaceum</i>	
Chapman oak	<i>Quercus chapmanii</i>	
Runner oak	<i>Quercus elliotii</i>	
Southern red oak	<i>Quercus falcata</i>	
Sand live oak	<i>Quercus geminata</i>	
Bluejack oak	<i>Quercus incana</i>	

Common Name	Scientific Name	State Status: LE - Endangered LT – Threatened
Turkey oak	<i>Quercus laevis</i>	
Laurel oak	<i>Quercus laurifolia</i>	
Sand post oak	<i>Quercus margaretta</i>	
Dwarf live oak	<i>Quercus minima</i>	
Myrtle oak	<i>Quercus myrtifolia</i>	
Water oak	<i>Quercus nigra</i>	
Live oak	<i>Quercus virginiana</i>	
Savannah meadowbeauty	<i>Rhexia alifanus</i>	
West Indian meadowbeauty	<i>Rhexia cubensis</i>	
Yellow meadowbeauty	<i>Rhexia lutea</i>	
Pale meadowbeauty	<i>Rhexia mariana</i>	
Nuttall's meadowbeauty	<i>Rhexia nuttallii</i>	
Fringed meadowbeauty	<i>Rhexia petiolata</i>	
Sweet pinxter azalea	<i>Rhododendron canescens</i>	
Swamp azalea	<i>Rhododendron viscosum</i>	
Winged sumac	<i>Rhus copallinum</i>	
Royal snoutbean	<i>Rhynchosia cytisoides</i>	
Dollarleaf	<i>Rhynchosia reniformis</i>	
Baldwin's beaksedge	<i>Rhynchospora baldwinii</i>	
Shortbristle beaksedge	<i>Rhynchospora breviseta</i>	
Loosehead beaksedge	<i>Rhynchospora chalarocephala</i>	
Chapman's beaksedge	<i>Rhynchospora chapmanii</i>	
Fringed beaksedge	<i>Rhynchospora ciliaris</i>	

Common Name	Scientific Name	State Status: LE - Endangered LT – Threatened
Starrush whitetop	<i>Rhynchospora colorata</i>	
Curtiss' beaksedge	<i>Rhynchospora curtissii</i>	
Fascicled beaksedge	<i>Rhynchospora facicularis</i>	
Threadleaf beaksedge	<i>Rhynchospora filifolia</i>	
Globe beaksedge	<i>Rhynchospora globularis</i>	
Slender beaksedge	<i>Rhynchospora gracilentia</i>	
Gray's beaksedge	<i>Rhynchospora grayi</i>	
Pinebarren beaksedge	<i>Rhynchospora intermedia</i>	
Giant whitetop	<i>Rhynchospora latifolia</i>	
Pineland beaksedge	<i>Rhynchospora perplexa</i>	
Plumed beaksedge	<i>Rhynchospora plumosa</i>	
Fairy beaksedge	<i>Rhynchospora pusilla</i>	
Fewflower beaksedge	<i>Rhynchospora rariflora</i>	
Swamp rose	<i>Rosa palustris</i>	
Sawtooth blackberry	<i>Rubus argutus</i>	
Sand blackberry	<i>Rubus cuneifolius</i>	
Northern dewberry	<i>Rubus flagellaris</i>	
Southern dewberry	<i>Rubus trivialis</i>	
Orange coneflower	<i>Rudbeckia fulgida</i>	
Carolina wild petunia	<i>Ruellia caroliniensis</i>	
Hairyflower wild petunia	<i>Ruellia ciliatiflora</i>	
Ciliate wild petunia	<i>Ruellia ciliosa</i>	
Dwarf palmetto	<i>Sabal minor</i>	

Common Name	Scientific Name	State Status: LE - Endangered LT – Threatened
Cabbage palm	<i>Sabal palmetto</i>	
Shortleaf rosegentain	<i>Sabatia brevifolia</i>	
Slender rosegentian	<i>Sabatia campanulata</i>	
Largeleaf rosegentian	<i>Sabatia macrophylla</i>	
Fourangle rosegentian	<i>Sabatia quadrangula</i>	
Rose of Plymouth	<i>Sabatia stellaris</i>	
Sugarcane plumegrass	<i>Saccharum coarctatum</i>	
Sugarcane plumegrass	<i>Saccharum giganteum</i>	
Bulltongue arrowhead	<i>Sagittaria lancifolia</i>	
Azure blue sage	<i>Salvia azurea</i>	
Lyreleaf sage	<i>Salvia lyrata</i>	
Seaside brookweed	<i>Samolus valerandi</i>	
Hooded pitcherplant	<i>Sarracenia minor</i>	LT
Parrot pitcherplant	<i>Sarracenia psittacina</i>	LT
Sassafras	<i>Sassafras albidum</i>	
Lizard's tail	<i>Saururus cernuus</i>	
Little bluestem	<i>Schizachyrium scoparium</i>	
Creeping bluestem	<i>Schizachyrium stoloniferum</i>	
Slender bluestem	<i>Schizachyrium tenerum</i>	
Florida sensitive brier	<i>Schrankia microphylla</i>	
Bulrush species	<i>Scirpus spp.</i>	
Baldwin's nutrush	<i>Scleria baldwinii</i>	
Fringed nutrush	<i>Scleria ciliata</i>	

Common Name	Scientific Name	State Status: LE - Endangered LT – Threatened
Fewflower nutrush	<i>Scleria ciliata var. pauciflora</i>	
Slenderfruit nutrush	<i>Scleria georgiana</i>	
Netted nutrush	<i>Scleria retulgris</i>	
Tall nutgrass	<i>Scleria triglomerata</i>	
Low nutrush	<i>Scleria verticillata</i>	
Small'S skullcap	<i>Scutellaria multiglandulosa</i>	
Hoary skullcap	<i>Scutellaria spp.</i>	
Saw palmetto	<i>Serenoa repens</i>	
Dixie whitetopped aster	<i>Sericocarpus tortifolius</i>	
Foxtail species	<i>Setaria spp.</i>	
Yaupon blacksennea	<i>Seymeria cassioides</i>	
Piedmont blacksennea	<i>Seymeria pectinata</i>	
Gum bully	<i>Sideroxylon langinosum</i>	
White blue-eyed grass	<i>Sisyrinchium albidum</i>	
Eastern blue-eyed grass	<i>Sisyrinchium atlanticum</i>	
Nash's blue-eyed grass	<i>Sisyrinchium nashii</i>	
Blue-eyed grass	<i>Sisyrinchium spp.</i>	
Earleaf greenbrier	<i>Smilax auriculata</i>	
Saw greenbrier	<i>Smilax bona-nox</i>	
Cat greenbrier	<i>Smilax glauca</i>	
Laurel greenbrier	<i>Smilax laurifolia</i>	
Sarsparilla vine	<i>Smilax pumila</i>	
Pinebarren goldenrod	<i>Solidago fistulosa</i>	

Common Name	Scientific Name	State Status: LE - Endangered LT – Threatened
Giant goldenrod	<i>Solidago gigantea</i>	
Anise-scented goldenrod	<i>Solidago odora var. odora</i>	
Wrinkleleaf goldenrod	<i>Solidago rugosa</i>	
Wand goldenrod	<i>Solidago stricta</i>	
Slender Indiangrass	<i>Sorghastrum elliottii</i>	
Yellow Indiangrass	<i>Sorghastrum nutans</i>	
Lopsided Indiangrass	<i>Sorghastrum secundum</i>	
Saltmeadow cordgrass	<i>Spartina patens</i>	
Bog moss species	<i>Sphagnum spp.</i>	
Florida ladiestresses	<i>Spiranthes floridana</i>	
Hidden dropseed	<i>Sporobolus clandestinus</i>	
Florida dropseed	<i>Sporobolus floridanus</i>	
Pineywoods dropseed	<i>Sporobolus junceus</i>	
Water toothleaf; corkwood	<i>Stillingia aquatica</i>	
Queens delight	<i>Stillingia sylvatica</i>	
Pink fuzzybean	<i>Strophostyles umbellata</i>	
Coastalplain dawnflower	<i>Stylisma patens</i>	
Sidebeak pencilflower	<i>Stylosanthes biflora</i>	
American snowbell	<i>Styrax americanus</i>	
Scaleleaf aster	<i>Symphyotrichum adnatum</i>	
Savannah aster	<i>Symphyotrichum chapmanii</i>	
Eastern silver aster	<i>Symphyotrichum concolor</i>	
Rice button aster	<i>Symphyotrichum dumosum</i>	

Common Name	Scientific Name	State Status: LE - Endangered LT – Threatened
Yellow hatpins	<i>Syngonanthus flavidulus</i>	
Pond-cypress	<i>Taxodium ascendens</i>	
Scurf hoarypea	<i>Tephrosia chrysophylla</i>	
Florida hoarypea	<i>Tephrosia florida</i>	
Sprawling hoarypea	<i>Tephrosia hispidula</i>	
Spiked hoarypea	<i>Tephrosia spicata</i>	
Canadian germander	<i>Teucrium canadense</i>	
Maiden fern species	<i>Thelypteris spp.</i>	
Spanish moss	<i>Tillandsia usneoides</i>	
Coastal false asphodel	<i>Tofieldia racemosa</i>	
Eastern poison ivy	<i>Toxicodendron radicans</i>	
Atlantic poison oak	<i>Toxicodendron toxicarium</i>	
Poison sumac	<i>Toxicodendron vernix</i>	
Climbing dogbane	<i>Trachelospermum difforme</i>	
Spiderwort	<i>Tradescantia</i>	
Small's noseburn	<i>Tragia smallii</i>	
Wavyleaf noseburn	<i>Tragia urens</i>	
Nettleleaf noseburn	<i>Tragia urticifolia</i>	
Forked bluecurls	<i>Trichostema dichotomum</i>	
Carolina fluffgrass	<i>Tridens carolinianus</i>	
Trillium species	<i>Trillium spp.</i>	
Clasping venus' looking glass	<i>Triodanis perfoliata</i>	
Perennial sandgrass	<i>Triplasis americana</i>	

Common Name	Scientific Name	State Status: LE - Endangered LT – Threatened
Purple sandgrass	<i>Triplasis purpurea</i>	
American elm	<i>Ulmus americana</i>	
Bladderwort	<i>Utricularia subulata</i>	
Sparkleberry; Farkleberry	<i>Vaccinium arboreum</i>	
Highbush blueberry	<i>Vaccinium corymbosum</i>	
Darrow's blueberry	<i>Vaccinium darrowii</i>	
Shiny blueberry	<i>Vaccinium myrsinites</i>	
Deerberry	<i>Vaccinium stamineum</i>	
Tall ironweed	<i>Vernonia angustifolia</i>	
Possumhaw	<i>Viburnum nudan</i>	
Rusty blackhaw	<i>Viburnum rufidulum</i>	
Vetch species	<i>Vicia spp.</i>	
Bog white violet	<i>Viola lanceolata</i>	
Early blue violet	<i>Viola palmata</i>	
Primroseleaf violet	<i>Viola primulifolia</i>	
Summer grape	<i>Vitis aestivalis</i>	
Graybark grape	<i>Vitis cinerea</i>	
Muscadine	<i>Vitis rotundifolia</i>	
Southern rockbell	<i>Wahlenbergia marginata</i>	
Netted chain fern	<i>Woodwardia areolata</i>	
Virginia chain fern	<i>Woodwardia virginica</i>	
Coastal Plain yellow-eyed grass	<i>Xyris ambigua</i>	
Baldwin's yellow-eyed grass	<i>Xyris baldwiniana</i>	

Common Name	Scientific Name	State Status: LE - Endangered LT – Threatened
Carolina yellow-eyed grass	<i>Xyris caroliniana</i>	
Curtiss' yellow-eyed grass	<i>Xyris difformis</i> var. <i>curtissii</i>	
Elliott's yellow-eyed grass	<i>Xyris elliotii</i>	
Savannah yellow-eyed grass	<i>Xyris flabelliformis</i>	
Tall yellow-eyed grass	<i>Xyris platylepis</i>	
Aloe yucca	<i>Yucca aloifolia</i>	
Crowpoison, Osceola's plume	<i>Zigadenus densus</i>	

TREES, SHRUBS, AND SELECTED WOOD PLANTS REPRESENTATIVE OF ALL HABITATS AT ST. MARKS NATIONAL WILDLIFE REFUGE

Nomenclature follows The Atlas of Florida Vascular Plants (<http://www.plantatlas.usf.edu/>).

* Denotes nonnative plants.

Common Name	Scientific Name
Boxelder	<i>Acer negundo</i>
Red maple	<i>Acer rubrum</i>
Florida maple	<i>Acer saccharum subsp. Floridanum</i>
Red buckeye	<i>Aesculus pavia</i>
Mimosa	<i>Albizia julibrissin*</i>
Hazel alder	<i>Alnus serrulata</i>
False indigo	<i>Amorpha fruticosa</i>
Devil's walkingstick	<i>Aralia spinosa</i>
Coral ardisia	<i>Ardisia crenata*</i>
Slimleaf pawpaw	<i>Asimina angustifolia</i>
Smallflower pawpaw	<i>Asimina parviflora</i>
Saltwater false willow	<i>Baccharis angustifolia</i>
Silverling	<i>Baccharis glomulerifolia</i>
Eastern baccharis	<i>Baccharis halmifolia</i>
American beautyberry	<i>Callicarpa Americana</i>
American hornbeam	<i>Carpinus caroliniana</i>
Mockernut hickory	<i>Carya alba</i>
Water hickory	<i>Carya aquatica</i>
Pignut hickory	<i>Carya glabra</i>
Chinquapin	<i>Castanea pumila</i>

Common Name	Scientific Name
Sugarberry	<i>Celtis laevigata</i>
Common buttonbush	<i>Cephalanthus occidentalis</i>
Eastern redbud	<i>Cercis Canadensis</i>
Fringetree	<i>Chionanthus virginicus</i>
Camphor tree	<i>Cinnamomum camphora</i> *
Coastal sweetpepperbush	<i>Clethra alnifolia</i>
Black titi	<i>Cliftonia monophylla</i>
Flowering dogwood	<i>Cornus florida</i>
Swamp dogwood	<i>Cornus foemina</i>
Cockspur hawthorne	<i>Craetagus crus-galli</i>
Yellowleaf hawthorne	<i>Craetagus flava</i>
Parsley hawthorne	<i>Craetagus marshallii</i>
Green hawthorne	<i>Craetagus viridis</i>
May haw	<i>Crataegus michauxii</i>
Michaux's hawthorne	<i>Crataegus michauxii</i>
Titi	<i>Cyrilla racemiflora</i>
Common persimmon	<i>Diospyros virginiana</i>
Coralbean	<i>Erythrina herbacea</i>
American strawberrybush	<i>Euonymus americanus</i>
American beech	<i>Fagus grandifolia</i>
Eastern swampprivet	<i>Forestiera acuminata</i>
White ash	<i>Fraxinus Americana</i>
Carolina ash	<i>Fraxinus caroliniana</i>

Common Name	Scientific Name
Pumpkin ash	<i>Fraxinus pennsylvanica</i>
Dwarf huckleberry	<i>Gaylussacia dumosa</i>
Blue huckleberry	<i>Gaylussacia frondosa</i>
Woolly huckleberry	<i>Gaylussacia mosieri</i>
Waterlocust	<i>Gleditsia aquatica</i>
Honeylocust	<i>Gleditsia triacanthos</i>
Loblolly bay	<i>Gordonia lasianthus</i>
Carolina silverbell	<i>Halesia caroliniana</i>
American witchhazel	<i>Hamamelis virginiana</i>
Coastalplain St. John's-wort	<i>Hypericum brachphyllum</i>
Roundpod St. John's-wort	<i>Hypericum cistifolium</i>
St. Peter's-wort	<i>Hypericum crus-andreae</i>
Peelbark St. John's-wort	<i>Hypericum fasciculatum</i>
St. Andrew's-cross	<i>Hypericum hypericoides</i>
Flatwoods St. John's-wort	<i>Hypericum microsepalum</i>
Myrtleleaf St. John's-wort	<i>Hypericum myrtifolium</i>
Hairy St. John's-wort	<i>Hypericum setosum</i>
Fourpetal St. John's-wort	<i>Hypericum tetrapetalum</i>
Carolina holly	<i>Ilex ambigua</i>
Dahoon holly	<i>Ilex cassine</i>
Large gallberry	<i>Ilex coriacea</i>
Possumhaw	<i>Ilex deciduas</i>
Gallberry	<i>Ilex glabra</i>

Common Name	Scientific Name
Myrtle dahoon	<i>Ilex myrtifolia</i>
American holly	<i>Ilex opaca</i>
Yaupon	<i>Ilex vomitoria</i>
Virginia willow	<i>Itea virginica</i>
Bigleaf sumpweed	<i>Iva frutescens</i>
Seacoast marshelder	<i>Iva imbricate</i>
Southern redcedar	<i>Juniperus silicicola</i>
Wicky; Hairy laurel	<i>Kalmia hirsute</i>
Lantana	<i>Lantana camara*</i>
Corkwood	<i>Leitneria floridana</i>
Coastal doghobble	<i>Leucothoe axillaries</i>
Swamp doghobble	<i>Leucothoe racemosa</i>
Gopher apple	<i>Licana michauxii</i>
Glossy privet	<i>Ligustrum lucidum*</i>
Sweetgum	<i>Liquidambar styraciflua</i>
Yellow-poplar	<i>Liriodendron tulipifera</i>
Christmasberry	<i>Lycium carolinianum</i>
Rusty lyonia	<i>Lyonia ferruginea</i>
Coastalplain staggerbush	<i>Lyonia fruticosa</i>
Maleberry	<i>Lyonia ligustrina var. foliosifolia</i>
Fetterbush	<i>Lyonia lucida</i>
Piedmont staggerbush	<i>Lyonia mariana</i>
Southern magnolia	<i>Magnolia grandiflora</i>

Common Name	Scientific Name
Sweetbay	<i>Magnolia virginiana</i>
Southern crabapple	<i>Malus angustifolia</i>
Chinaberry	<i>Melia azedarach*</i>
Red mulberry	<i>Morus rubra</i>
Southern bayberry	<i>Myrica carolinensis</i>
Wax myrtle	<i>Myrica cerifera</i>
Odorless bayberry	<i>Myrica inodora</i>
Oleander	<i>Neria oleander*</i>
Water tupelo	<i>Nyssa aquatica</i>
Ogeechee tupelo	<i>Nyssa ogeche</i>
Black gum	<i>Nyssa sylvatica</i>
Swamp tupelo	<i>Nyssa sylvatica var. biflora</i>
Devilwood	<i>Osmanthus americanus</i>
Eastern hophornbeam	<i>Ostrya virginiana</i>
Redbay	<i>Persea borbonia</i>
Swamp bay	<i>Persea palustris</i>
Red chokeberry	<i>Photinia pyrifolia</i>
Fevertree	<i>Pinckneya bracteata</i>
Sand pine	<i>Pinus clausa</i>
Slash pine	<i>Pinus elliotii</i>
Spruce pine	<i>Pinus glabra</i>
Longleaf pine	<i>Pinus palustris</i>
Pond pine	<i>Pinus serotina</i>

Common Name	Scientific Name
Loblolly pine	<i>Pinus taeda</i>
Waterelm	<i>Planera aquatica</i>
Eastern cottonwood	<i>Populus deltoids</i>
American plum	<i>Prunus Americana</i>
Chickasaw plum	<i>Prunus angustifolia</i>
Carolina laurelcherry	<i>Prunus caroliniana</i>
Black cherry	<i>Prunus serotina</i>
Flatwoods plum	<i>Prunus umbellate</i>
White oak	<i>Quercus alba</i>
Chapman's oak	<i>Quercus chapmanii</i>
Running oak	<i>Quercus elliotii</i>
Southern red oak	<i>Quercus falcate</i>
Sand live oak	<i>Quercus geminate</i>
Bluejack oak	<i>Quercus incana</i>
Turkey oak	<i>Quercus laevis</i>
Laurel oak	<i>Quercus laurifolia</i>
Sand post oak	<i>Quercus margaretta</i>
Swamp chestnut oak	<i>Quercus michauxii</i>
Dwarf live oak	<i>Quercus minima</i>
Myrtle oak	<i>Quercus myrtifolia</i>
Water oak	<i>Quercus nigra</i>
Shumard's oak	<i>Quercus shumardii</i>
Bluff oak	<i>Quercus sinuate</i>

Common Name	Scientific Name
Live oak	<i>Quercus virginiana</i>
Needle palm	<i>Rhapidophyllum hystrix</i>
Sweet pinxter azalea	<i>Rhododendron canescens</i>
Swamp azalea	<i>Rhododendron viscosum</i>
Winged sumac	<i>Rhus copallina</i>
Swamp rose	<i>Rosa palustris</i>
Sawtooth blackberry	<i>Rubus argutus</i>
Sand blackberry	<i>Rubus cuneifolius</i>
Northern dewberry	<i>Rubus flagellaris</i>
Southern dewberry	<i>Rubus trivialis</i>
Dwarf palmetto	<i>Sabal minor</i>
Cabbage palm	<i>Sabal palmetto</i>
Carolina willow	<i>Salix caroliniana</i>
Black willow	<i>Salix nigra</i>
American elder	<i>Sambucus nigra subsp. Canadenis</i>
Chinese tallow	<i>Sapium sebiferum*</i>
Sassafras	<i>Sassafras albidum</i>
Saw palmetto	<i>Serenoa repens</i>
Purple sesban	<i>Sesbania punicea*</i>
Gum bully	<i>Sideroxylon lanuginose</i>
Florida bully	<i>Sideroxylon reclinatum</i>
Water toothleaf	<i>Stillingia aquatica</i>
American snowbell	<i>Styrax americanus</i>

Common Name	Scientific Name
Bigleaf snowbell	<i>Styrax grandiflorus</i>
Common sweetleaf	<i>Symplocos tinctoria</i>
Pond-cypress	<i>Taxodium ascendens</i>
Bald-cypress	<i>Taxodium distichum</i>
Carolina basswood	<i>Tilia americana var. caroliniana</i>
White basswood	<i>Tilia americana var. heterophylla</i>
Eastern poison oak	<i>Toxicocendron pubescens</i>
Eastern poison ivy	<i>Toxicodendron radicans</i>
Poison sumac	<i>Toxicodendron vernix</i>
Winged elm	<i>Ulmus alata</i>
American elm	<i>Ulmus Americana</i>
Sparkleberry	<i>Vaccinium arboretum</i>
Highbush blueberry	<i>Vaccinium corymbosum</i>
Darrow's blueberry	<i>Vaccinium darrowii</i>
Shiny blueberry	<i>Vaccinium myrsinites</i>
Deerberry	<i>Vaccinium stamineum</i>
Southern arrowwood	<i>Viburnum dentate</i>
Possumhaw	<i>Viburnum nudum</i>
Walter's viburnum	<i>Viburnum obovatum</i>
Rusty blackhaw	<i>Viburnum rufidulum</i>
Spanish bayonet	<i>Yucca aloifolia</i>
Adam's needle	<i>Yucca filamentosa</i>
Hercules-club	<i>Zanthoxylum clava-herculis</i>

ST. MARKS NATIONAL WILDLIFE REFUGE REPRESENTATIVE SPECIES ASSEMBLAGES

Adapted from Clewell (1981)

The following six groupings of habitat types list representative common plants found within each habitat type and recorded in surveys from the listed location.

Hardwood hammock near Aucilla River (Hydric Hardwood Hammock)	
Common Name	Scientific Name
Red maple	<i>Acer rubrum</i>
Red buckeye	<i>Aesculus pavia</i>
Jack-in-the-pulpit	<i>Arisaema triphyllum</i>
Switchcane	<i>Arundinaria gigantea</i>
Eastern baccharis	<i>Baccharis halmifolia</i>
Alabama supplejack	<i>Berchemia scandens</i>
Crossvine	<i>Bignonia capreolata</i>
False nettle	<i>Boehmeria cylindrica</i>
American beautyberry	<i>Callicarpa Americana</i>
Trumpet creeper	<i>Campsis radicans</i>
American hornbeam	<i>Carpinus caroliniana</i>
Sugarberry	<i>Celtis laevigata</i>
Eastern redbud	<i>Cercis Canadensis</i>
Shiny woodoats	<i>Chasmanthium nitidum</i>
Slender woodoats	<i>Chasmanthium laxum</i>
Fringetree	<i>Chionanthus virginica</i>
Sawgrass	<i>Cladium jamaicense</i>
Coastal sweetpepperbush	<i>Clethra alnifolia</i>
Swamp dogwood	<i>Cornus foemina</i>

Common Name	Scientific Name
Compact dodder	<i>Cuscuta compacta</i>
Lax hornpod	<i>Cynoctonum mitreola</i>
Variable witchgrass	<i>Dichantherium commutatum</i>
Smooth elephantsfoot	<i>Elephantopus nudatus</i>
American strawberrybush	<i>Euonymus americanus</i>
Eastern swampprivet	<i>Forestiera acuminata</i>
Carolina ash	<i>Fraxinus pauciflora</i>
Hairy bedstraw	<i>Galium pilosum</i>
Water locust	<i>Gleditsia aquatica</i>
Bedstraw St. John's-wort	<i>Hypericum galioides</i>
American holly	<i>Ilex opaca</i>
Yaupon	<i>Ilex vomitoria</i>
Dahoon holly	<i>Ilex cassine</i>
Large gallberry	<i>Ilex coriacea</i>
Virginia willow	<i>Itea virginica</i>
Southern redcedar	<i>Juniperus sillicicola</i>
Corkwood	<i>Leitnera floridana</i>
Swamp doghobble	<i>Leucothoe racemosa</i>
Sweetgum	<i>Liquidambar styraciflua</i>
Fetterbush	<i>Lyonia lucida</i>
Coastalplain staggerbush	<i>Lyonia fruticosa</i>
Southern magnolia	<i>Magnolia grandiflora</i>
Sweetbay	<i>Magnolia virginiana</i>

Common Name	Scientific Name
Red mulberry	<i>Morus rubra</i>
Southern bayberry	<i>Myrica cerifera</i>
Swamp tupelo	<i>Nyssa sylvatica var. biflora</i>
Woodsgrass	<i>Oplismenus hirtellus</i>
Devilwood	<i>Osmanthus Americana</i>
Cinnamon fern	<i>Osmunda cinnamomea</i>
Redtop panicum	<i>Panicum rigidulum</i>
Swamp bay	<i>Persea palustris</i>
Slash pine	<i>Pinus elliotii</i>
Loblolly pine	<i>Pinus taeda</i>
Green wood orchid	<i>Plantanthera clavellata</i>
Resurrection fern	<i>Polypodium polypodioides</i>
Hairy shadow witch	<i>Ponthieva racemosa</i>
Bracken fern	<i>Pteridium aquilifolium</i>
Laurel oak	<i>Quercus laurifolia</i>
Water oak	<i>Quercus nigra</i>
Shumard's oak	<i>Quercus shumardii</i>
Live oak	<i>Quercus virginiana</i>
Needle palm	<i>Rhapidophyllum hystrix</i>
Millet beaksedge	<i>Rhynchospora miliacea</i>
Southern dewberry	<i>Rubus trivialis</i>
Carolina wild petunia	<i>Ruellia caroliniensis</i>
Cabbage palm	<i>Sabal palmetto</i>

Common Name	Scientific Name
Dwarf palmetto	<i>Sabal minor</i>
Coastal rosegentian	<i>Sabatia calycina</i>
Pineland pimpernel	<i>Samolus parviflorus</i>
Lizard's tail	<i>Saururus cernuus</i>
Saw palmetto	<i>Serenoa repens</i>
Saw greenbrier	<i>Smilax bona-nox</i>
Bald-cypress	<i>Taxodium distichum</i>
Spanish moss	<i>Tillandsia usneoides</i>
Eastern poison ivy	<i>Toxicodendron radicans</i>
American elm	<i>Ulmus Americana</i>
Sparkleberry	<i>Vaccinium arboretum</i>
Common blue violet	<i>Viola floridana</i>
Muscadine	<i>Vitis rotundifolia</i>
Netted chain fern	<i>Woodwardia areolata</i>
Virginia chain fern	<i>Woodwardia virginica</i>
Spanish bayonet	<i>Yucca aloifolia</i>

East River Salt Marsh

Common Name	Scientific Name
Eastern Baccharis	<i>Baccharis halmifolia</i>
Saltwort	<i>Batis maritima</i>
Bushy seaside oxeye	<i>Borrichia frutescens</i>
Saltgrass	<i>Distichlis spicata</i>
Yaupon	<i>Ilex vomitoria</i>
Bigleaf sumpweed	<i>Iva frutescens</i>
Black needle rush	<i>Juncas roemarianus</i>
Eastern glasswort	<i>Lilaeopsis chinensis</i>
Carolina sealavender	<i>Limonium carolinianum</i>
Christmasberry	<i>Lycium carolinianum</i>
Awl-leaf arrowhead	<i>Sagittaria subulata</i>
Annual glasswort	<i>Salicornia bigelovii</i>
Virginia glasswort	<i>Salicornia virginica</i>
Saltmarsh cordgrass	<i>Spartina alterniflora</i>
Big cordgrass	<i>Spartina cynosuroides</i>
Saltmeadow cordgrass	<i>Spartina patens</i>
Seashore dropseed	<i>Sporobolus virginicus</i>
Sea blite	<i>Suaeda linearis</i>
Perennial saltmarsh aster	<i>Symphotrichum tenuifolium</i>

**Wakulla/St. Marks River Marshes and Streambed
(Spring Run Stream, Freshwater Marsh)**

Common Name	Scientific Name
Coontail	<i>Ceratophyllum demersum</i>
Sawgrass	<i>Cladium jamaicense</i>
String-lily	<i>Crinum americanum</i>
Saltgrass	<i>Distichlis spicata</i>
Gulf Coast spikerush	<i>Eleocharis cellulosa</i>
Marsh fimbry	<i>Fimbristylis castanea</i>
Hydrilla	<i>Hydrilla verticillata*</i>
Manyhead rush	<i>Juncas polycephalos</i>
Black needle rush	<i>Juncus roemerianus</i>
Eastern grasswort	<i>Lilaeopsis chinensis</i>
Carolina sealavender	<i>Limonium carolinianum</i>
Creeping primrosewillow	<i>Ludwigia repens</i>
Wand loosestrife	<i>Lythrum lineare</i>
Climbing hempvine	<i>Mikania scandens</i>
Southern waternymph	<i>Najas guadalupensis</i>
Eastern false dragonhead	<i>Physostegia purpurea</i>
Dotted smartweed	<i>Polygonum punctatum</i>
Pickerelweed	<i>Pontederia cordata</i>
Illinois pondweed	<i>Potamogeton illinoensis</i>
Claspingleaf	<i>Potamogeton perfoliatus</i>
Small pondweed	<i>Potamogeton pusillus</i>
Wigeongrass	<i>Ruppia maritime</i>

Common Name	Scientific Name
Springtape	<i>Sagittaria kurziana</i>
Bulltongue arrowhead	<i>Sagittaria lancifolia</i>
Pigmyflower vetch	<i>Sagittaria subulata</i>
Lizard's tail	<i>Saururus cernuus</i>
Threesquare bulrush	<i>Scirpus pungens</i>
Gulf cordgrass	<i>Spartina spartinae</i>
Saltmarsh cordgrass	<i>Spartina alterniflora</i>
Tapegrass	<i>Vallisneria Americana</i>
Annual wild rice	<i>Zizania aquatica</i>

Apalachee Bay Seagrass Beds

Common Name	Scientific Name
Shoal grass	<i>Halodule wrightii</i>
Engelmann's seagrass	<i>Halophila engelmannii</i>
Wigeon grass	<i>Ruppia maritima</i>
Manatee grass	<i>Syringodium filiforme</i>
Turtle grass	<i>Thalassia testudinum</i>

Bird Hammock (Wakulla Unit Mesic Hardwood Hammock)

Common Name	Scientific Name
Red maple	<i>Acer rubrum</i>
Red buckeye	<i>Aesculus pavia</i>
Devil's walkingstick	<i>Aralia spinosa</i>
Greendragon	<i>Arisaema dracontium</i>

Common Name	Scientific Name
Smallflower pawpaw	<i>Asimina parviflora</i>
Ebony spleenwort	<i>Asplenium platyneuron</i>
Crossvine	<i>Bignonia capreolata</i>
Gum bully	<i>Bumelia lanuginosa</i>
American beautyberry	<i>Callicarpa americana</i>
Trumpet creeper	<i>Campsis radicans</i>
Coastalplain sedge	<i>Carex crebriflora</i>
American hornbeam	<i>Carpinus caroliniana</i>
Pignut hickory	<i>Carya glabra</i>
Eastern redbud	<i>Cercis canadensis</i>
American squawroot	<i>Conopholis americana</i>
Flowering dogwood	<i>Cornus florida</i>
Swamp dogwood	<i>Cornus foemina</i>
Hemlock witchgrass	<i>Dichantherium portoricense</i>
Tall elephantsfoot	<i>Elephantopus elatus</i>
American beech	<i>Fagus grandifolia</i>
White ash	<i>Fraxinus americana</i>
American witchhazel	<i>Hamamelis virginiana</i>
Yaupon	<i>Ilex vomitoria</i>
American holly	<i>Ilex opaca</i>
Southern redcedar	<i>Juniperus silicicola</i>
Sweetgum	<i>Liquidambar styraciflua</i>
Coral honeysuckle	<i>Lonicera sempervirens</i>

Common Name	Scientific Name
Southern magnolia	<i>Magnolia grandiflora</i>
Partridgeberry	<i>Mitchella repens</i>
Devilwood	<i>Osmanthus Americana</i>
Eastern hophornbeam	<i>Ostraya virginiana</i>
Virginia creeper	<i>Parthenocissus quinquefolia</i>
Red bay	<i>Persea borbonia</i>
Red chokecherry	<i>Photinia pyrifolia</i>
Spruce pine	<i>Pinus glabra</i>
Resurrection fern	<i>Polypodium polypodioides</i>
Black cherry	<i>Prunus serotina</i>
Bluff oak	<i>Quercus sinuate</i>
Swamp chestnut oak	<i>Quercus michauxii</i>
Laurel oak	<i>Quercus laurifolia</i>
Live oak	<i>Quercus virginiana</i>
White oak	<i>Quercus alba</i>
Water oak	<i>Quercus nigra</i>
Winged sumac	<i>Rhus copallinum</i>
Cabbage palm	<i>Sabal palmetto</i>
Saw palmetto	<i>Serenoa repens</i>
Saw greenbrier	<i>Smilax bona-nox</i>
White basswood	<i>Tilia americana var. heterophylla</i>
Spanish moss	<i>Tillandsia usneoides</i>
Eastern poison ivy	<i>Toxicodendron radicans</i>

Common Name	Scientific Name
Sparkleberry	<i>Vaccinium arboretum</i>
Rusty blackhaw	<i>Viburnum rufidulum</i>
Muscadine	<i>Vitis rotundifolia</i>

Wakulla River Swamp	
Common Name	Scientific Name
Red maple	<i>Acer rubrum</i>
Peppervine	<i>Ampelopsis arborea</i>
Switchcane	<i>Arundinaria gigantea</i>
Swamp milkweed	<i>Asclepias perennis</i>
Baccharis species	<i>Baccharis spp.</i>
False nettle	<i>Boehmeria cylindrica</i>
American beautyberry	<i>Callicarpa americana</i>
American hornbeam	<i>Carpinus caroliniana</i>
Pignut hickory	<i>Carya glabra</i>
Sugarberry	<i>Celtis laevigata</i>
Common buttonbush	<i>Cephalanthus occidentalis</i>
Eastern redbud	<i>Cercis canadensis</i>
Swamp dogwood	<i>Cornus foemina</i>
String-lily	<i>Crinum americanum</i>
Cowitch vine	<i>Decumaria barbara</i>
American strawberrybush	<i>Euonymus americanus</i>

Common Name	Scientific Name
Pumpkin ash	<i>Fraxinus pennsylvanica</i>
Carolina ash	<i>Fraxinus caroliniana</i>
Manyflower marshpennywort	<i>Hydrocotyle umbellata</i>
Coastalplain spiderlily	<i>Hymenocallis crassifolia</i>
Bedstraw St. John's-wort	<i>Hypericum galioides</i>
American holly	<i>Ilex opaca</i>
Large gallberry	<i>Ilex coriacea</i>
Yaupon	<i>Ilex vomitoria</i>
Dahoon holly	<i>Ilex cassine</i>
Virginia willow	<i>Itea virginica</i>
Sweetgum	<i>Liquidambar styraciflua</i>
Cardinal flower	<i>Lobelia cardinalis</i>
Sweetbay	<i>Magnolia virginiana</i>
Alabama milkvine	<i>Matelea alabamensis</i>
Climbing hempvine	<i>Mikania scandens</i>
Partridgeberry	<i>Mitchella repens</i>
Red mulberry	<i>Morus rubra</i>
Southern bayberry	<i>Myrica cerifera</i>
Swamp tupelo	<i>Nyssa sylvatica var. biflora</i>
Devilwood	<i>Osmanthus Americana</i>
Royal fern	<i>Osmunda regalis</i>
Beaked panicum	<i>Panicum anceps</i>
Swamp bay	<i>Persea palustris</i>

Common Name	Scientific Name
Water elm	<i>Planera aquatica</i>
Dotted smartweed	<i>Polygonum punctatum</i>
Pickerelweed	<i>Pontederia cordata</i>
Water oak	<i>Quercus nigra</i>
Laurel oak	<i>Quercus laurifolia</i>
Swamp chestnut oak	<i>Quercus michauxii</i>
Shortbristle horned beaksedge	<i>Rhynchospora corniculata</i>
Swamp rose	<i>Rosa palustris</i>
Carolina wild petunia	<i>Ruellia caroliniensis</i>
Swamp dock	<i>Rumex verticillatus</i>
Coastal rosegiant	<i>Sabatia calycina</i>
Bulltongue arrowhead	<i>Sagittaria lancifolia</i>
Hemlock waterparsnip	<i>Sium suave</i>
Saw greenbrier	<i>Smilax bona-nox</i>
Bristly greenbrier	<i>Smilax tamnoides</i>
American snowbell	<i>Styrax Americana</i>
Common sweetleaf	<i>Symplocos tinctoria</i>
Bald-cypress	<i>Taxodium distichum</i>
Widespread maiden fern	<i>Thelypteris normalis</i>
Eastern poison ivy	<i>Toxicodendron radicans</i>
American elm	<i>Ulmus Americana</i>
Highbush blueberry	<i>Vaccinium corymbosum</i>
Tapegrass	<i>Vallisneria Americana</i>

Common Name	Scientific Name
Muscadine	<i>Vitis rotundifolia</i>

FEDERAL AND STATE OF FLORIDA THREATENED AND ENDANGERED PLANT SPECIES FOR ST. MARKS NATIONAL WILDLIFE REFUGE

List derived from current and historical records of species from St. Marks National Wildlife Refuge and unpublished data courtesy of Dr. Gil Nelson, Dr. Jeff Glitzenstein, Dr. Donna Streng, Dr. William Platt, and Susan Carr.

Includes global and state ranking system scores.
Adapted from Florida Natural Areas Inventory, 2000b.

Common Name	Scientific Name	Global Rank	State Rank	Federal Status	State Status
Pinewood bluestem	<i>Andropogon arctatus</i>	G3	S3	N	T
Southern threawn	<i>Aristida simpliciflora</i>			N	E
Scareweed	<i>Baptisia simplicifolia</i>	G3	S3	MC	T
Spreading pogonia	<i>Cleistes divaricata</i>			N	T
Wiregrass gentian	<i>Gentiana pennelliana</i>	G3	S3	MC	E
Godfrey's spiderlily	<i>Hymenocallis godfreyi</i>	G1	S1	N	E
Corkwood	<i>Leitneria floridana</i>	G3	S2	N	T
Godfrey's blazing star	<i>Liatris provincialis</i>	G2	S2	MC	E
Pinewoods lily	<i>Lilium catesbaei</i>			N	T
Cardinal flower	<i>Lobelia cardinalis</i>			N	T
Southern crabapple	<i>Malus angustifolia</i>			N	T
Florida spiny pod	<i>Matelea floridana</i>	G2	S2	MC	T
Prickly pear cactus	<i>Opuntia stricta</i>			N	T
Fevertree	<i>Pinckneya pubens</i>			N	T
Blueflower butterwort	<i>Pinguicula caerulea</i>			N	T
Yellow butterwort	<i>Pinguicula lutea</i>			N	T
Chapman's butterwort	<i>Pinguicula planifolia</i>			N	T
Florida golden aster	<i>Pityopsis flexuosa</i>	G3	S3	MC	E

Common Name	Scientific Name	Global Rank	State Rank	Federal Status	State Status
Green wood orchid	<i>Platanthera clavellata</i>	G5	SH	N	E
Yellow fringeless orchid	<i>Platanthera integra</i>	G3, G4	S3	N	E
Rose pogonia	<i>Pogonia ophioglossoides</i>			N	T
Threeleaf beaksedge	<i>Rhynchospora filifolia</i>			N	E
Nightflowering petunia	<i>Ruellia noctiflora</i>	G2	S2	N	E
Hooded pitcher plant	<i>Sarracenia minor</i>			N	T
Parrot pitcher plant	<i>Sarracenia psittacina</i>			N	T
Bay starvine	<i>Schisandra glabra</i>	G3	S2	MC	E
Florida ladiestresses	<i>Spiranthes floridana</i>			N	E
Crippled crane fly orchid	<i>Tipularia discolor</i>			N	T
Treat's rainlily	<i>Zephyranthes treatiae</i>			N	T

PRIORITY BIRD – (GENERAL) HABITAT RELATIONSHIPS, SOUTHEASTERN COASTAL PLAIN, SOUTHEAST U.S.

Species may occur in more than one habitat (only major habitats are recognized here). Species are considered permanent resident within a habitat (though there may be major seasonal movements within the BCR) unless otherwise noted as **B** = breeding resident, **N** = non-breeding resident, **T** = transient. Exterp; ext.? = likely extirpated or nearly so).

Regional Combined Score is used to rank Tier I species (except waterfowl) within a habitat, within an Action Level (**IM** = Immediate Management, **MA** = Management Attention, **PR** = Planning and Responsibility, **PCL** = Local or Regional population control/suppression). These action levels are defined at the end of the table. Nearctic-Neotropical migrants are identified by an asterisk (*). Species that are **not** on the St. Marks National Wildlife Refuge Official Bird List are identified by a plus sign (+).

Conservation Tier/Action Level;	Open mature pine	Mature Hardwood, forested wetlands, pine-hardwood mix	Shrub-scrub (including maritime)	Grassland, open lands	Woodland transients	Marshes/long-legged waders	Open water near –shore, inland	Mudflats	Beach front, shoreline inlets	Off-shore (pelagic)
Tier I High Concern IM	Red-cockaded Woodpecker (23)	Ivory-billed Woodpecker + (25; ext?)	Florida Scrub-Jay + (22; ext?)	Henslow's Sparrow (N, 23)	Kirtland's Warbler * + (T, 25)	Saltmarsh Sharp-tailed Sparrow (N, 23)		Whimbrel* (N, 19)	Piping Plover (22)	Bermuda Petrel + (N, 22)
	Henslow's Sparrow (N, 23)	Bachman's Warbler* + (B, 25; ext.?)	American Woodcock (N, 19)	Whooping Crane (T, 22)		Whooping Crane (T, 22)		Long-billed Curlew (N, 19)	Snowy Plover + (20)	Audubon's Shearwater + (N, 22)
		Cerulean Warbler* (B, 18)	Painted Bunting* (B, 18)	Buff-breasted Sandpiper* (T, 21)		Purple Gallinule* (B, 17)			Common Tern* (B, 15)	
		Limpkin (16)	Common Ground-Dove (16)	Henslow's Sparrow (B, 20)		Wood Stork (16)				
		Black-throated Green Warbler *(B, 16)	Bewick's Wren (16)	Sandhill Crane + (18)		American Coot (B, 15)				
				Loggerhead Shrike (16)						
Tier I High Concern MA	Bachman's Sparrow (21)	Solitary Sandpiper* (T, 18)	Prairie Warbler *(B, 18)	Upland Sandpiper* (T, 18)	Bicknell's Thrush* + (T, 22)	Black Rail (22)	Horned Grebe (N, 19)	Semipalmated Sandpiper* (T, 19)	American Oystercatcher (21)	Black-capped Petrel + (N, 21)
	Brown-headed Nuthatch (20)	Swainson's Warbler * (B, 18)	Eastern Towhee (16)	American Golden-Plover *(T, 17)		Yellow Rail (N, 21)	Red-throated Loon (N, 18)	Short-billed Dowitcher (N, 19)	Wilson's Plover (B, 20)	Razorbill + (N, 16)
	Northern Bobwhite (16)	Rusty Blackbird (N, 18)	Brown Thrasher (15)	Le Conte's Sparrow (N, 17)		King Rail (18)	Northern Gannet (N, 16)	Solitary Sandpiper* (T, 18)	Black Skimmer (20)	Black Scoter (N)

Conservation Tier/Action Level;	Open mature pine	Mature Hardwood, forested wetlands, pine-hardwood mix	Shrub-scrub (including maritime)	Grassland, open lands	Woodland transients	Marshes/long-legged waders	Open water near-shore, inland	Mudflats	Beach front, shoreline inlets	Off-shore (pelagic)
	Chuck-will's-widow* (B, 16)	Swallow-tailed Kite* (B, 16)	Field Sparrow (B, 15)	Northern Bobwhite (16)		Gull-billed Tern (B, 18)	Magnificent Frigatebird (N, 16)	Marbled Godwit (N, 18)	Least Tern* (B, 19)	
	Northern Flicker (15)	Chuck-will's-widow* (B, 16)		Short-eared Owl (N, 15)		Nelson's Sharp-tailed Sparrow (N, 18)	Common Loon (N, 15)	Least Sandpiper (N, 18)	Gull-billed Tern (B, 18)	
	American Kestrel (B, 14)	Yellow-billed Cuckoo* (B, 15)		Eastern Kingbird* (B, 15)		American Bittern (N, 17)	American White Pelican (N, 15)	Stilt Sandpiper* (T, 18)	Red Knot* (N, 17)	
	Eastern Wood-Pewee *(B, 14)	Chimney Swift* (B, 15)		Field Sparrow (N, 15)		Tricolored Heron (17)	Brant (N)	Wilson's Phalarope* (T, 18)	Sanderling* (N, 17)	
		Northern Flicker (15)		Grasshopper Sparrow* (15)		White Ibis (16)	Canada Goose (migrant pops; N)	American Avocet (N, 17)	Common Tern* (T, 17)	
		Wood Thrush *(B, 15)		Northern Harrier (N, 14)		Little Blue Heron (15)	American Black-Duck (N)	Lesser Yellowlegs (N, 17)	Black Tern* (T, 17)	
		Eastern Wood-Pewee* (B, 14)		Vesper Sparrow (N, 14)		Black-crowned Night-Heron (15)	Northern Pintail (N)	Western Sandpiper* (N, 17)	Sandwich Tern (B, 17)	
		White-throated Sparrow (N, 14)		Eastern Meadowlark (14)		Pied-billed Grebe (B, 14)	Canvasback (N)	Dunlin (N, 16)	Ruddy Turnstone* (N, 16)	
						Least Bittern (B, 14)	Redhead (N)			

Conservation Tier/Action Level;	Open mature pine	Mature Hardwood, forested wetlands, pine-hardwood mix	Shrub-scrub (including maritime)	Grassland, open lands	Woodland transients	Marshes/long-legged waders	Open water near –shore, inland	Mudflats	Beach front, shoreline inlets	Off-shore (pelagic)
						Snowy Egret (14)	Lesser Scaup (N)			
						Yellow-crowned Night-Heron (14)				
						Glossy Ibis (14)				
						Northern Harrier (N, 14)				
						Common Moorhen (14)				
I. High Concern PR	Red-headed Woodpecker (15)		Blue-winged Warbler* (B, 15)	Dickcissel* (B, 13)		Seaside Sparrow (22)			Willet (16)	Greater Shearwater + (N, 16)
		Prothonotary Warbler* (B, 16)				Wilson's Snipe (N, 19)				Manx Shearwater + (N, 14)
		Kentucky Warbler *(B, 16)				Mottled Duck + (does not include introduced pops.)				Band-rumped Storm-Petrel + (N, 16)
		Red-headed Woodpecker (15)								Bridled Tern (N, 16)
		Worm-eating Warbler* (B, 15)								Cory's Shearwater (N, 14)
										Red Phalarope (N, 14)

Conservation Tier/Action Level;	Open mature pine	Mature Hardwood, forested wetlands, pine-hardwood mix	Shrub-scrub (including maritime)	Grassland, open lands	Woodland transients	Marshes/long-legged waders	Open water near –shore, inland	Mudflats	Beach front, shoreline inlets	Off-shore (pelagic)
Tier II Additional Stewardship PR	Red-bellied Woodpecker	Wood Duck	White-eyed Vireo* (B)	Sandhill Crane + (T)	Cape May Warbler *(T)	Clapper Rail	Tundra Swan (N)	Black-bellied Plover* (N, 16)	Royal Tern	
	Carolina Chickadee	Red-shouldered Hawk	Orchard Oriole* (B)	Killdeer	Black-throated Blue Warbler* (T)	Forster's Tern (B)	Wood Duck	Semipalmated Plover *(N)	Forster's Tern (N)	
	Pine Warbler	Red-bellied Woodpecker		Sedge Wren (N)	Blackpoll Warbler *(T)	Marsh Wren	Bonaparte's Gull (N)	Greater Yellowlegs* (N)		
	Summer Tanager *(B)	Acadian Flycatcher* (B)		Bobolink* (T)	Connecticut Warbler *(T)			Spotted Sandpiper* (N)		
		Yellow-throated Vireo* (B)						Pectoral Sandpiper *(T)		
		Carolina Chickadee								
		Carolina Wren								
		Northern Parula* (B)								
		Yellow-throated Warbler* (B)								
		Hooded Warbler *(B)								
		Summer Tanager *(B)								
		Indigo Bunting* (B)								

Conservation Tier/Action Level;	Open mature pine	Mature Hardwood, forested wetlands, pine-hardwood mix	Shrub-scrub (including maritime)	Grassland, open lands	Woodland transients	Marshes/long-legged waders	Open water near-shore, inland	Mudflats	Beach front, shoreline inlets	Off-shore (pelagic)
III Additional Fed Listed	Bald Eagle	Bald Eagle					Brown Pelican		Brown Pelican	Roseate Tern*(N)
III Additional State Listed	Cooper's Hawk (B)	Hooded Merganser (B)	Bell's Vireo* (B)	Cattle Egret (B)		Great Blue Heron (B)	Trumpeter Swan (N)		Reddish Egret (B)	
		Mississippi Kite* (B)		Black Vulture (B)		Great Egret (B)	Blue-winged Teal* (B)		Peregrine Falcon* (N)	
		Cooper's Hawk (B)		Northern Harrier (B)		Peregrine Falcon* (N)	Northern Shoveler (B)			
				Spotted Sandpiper* (B)		Barn Owl (B)	Double-crested Cormorant (B)			
				Barn Owl (B)			Anhinga (B)			
				Burrowing Owl (B)			Osprey (B)			
				Bank Swallow* (B)			Peregrine Falcon* (N)			
				Sedge Wren (B)						
				Lark Sparrow (B)						
				Bobolink* (B)						
IV Other Local or Regional Interest PR	Wild Turkey	Short-tailed Hawk (B)	Willow Flycatcher* (B)	Common Nighthawk* (B)		Virginia Rail (N)	Snow Goose (N)	Black-necked Stilt*(B)	Purple Sandpiper (N)	
		Wild Turkey	Gray Kingbird* (B)	Mourning Dove		Sora (N)	Gadwall (N)		Sooty Tern + (B)	

Conservation Tier/Action Level;	Open mature pine	Mature Hardwood, forested wetlands, pine-hardwood mix	Shrub-scrub (including maritime)	Grassland, open lands	Woodland transients	Marshes/long-legged waders	Open water near –shore, inland	Mudflats	Beach front, shoreline inlets	Off-shore (pelagic)
		Louisiana Waterthrush* (B)	Warbling Vireo* (B)				American Wigeon (N)			
							Mallard (N)			
							Blue-winged Teal (N)			
							Green-winged Teal (N)			
							Ring-necked Duck (N)			
							Greater Scaup (N)			
							Common Goldeneye (N)			
							Bufflehead (N)			
Tier IV Other Local and Regional Interest PCL						Cattle Egret (B)	Canada Goose (B)		Laughing Gull (B)	
							Double-crested Cormorant (N)		Herring Gull (B)	
							American White Pelican (N)		Great Black-backed Gull (B)	

* **Nearctic** - Neotropical Migrant species, those species with populations principally breeding in temperate North American areas that winter principally in tropical North American and/or South America areas.

Action Level:

IM = Immediate management needed to reverse or stabilize significant, long-term population declines in species with small populations, or to protect species with the smallest populations for which trends are poorly known. Lack of action may lead to extirpations or extinction. Generally species with a TB/TN=5 or a TB/TN=4+PT=5 fall under this action level.

MA = Management or other on-the-ground conservation actions needed to reverse or stabilize significant, long-term population declines in species that are still relatively abundant. All other Regional Concern species that are not IM, fall under this action level. Some Federally or State/Provincial listed species not otherwise meeting either Continental or Regional Concern criteria may fall under this action level.

PR = Long-term Planning and Responsibility needed for species to ensure that sustainable populations are maintained for species for which a region has high responsibility for that species. All Continental Concern species that are not also Regional Concern species fall under this action level, as well as any additional Regional Stewardship and Continental Stewardship species and any additional LORI species identified.

PC = Population Control/Suppression needed for species that are otherwise secure and increasing that may come into conflict with other species of higher conservation concern or other resources of interest.

PCL = Local or Regional Population Control/Suppression that generally are species listed as in need of Management Attention or Long-term Planning and Responsibility, but locally may be subject to population control measures to alleviate documented economic, environmental, or human health and safety conflicts, but only when economics and conservation implications have been thoroughly considered.

DESCRIPTIONS OF NATURAL COMMUNITY TYPES, ST. MARKS NATIONAL WILDLIFE REFUGE

The natural community descriptions that follow are those currently in use at the refuge as outlined in “A Wildlife Management Plan for the Forested Uplands of the St. Marks National Wildlife Refuge” (Reinman 1989). These descriptions are focused on the forested communities on the refuge and predate other classification systems used by the Florida Natural Areas Inventory and the State of Florida water management districts. This classification system will be updated during the development of the Habitat Management Plan to make it more compatible with systems used by Fish and Wildlife Service partners. The common names of the plants in this section do not necessarily match common plant names used elsewhere in this document. Acres listed for each community type correspond to Table 5, Section A.

The habitats described in this section have been grouped according to soil moisture conditions: xeric, mesic, and hydric. Xeric habitats are those that are found on deep, well-drained sands where water percolates rapidly to a relatively deep water table. The vegetation on these sites is often adapted to extremely dry conditions. Mesic habitats occur on sites where the water table is much closer to the surface and moisture is more readily available for use by the vegetation. During periods of heavy rainfall, however, these sites may flood for short periods of time. Hydric habitats are those which regularly flood for at least a portion of a typical year. Plants found in these habitats are often adapted to survive the poor aeration of the waterlogged soils that result from a relatively high water table.

Xeric Habitats

Longleaf Pine-Turkey Oak Sandhill (5,059 acres)

The longleaf pine-turkey oak sandhill community generally occurs from Wakulla Field in the Wakulla Unit westward throughout much of the Panacea Unit. It is found on elevated, well-drained, infertile sand soils that were once coastal sandbars. The habitat is typically open, and consists of a low understory and good vertical development. The overstory and midstory trees are primarily longleaf pine, turkey oak, and bluejack oak, with lesser numbers of sand-live and sand-post oaks. The understory, which varies in density, is predominately wiregrass with a diverse array of other herbaceous species, except on sites where past soil disturbance has reduced or eliminated the wiregrass. Characteristic understory plants include wiregrass, narrow-leaf aster, blazing-star, gopher apple, *Euphorbia exserta*, bent golden-aster, *Tragia urens*, spurge nettle, deerberry, sand blackberry, silver croton, queen’s delight, sensitive brier, lady lupine, partridge pea, and *Bulbostylis ciliatifolia* (see Reinman 1985, for additional understory species).

Scrubby Flatwoods (515 acres)

Scrubby flatwoods is a xeric pine flatwoods community that is considered rare on the refuge. The habitat consists of a widely scattered pine canopy, a patchy, thicket-forming, primarily woody understory and occasional patches of bare sand. Slash or longleaf pine usually comprise the overstory while the understory includes saw palmetto, staggerbush, myrtle oak, rusty lyonia, deer tongue, *Rhynchospora megalocarpa*, sand-live oak, *Calamintha coccinea*, dangleberry, *Seymeria pectinata*, Chapman oak, deerberry, prickly pear cactus, reindeer moss, and greenbrier. Wiregrass is also occasionally found in the understory and is generally the only grass present. In some cases, sand-live oak or possibly live oak may reach midstory heights. The best example of scrubby flatwoods on the refuge occurs in the southeastern corner of Compartment P9. Scattered pockets may occur elsewhere, particularly near the coast.

Due to the nature of the understory with few grasses and a patchy, often incombustible litter layer, the natural fire regime in this community is undoubtedly much less frequent than longleaf pine-turkey oak sandhill or mesic flatwoods habitats.

Xeric Hammock (501 acres)

Xeric hammocks occur infrequently on the refuge usually as small scattered pockets that have been missed by previous fires. The overstory and midstory may contain some residual longleaf pines or xeric oaks, but are primarily comprised of live oaks or sand-live oaks, which often form a low, relatively dense canopy. The understory will vary in density from negligible to moderate growths of saw palmetto, oak seedlings, wax myrtle, highbush blueberry, reindeer moss, bracken fern, residual wiregrass, greenbrier, sparkleberry, gallberry, deerberry, muscadine, American beautyberry, and/or yaupon.

Mesic Habitats

Mesic Flatwoods (9,791 acres)

Nearly one-third of the forestland on the refuge is considered mesic flatwoods. It can be characterized by a pure or predominately pine overstory, little midstory except for regenerating pine and perhaps a few hardwoods, and a dense yet variable understory. Hardwoods are generally excluded by recurring fires, but in some areas, especially where fire has occurred infrequently, hardwoods may comprise up to 25 percent of the overstory and midstory basal area.

Longleaf pine is the predominant pine on most of the Panacea Unit and the northwestern portion of the Wakulla Unit while slash pine occurs on nearly all of the St. Marks Unit, much of the Wakulla Unit, and along the coast of the Panacea Unit. Pond pine is much less common as the dominant species and stands of pond pine are primarily restricted to coastal areas in the southwestern portion of the Wakulla Unit and extreme eastern portion of the Panacea Unit. Loblolly pine also occurs as the predominant pine in a few stands, particularly near the coast, but generally tends to be found more frequently in pine-hardwood associations as appears to have been the case historically (Harper 1914, Clewell 1981). Sand pine and spruce pine are also known to occur on the refuge, but as very rare inhabitants of longleaf pine-turkey oak sandhills and mesic hardwood hammocks, respectively.

Five mesic flatwood understory communities were described on the refuge by Reinman (1985). The understory composition varied considerably between communities, as well as within communities, due to the frequency of fire and other factors. A general list of characteristic understory species includes gallberry, saw palmetto, wiregrass, Florida dropseed, runner and dwarf-live oaks, lowbush blueberries, wax myrtle, deer tongue, St. John's wort, blackroot, staggerbush, dwarf huckleberry, sweet pepperbush, and dangleberry.

Most mixed species stands of mesic flatwoods today that contain some longleaf pine were probably once pure or nearly pure longleaf pine flatwoods that have been invaded by slash and/or loblolly pines over the last 50 to 60 years due to human influence over the fire regime.

Adjacent to the coast, the mesic flatwoods communities dominated by slash or loblolly pine contain more salt-tolerant plants. They often contain a larger hardwood component in the midstory than mesic flatwoods located inland. Common associates include cabbage palmetto, live oak, and southern red cedar. Due to shading, the understory is variable, frequently including saw palmetto, yaupon, sea myrtle, gallberry, spikegrass, saltmeadow cordgrass, needlerush, blackberry, false willow, and wax myrtle. Pond pine also occurs in mesic flatwoods that tend to be wetter and more acidic and that contain more shrubs than longleaf pine sites (Edmisten 1963, Clewell 1981).

There are also mesic flatwoods sites that have been cut and converted to pine plantations. In many cases the pine species that originally occurred on the site were replaced by other species. The most common conversion was from longleaf pine to slash pine. Some flatwoods sites were also converted to agricultural fields.

Mesic Hammock (6,136 acres)

Mesic hammocks are typically moderate-to-dense-canopied, mixed hardwood or pine-hardwood forests that have developed in the absence of frequent fires. For the purpose of the forest habitat plan, mesic hammocks are subdivided. Hardwoods comprise over 75 percent of the overstory and midstory basal area in mesic hardwood hammocks. Mesic pine-hardwood hammocks, in contrast, have at least 25 percent of the overstory and midstory basal area comprised of pine and hardwoods.

These pine-hardwood hammocks, particularly those stands with low hardwood stocking, will often be indicative of a transition between mesic flatwoods and mesic hammock habitats. However, most pine-hardwood hammocks will be vegetatively similar to mesic hardwood hammocks, except for the relative abundance of overstory pine.

Typically, mesic hammocks consist of a mix of overstory and midstory trees, which may include live oak, sweetgum, laurel oak, water oak, loblolly pine, southern magnolia, wax myrtle, redbay, American holly, persimmon, pignut hickory, rusty lyonia, longleaf pine, sparkleberry, red buckeye, yaupon, slash pine, mockernut hickory, and/or flowering dogwood. The understory and groundcover are generally sparse to moderate and consist of the overstory and midstory species, as well as spikegrass, American beautyberry, saw palmetto, highbush blueberry, poison ivy, gallberry, partridge berry, muscadine, Virginia creeper, and witch hazel.

Hydric Habitats

Wet Flatwoods (2,586 acres)

The wet flatwoods habitat on the refuge can be subdivided into two very distinct communities: longleaf pine-wiregrass and slash pine-sedge.

The longleaf pine-wiregrass wet flatwoods community is similar to communities described by other authors as herbaceous bogs or savannas (Folkerts 1982, Clewell 1981, Edmiston and Tuck 1987, Wolfe et al., 1988). This community, which is often intermixed with mesic flatwoods, primarily occurs west of Buckhorn Creek, although a few scattered pockets may be found elsewhere on the Panacea Unit.

The overstory of the longleaf pine-wiregrass wet flatwoods is generally very open and mainly contains scattered longleaf pine and occasional slash pine. An exception is an area where up to 200 acres or more were clear cut and planted to slash pine in the early 1960s (Kreager 1961, Hays 1961, Roberts 1962, Roberts and Hays 1962). The slash pines in these plantations have generally developed very poorly in these hydric sites and have not formed the dense canopies typical of mesic flatwoods plantations.

The predominately herbaceous ground cover is very diverse and dominated by wiregrass, which often forms tussocks (Clewell 1981). Other common species include pipewort, St. John's wort, club moss, sundews, sedges, yellow-eyed grass, smooth meadow-beauty, various orchids, bog buttons, toothache grass, beard grass, candyweed, colic root, butterworts, dwarf wax myrtle, Florida dropseed, *Helianthus heterophyllus*, *Baldwina uniflora*, yellow meadow-beauty, goldcrest, redroot, parrot pitcher-plant, and coppicing titi and giant gallberry.

The slash pine-sedge wet flatwoods community occurs on the St. Marks Unit and possibly the Wakulla Unit of the refuge. It consists of a variable slash pine overstory with occasionally pond cypress on some sites, and a moderate to dense ground cover that is usually dominated by either sawgrass or needlerush. Other common understory plants include various sedges, wax myrtle, marsh fleabane, musky mint, pipewort, and white-top sedge.

Evergreen Shrub Bog (701 acres)

Evergreen shrub bogs are found throughout the Panacea Unit and on the northwestern portion of the Wakulla Unit. These shrub bogs generally occur in hydric depressions interspersed in mesic flatwoods or along the edge of swamps, hydric hammocks, or ponds.

The overstory, if present, is usually sparse to moderately dense slash pine and occasionally pond cypress. The usually dense shrub midstory is frequently dominated by titi, although myrtle-leaf holly is the most common component on some sites. Other common components of the shrub zone include giant gallberry, fetterbush, bamboo vine, wax myrtle, and black titi. The ground cover, if present, usually consists of sphagnum moss and perhaps a few sedges, pipeworts, bog buttons, sundews, or club mosses.

Hydric Hammock (7,692 acres)

Hydric hammocks are differentiated from mesic hammocks by the predominance of species, such as cabbage palmetto, diamond-leaf oak, red maple, sweetbay, green and swamp ash, sawgrass, and lizard's tail that are adapted to wet soil conditions. Although found on all three management units of the refuge, hydric hammocks are most prevalent on the Wakulla and St. Marks Units where they comprise approximately 30 and 63 percent of the forested habitats, respectively. These hydric hammocks vary somewhat due to the relative dominance of certain overstory trees. For the purpose of this plan, hydric hammocks are subdivided into three communities: hydric hardwood hammocks, hydric pine-hardwood hammocks, and pine-cabbage palmetto hammocks.

Hydric hardwood hammocks are those hydric hammocks in which pines comprise less than 25 percent of the overstory and midstory basal area. Where limestone is close to the surface on the St. Marks and Wakulla Units, these wet, calcareous hardwood hammocks are some of the most diverse in Florida (Vince et al., 1989). The overstory and midstory typically form a diverse, moderate to dense canopy of cabbage palmetto, diamond-leaf oak, live oak, red maple, sweetbay, loblolly pine, sweetgum, blackgum, water oak, ironwood, swamp ash, slash pine, cypress, southern red cedar, green ash, swampbay, wax myrtle, yaupon and/or dahoon holly (Thompson 1980). The understory and groundcover are commonly sparse to moderate and often aggregated on slightly elevated sites. Characteristic plants include the overstory and midstory species as well as spikegrass, sawgrass, lizard's tail, netted chain-fern, poison ivy, *Rhynchospora miliacea*, carex, wood grass, saw palmetto, cinnamon fern, resurrection fern, dwarf palmetto, Virginia chain-fern, fetterbush, royal fern, and cane.

Hydric pine-hardwood hammocks are those hydric hammocks where pines comprise between 25 and 75 percent of the overstory and midstory basal area and cabbage palmetto does not account for over 75 percent of the non-pine basal area.

These hammocks are usually similar to the hydric hardwood hammocks in species composition, except for the relative abundance of overstory pines, and are probably the result of a more recent severe disturbance (e.g., fire) than the hardwood hammocks (Vince et al., 1989).

As the name implies, pine-cabbage palmetto hammocks are predominately composed of pines and cabbage palmetto although live oak and/or other hardwoods may occur. This community can be identified by pines comprising between 25 and 75 percent of the total overstory and midstory basal

area and cabbage palmetto comprising over 75 percent of the non-pine basal area. The dominance by pine and cabbage palmetto are a result of their tolerance of the recurring fires that frequent this hydric community (Vince et al., 1989).

The pine-cabbage palmetto hammocks are generally composed of a moderate to dense mixture of taller-growing loblolly or slash pines that tower over shorter-statured cabbage palmetto. The understory varies with the density of the canopy, but often includes spikegrass, yaupon, wax myrtle, cabbage palmetto, wiregrass, saw palmetto, sawgrass, greenbrier, gallberry, blackberry, poison ivy, and/or cane.

Swamp (approx. 7,322 acres)

Swamps are subject to more frequent inundation than any other forested habitat on the refuge. The overstory, which is typically dominated by pond cypress and/or blackgum, is usually dense, although moderate to open stands do occur. Other commonly associated overstory and midstory trees and shrubs include slash pine, red maple, sweetbay, willow, buttonbush, titi, ash, myrtle-leaf holly, loblolly pine, wax myrtle, bald cypress, cabbage palmetto, dahoon holly, water tupelo, and swampbay. The understory is generally open and many species are clumped on the buttresses of certain overstory trees (particularly cypress) and decaying stumps and logs. Characteristic plants include bamboo vine, sphagnum moss, fetterbush, netted chain-fern, leucothoe, sawgrass, poison ivy, sweet pepperbush, climbing heath, St. John's wort, carex, *Rhynchospora miliacea*, lizard's tail, purple bladderwort, and *Eleocharis vivipara*.

Marsh (approx. 25,308 acres)

Marshes often occur adjacent to, or interspersed with, the forested habitats of the refuge. They are dominated by herbaceous plants, although the composition varies considerably due to soil, hydrology, and nearness to the coast. Sawgrass, needlerush, cattail, arrowhead, and pickerelweed are some of the more dominant species encountered in freshwater systems, while black needlerush and smooth cordgrass dominate tidally influenced saltwater systems.

Appendix V. Public Involvement, Consultation, and Coordination

This appendix presents a summary of public comments received from public scoping initiatives as described below. Following the public comment summary are the fact sheets and comment form used during the public scoping process. The persons involved in the development of this plan are listed in the section entitled consultation and coordination.

Summary of Public Scoping

In August 2000, a series of six public meetings were held in the surrounding communities of Panacea, St. Marks, Perry, Monticello, Crawfordville and Tallahassee. More than 100 people attended these meetings to learn about the comprehensive conservation planning process, refuge management programs, refuge vision, and to provide input on the changes in public uses, visitor facilities, and programs they would like to see over the next 15 years. Also, as part of this public scoping process, a packet of information and a questionnaire (copy included) were mailed to over 400 interested citizens, neighbors, organizations, public officials, and friends of the refuge in order to educate them about the planning process and to gauge their interests and concerns about the refuge. The refuge sincerely appreciates those who took the time to attend the meetings, or fill out the questionnaire. Responses were received from 5 organizations and 85 individuals. These comments are helpful to the staff in determining the direction of management and ways for the refuge to become a more enjoyable place to visit and experience nature.

Comments from Organizations

University of Florida Extension, Natural Resource Management, Crawfordville, Florida:

- Primary interests on the refuge are biking, scalloping, birding, hiking, and educating children.
- Provide camping areas that would still allow for wildlife conservation.
- Would like to be able to canoe on the Wakulla and be able to stop at areas that aren't marked by "no trespassing" signs; wants the Service to buy one of these areas (a 5-acre tract of land).
- Would like to see an educational center at the Lighthouse.

Wilderness Watch, Missoula, Montana:

- The plan needs to assess potential impacts of each alternative on the wilderness character of the affected environment. The plan needs to include the St. Marks Wilderness as a specific resource category when assessing environmental impacts to resources on the refuge.
- Encourages the refuge to update its website, brochures, and interpretive displays to highlight the St. Marks Wilderness as an important refuge resource.
- Supports keeping the wilderness as a no-hunting haven for birds and wildlife.
- No artificial nests or viewing blinds should be constructed within the wilderness.
- The plan should analyze the possibility of limiting access to certain areas of the refuge and the wilderness during sensitive nesting seasons.
- Predator control should not be allowed in wilderness except in a temporary emergency situation to protect recovery of an endangered species. Predator control should be addressed in the plan.

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- The plan should identify the locations and extent of exotic species on the refuge and within the wilderness.
 - Recommends a revision of previous management direction that allowed motorized entry into wilderness for fire suppression purposes.
 - The potential impacts of fire retardant on birds and wildlife should be assessed in the plan.
 - Prescribed fire should be considered within wilderness only when necessary to protect survival of threatened and endangered species.
 - The plan should detail current recreational use by type of activity and provide data on visitor numbers and average range in group size.
 - Visitor facilities, such as signs, interpretive displays, or picnic tables, should be located outside the wilderness boundary. No new trails or bridges or boardwalks should be constructed within the wilderness unless an administrative need identifies these as the minimum necessary to protect the wilderness resource.
 - Support an interpretation of minimum tools as the minimum technology and minimum management action that will accomplish management objectives while also preserving an area's wilderness character.
 - The Service should assert regulatory authority over motorized boating within the refuge, and the plan should ban motorized boating within the wilderness boundaries.
 - Believes the refuge has legal authority to regulate activities on surface water within the refuge and that boating is not solely under state jurisdiction. The plan should address issues involving boating within the refuge and particularly within the wilderness and provide the public with a detailed discussion of federal and state authority in this regard. Wants the Service to regulate boating within the refuge and ban all motorized boats from the St. Marks Wilderness to protect federal interests that include the legislatively recognized wilderness character of the area.

Animal Protection Institute, Sacramento, California:

- A rigorous biological assessment and inventory of flora and fauna inhabiting the refuge is needed before compatibility determinations are made.
- Opposed to recreational and commercial killing of wildlife.
- An assessment and mitigation of the impacts of recreational activities on native flora and fauna is needed.
- Request that the Service implement a rigorous biological inventory and analyses of the refuge's fish and wildlife populations, prohibit consumptive use of wildlife on the refuge, and mitigate impacts of recreation on resident and migratory wildlife.

Florida Wildlife Federation, Tallahassee, Florida:

- Supports the refuge system as a critical component of America's wildlife conservation program that provides resource-based outdoor recreation opportunities.
- The refuge provides an increasingly vital link in the chain of state and federal conservation lands in Florida's Big Bend. Supports proposed expansions in the land base of the refuge and restoration of cut over lands to native revegetation. Would like to see future acquisitions and coordination with the Florida Fish and Wildlife Conservation Commission on development of common boundaries. Encourage potential acquisition in partnership with other agencies of Primex buffer land along the east shore of the Wakulla River close to Highway 98.
- Would like to increase current efforts on behalf of the refuge primarily through support of acquisition of inholdings and adjacent parcels which will become subject to development if not acquired.
- Keep Chinese tallow trees and other exotics out of the refuge and surrounding areas.

Defenders of Wildlife, Washington, D.C.:

- The refuge should take an ecosystem approach to management focusing on the following five major areas.
- Regarding land acquisition, objectives should strive to meet the needs of the refuge itself and of the larger system of which it is a part. This agency supports the acquisition of lands identified in the Final Environmental Assessment and Land Protection Plan (2000).
- The refuge should base all of its decisions regarding recreational uses on the needs of wildlife and habitat and on maintaining the “biological integrity, diversity, and environmental health” of the refuge. The refuge should ensure that all uses have minimal impacts.
- To protect water quality, all upland development should be prevented in the refuge, even if the structures are small, outdoor facilities, such as restrooms or vending machines. We recommend the refuge continue to prohibit off shore drilling in order to prevent spills that could adversely affect the refuge.
- The refuge should continue to respond rapidly to new colonies of invasive plants and animals in order to restore the native and endemic species that belong on the refuge. The plan should include a target date for completion of an integrated pest management plan.
- Controlled burns should mimic the original fire regimes.
- The refuge needs staffing and funding to monitor the habitat and populations of listed species (black bear, etc.), and to assure that resource management practices are having their intended results.

Comments from Citizens (Summary of comments from 85 individuals)

Primary Interests or Activities on Refuge:

The majority of citizens support and appreciate the opportunities for viewing wildlife on the refuge. Interest in hiking was mentioned most frequently by the public, followed by birding, viewing other wildlife, fishing, environmental education, bicycling, hunting, watching butterflies, horseback riding, photography, and camping. There is a lot of interest in the St. Marks Lighthouse. There was strong support for refuge trails used by birders, hikers, bicyclists, and horseback riders.

There was high praise for the refuge staff and its management of the refuge. The staff was especially praised for the biological, recreational, and environmental education programs. A few specific comments regarding current management include: keep the refuge the way it is; we like/love it the way it is; allow only what is necessary to meet the refuge mission; don't want to see changes there, leave it as a preserve; and keep up the good work, good job!

General comments:

- The refuge maintains the rural characteristic of the community and provides a pleasant environment. However, residents also bear an economic burden with the refuge having such a large presence, since real estate taxes/equivalence are not fully funded by the federal government. The refuge should lessen the adverse economic impact to Wakulla County property owners.
- Expand the refuge into one large unit instead of many individual sections.

Land Acquisition:

- Enlarge refuge owned/managed acreage. Inholdings and the most sensitive areas should be purchased first so that rangers could more easily keep out poachers, vandals, etc.; but ideally all the targeted areas in the Final Environmental Assessment and Land Protection Plan for the Proposed Expansion of St. Marks National Wildlife Refuge of 2000 should be included.

Wildlife Habitat Management:

- The majority of the individual responses mentioned the restoration and protection of wildlife habitat as the most important management initiative on the refuge, which is consistent with the refuge's primary mission of wildlife first.

Specific Comments:

- Protect watersheds and habitat.
- Manage in a pristine state to the extent possible.
- Remain undeveloped as much as possible.
- Limit human intrusion in some areas.
- Protect from development encroachment; there are not many natural areas left.
- Keep it old-time Florida and not built-up.
- Stay wild and unmanaged looking.
- Expand protection in those areas that affect endangered species.
- More protection for birds--habitat protection, land acquisition, protect from outside threats.
- Less human intrusion and more improvements for wildlife.
- Less human impact; no more paving; keep it natural, clean, and safe for wildlife.
- People may need to change their own habits to accommodate wildlife needs.
- Animal welfare should be considered before conveniences for humans.
- More wildlife conservation and less human recreation.
- Maximize public use consistent with protection of native plants and migrating birds.
- Preserve long-term management of Tall Timber plots (long leaf pine).
- New plantings of fall nectar plants and trees for butterfly roosting along the dikes.
- Continue to enhance environment for water birds.
- Protect refuge water quality as a buffer to the estuary.
- Computerize the fire management program.
- Find data on density of coastal slash pine virgin stands to justify stand thinning.
- Need assessment and mitigation of recreation impacts on native flora and fauna.
- Eradicate invasive and exotic species.
- Focus more on vegetative communities/habitats and their management; how and why does the refuge manage them?
- Concerned about the effect industry (Primex) is having on our natural resources from effluent discharge.
- Wants lakes/pools adversely affected by drought restored to support bass fish.
- Refuge plans should include elimination of pulp forest management, permitting the great diversity of native Florida flora and fauna to return to the wildlife area.
- Provide more mixed hardwoods to attract more migrating song birds.

Public Use Management:

- Support sound management of resource based recreation (hunting, fishing, and hiking).
- Need to accommodate kayaking, equestrian, biking, camping, photography, painting, snorkeling and hiking.
- No personal watercraft or all-terrain vehicles.
- Ban crab trapping or require use of excluder device to protect diamondback terrapins.
- Provide concessionaire for kayak/canoes.
- Open up more dikes or areas outside for people to bike and hike, but don't add buildings.
- Continue maintenance of areas to allow for birders to view.
- Encourage use of other units besides St. Marks.
- Keep people (weekender types) concentrated.
- Recreation impacts seem to be increasing; may need to close some areas to public.

Accessibility and Facility Development:

- Better accessibility on other units comparable to the St. Marks unit, with small visitor centers or shelters.
- Provide access to St. Marks and Wakulla Rivers or to refuge from rivers for resting.
- Difficult for hikers to get across the St. Marks River.
- No more access, there are already enough roads and trails.
- Don't build any more buildings, but if you do, keep them near the visitor center.
- Better rest and restroom facilities.
- Better accessibility for the elderly and handicapped.
- Need more mobility-impaired facilities like boardwalks, ramps to overlooks.
- Develop lighthouse as cultural/natural history center.
- Provide research station at the lighthouse.
- Provide facility for meetings with a nice dock at the lighthouse.
- Restore the lighthouse and open to visitors on regular schedule.
- Open/don't open lighthouse to the public.
- Provide better visitor services, with museum and gifts at lighthouse and larger visitor center for displays.
- Provide education center at the lighthouse focusing on coastal/estuarine learning.

Hunting:

- Oppose recreational killing of wildlife.
- Continue hunting, but keep it highly controlled.
- No hunting except for population control.
- Deer hunts eliminate young bucks allowing less dominant bucks to breed leading to inferior herd.
- Add more hunting days for wild hogs.
- The majority of turkey hunters enjoys spring turkey seasons and would appreciate if the turkey were eliminated from other hunts (current practice). Eliminating the turkey from other hunts could lead to an increase in the number of gobblers available to breed hens and lead to a subsequent increase in their population.

Fishing:

- Fishing seems incompatible with wildlife conservation.
- Restrict fishing to bank sides in designated areas, from canoes or battery/small horsepower boats.
- Need a small pier for better access for shore fishermen.
- Provide better access for shore fishermen.
- Extend the oyster bar adjacent to boat channel.
- Allow saltwater fishing guides to launch at refuge ramp, using special use permits, to enhance/promote public understanding of saltwater fishing.

Airboats and Motorboats:

- No airboats at Piney Island or anywhere else.
- Displeased by traffic from airboats and other motorized boats.
- Boaters speed along the road and are often rude and impatient with wildlife watchers.
- Many boaters are using refuge as a cheap launch site to the detriment of wildlife, other visitors and the environment.
- Re-open the boat ramp to 24 hours; front gate open before and after sunrise/sunset.
- Need access to boat ramp before 6 a.m.; 5 a.m. would be good enough.
- Dredge the boat channel.
- Expand dock eastward toward ramp for more boats to use simultaneously.
- Need restrooms at boat ramp.
- Expand parking at the boat ramp; too congested on the weekend.
- Fishermen expend less gas/oil into refuge waterways and nearby rivers if they use the saltwater boat ramp at the St. Marks Lighthouse instead of Shield's or the city of St. Marks boat ramps.

Motor Vehicle Use:

- Discourage vehicle traffic with shuttles/tours.
- Slower car speed through the refuge.
- Enforce the speed limit.
- Motor vehicle uses should be eliminated as much as possible.
- Enhance vehicle access; allow dike driving as is done at Merritt Island National Wildlife Refuge.

Hiking and Trails Management:

- Need more trails; maybe some along a coastal area; keep trails primitive.
- Cut grass more frequently on trails in summer.
- Do not allow or encourage bikers or horseback riders.
- Do not allow dogs, even when on leashes.
- Separate trails are needed for different user types--not multi-use.
- Continue to protect and improve the Florida National Scenic Trail (FNST).
- The FNST should be completed using optimal trail location procedures.
- Need way to join the FNST (St. Marks and Wakulla sections) without using U.S. Highway 98.

-
- Extend the FNST into Apalachicola National Forest by purchasing St. Joe land west of Highway 319. Link Ochlockonee River State Park to refuge via the FNST.
 - Is difficult for through hikers on FNST to plan exact dates of camping and to get permits.
 - High grass on dikes is hard to hike in, please cut more than once annually.
 - Refuge accessibility should involve some effort by walking and then only briefly.

Biking:

- Allow a bicycle concession at the visitor center to foster better public access to dikes and trails.

Horseback Riding:

- Provide marked horseback riding trails and trailer parking with shade.
- Public use should be limited to horseback riding with limited number of riders in a restricted area, with stables, restrooms and picnic areas; trail rides with guides.

Camping:

- Provide limited camping facilities.
- Experiment with camping for limited number of non-through hikers.
- Experiment with night use under ranger or volunteer supervision.
- Camping areas along refuge edge would minimize impacts.
- Establish one or two primitive camping sites for paddlers to fill the current gap in Big Bend Saltwater Trail; one good site is 2 miles up the Pinhook River.
- Want to hike only a portion of the Florida National Scenic Trail and camp overnight.
- Need to provide water, table, fire ring, and be able to register at campsites.

Environmental Education and Interpretation:

- More sophisticated facilities: web cams, computers and interactive tools at visitor center.
- Is important for young people to experience the undeveloped Florida.
- Add more educational displays and programs.
- Provide education stations for full student participation.
- Want more history interpretation and events related to human history on refuge property, such as lighthouse area and Native Americans.
- Would like to see a good written history of the land, peoples and the lighthouse; provide more education, interpretation, history along Lighthouse Road; and place educational displays at the lighthouse area about monarch butterfly migration/refuge role.
- Provide more education programs on living with and protecting natural resources.
- Focus on refuge world-class attractions--butterflies and birds.
- Provide more interpretation of vegetative communities and how they are managed.
- Increase interpretive areas that look at native species and habitat.
- Continue education for children to make them aware of environment.
- Place a display at the boat ramp identifying common fish and limits.
- Need more posted signs that identify the areas shown on maps.
- Provide more interpretive signs at pullout spots along the road.

Safety:

- Need better markers around the sunken barge.

Partnerships and Coordination:

- Better planning and management coordination is needed with Apalachicola National Forest and other large public lands.
- Encourage proactive acquisition partnerships with other agencies on Primex land, or, at least secure development rights or right of first refusal.
- Manage and coordinate human activities in and around the refuge.
- Work cooperatively with adjacent landowners to support controlled burning.
- Explore sustainable development opportunities with St. Joe.
- Acquisition and coordination is needed with Florida Fish and Wildlife Conservation Commission on common boundaries.
- Need to ally with environmental groups and state/federal agencies and politicians.
- More partnerships are needed with agencies/schools for monitoring and research.

This fact sheet was developed and distributed in 2000 during public scoping.

Comprehensive Conservation Plan: A Guide for Managing the Refuge

In April 2000, refuge staff began a two-year planning process to define the management objectives for guiding the refuge into the twenty-first century. The Comprehensive Conservation Plan (Plan) will be our working guide for wildlife management practices, fishing and hunting programs, endangered species recovery, land acquisition, habitat restoration, facilities development and maintenance, staffing and administrative priorities. Also, the National Wildlife Refuge Improvement Act (1997) requires us to consider six priority public uses- hunting, fishing, wildlife observation, photography, environmental education and interpretation when developing the Plan.

A Draft Plan will be available for review and comment in 2001 and a Final Draft should be ready by 2002. If you would like to provide written comments or be placed on the Plan mailing list for future notification about the planning process, contact the Natural Resource Planner at the address below or drop off your written comments at the Refuge Visitor Center on Lighthouse Road.

7298 Coastal Highway
Phone: 850-925-1497
Crawfordville, FL 32327
E-Mail: Steven_Ovenden@fws.gov

NOTE: This address, contact, and phone number are no longer current.

Mission of the National Wildlife Refuge System

The mission of the Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Goals of the National Wildlife Refuge System

- To conserve, restore, and enhance in their natural ecosystems (when practicable) all species of animals and plants that are endangered or threatened with becoming endangered;
- To perpetuate the migratory bird resource;
- To conserve a natural diversity and abundance of fauna and flora on refuge lands; and
- To provide an understanding and appreciation of fish and wildlife ecology and man's role in his environment and to provide refuge visitors with high quality, safe, wholesome and enjoyable recreational experiences oriented toward wildlife to the extent these activities are compatible with the purposes for which the refuge was established.

This fact sheet was developed and distributed in 2000 during public scoping.

St. Marks National Wildlife Refuge Comprehensive Conservation Plan

Frequently Asked Questions

Comprehensive Conservation Plan: A Guide for Managing the Refuge

In April 2000, refuge staff began a two-year planning process to define the management objectives for guiding the refuge into the twenty-first century. The Comprehensive Conservation Plan (Plan) will be a clear vision of the future refuge and provide sound justification for determining future operation, maintenance and enhancement priorities.

Why is the Refuge Preparing a Plan?

The Plan will guide wildlife and habitat management and determine the types of public uses that are compatible with the mission of the refuge- the conservation of fish, wildlife and plants. Most importantly, the Plan process requires input from refuge neighbors, visitors and cooperating agencies in order to foster partnerships and encourage compatibility of management practices within the ecosystem as a whole. *If you have certain issues or opportunities to discuss, now is the time to get involved in the planning process.*

How Will The Plan Affect the Refuge?

The Plan will be the refuge management plan for the next fifteen years. It is the vision for what we want the refuge to become over the long-term. The Plan will be our working guide for wildlife management practices, fishing and hunting programs, endangered species recovery, land acquisition, habitat restoration, facilities development and maintenance, staffing and administrative priorities. Also, the Wildlife Refuge Improvement Act requires us to consider six priority public uses- hunting, fishing, wildlife observation, photography, environmental education and interpretation when developing the Plan. *If you have a special interest or concern about any of these priority public uses, please let us know.*

Plan and Public Involvement

A series of public meetings will be held throughout the two-year planning process in order to provide citizens with information on the Plan and receive comments on all aspects of refuge management. A Draft Plan is scheduled to be completed in 2001 and will be available for review and comment and a Final Draft should be ready by 2002. If you would like to provide written comments or be placed on a mailing list for future notification about the planning process, contact the Natural Resource Planner at the address below **or** drop off your comments next time you visit the Refuge Visitor Center on Lighthouse Road.

7298 Coastal Highway
Crawfordville, FL 32327
Phone: 850-925-1497

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Mission of the National Wildlife Refuge System

The mission of the System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Goals of the National Wildlife Refuge System

- Conserve a diversity of fish, wildlife, and plants and their habitats, including species that are endangered or threatened with becoming endangered.
- Develop and maintain a network of habitats for migratory birds, anadromous and interjurisdictional fish, and marine mammal populations that is strategically distributed and carefully managed to meet important life history needs of these species across their ranges.
- Conserve those ecosystems, plant communities, wetlands of national or international significance, and landscapes and seascapes that are unique, rare, declining, or underrepresented in existing protection efforts.
- Provide and enhance opportunities to participate in compatible wildlife-dependent recreation (hunting, fishing, wildlife observation and photography, and environmental education and interpretation).
- Foster understanding and instill appreciation of the diversity and interconnectedness of fish, wildlife, and plants and their habitats.

St. Marks National Wildlife Refuge Establishing Legislation

“...as a refuge and breeding ground for wild animals and birds...” -Executive Order 5740, October 31, 1931

“...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds.” -16 U.S.C. 715d (Migratory Bird Conservation Act)

“...suitable for- (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species...” -U.S.C. 460k-1 (Refuge Recreation Act)

This fact sheet was developed and distributed in 2000 during public scoping.

St. Marks National Wildlife Refuge
Comprehensive Conservation Plan
Public Comments Form

The Refuge Plan planning process includes public participation in order to produce a plan that will be supported by the surrounding community, visitors, neighbors and cooperating agencies. Your comments will help us determine what your vision for the refuge is and how we can best manage the refuge in order to achieve our common goals for wildlife conservation. **Please return this form to the address listed below no later than September 1, 2000. Thanks!**

What are your primary interests or activities on the refuge?

What kind of changes would you like to see on the refuge in the next fifteen years?

What is your personal vision of the refuge? What kind of place will it be?

Additional comments?

(Optional) Provide your name and address if you would like to be notified of future meetings.

Coordination and Consultation

Several teams and advisory groups were involved in the planning process with representation from the Service, Florida Department of Environmental Protection, Florida Fish and Wildlife Conservation Commission, and others as listed below.

Biological Review - May 8-11, 2000:

A team of 15 biologists, ecologists, managers, and foresters from the Service (including key refuge staff), Florida Fish and Wildlife Conservation Commission, Tall Timbers Research Station and The Nature Conservancy conducted a review of the wildlife and habitat management programs on the refuge from May 8 through May 11, 2000. The primary focus of this effort was to examine the refuge's biological program to identify needs and to provide guidance to the refuge for the preparation of the Comprehensive Conservation Plan. Attendees included:

Frank Bowers, Migratory Bird Coordinator, USFWS, Atlanta, Georgia;
Roger Boykin, Chief, Fire and Law Enforcement, USFWS, Atlanta, Georgia;
Dave Brownlie, Regional Fire Ecologist, USFWS, Tall Timbers Research Station, Tallahassee, Florida;
James Burnett, Refuge Manager, USFWS, St. Marks NWR, St. Marks, Florida;
Bob Eaton, former Administrative Forester/Fire Management Officer, USFWS, St. Marks NWR;
Ron Freeman, former District Wildlife Management Biologist, USFWS, Auburn, Alabama;
Red Gidden, former Wildlife Biologist (1962-1990), USFWS, St. Marks NWR;
Sharon Hermann, Plant Ecologist, Tall Timber Research Station, Tallahassee, Florida;
Chuck Hunter, Migratory Birds, USFWS, Atlanta, Georgia;
Rob Kelsey, Fisheries Biologist, USFWS, Atlanta, Georgia;
Frank Parauka, Fisheries Biologist, USFWS, Ecological Services, Panama City, Florida
Joe Reinman, Wildlife Biologist, USFWS, St. Marks NWR;
Greg Seamon, Land Steward, The Nature Conservancy, Bristol, Florida;
Billy Sermons, Regional Biologist, Florida Fish and Wildlife Conservation Commission, Panama City, Florida; and
Stan Simpkins, Wildlife Biologist, USFWS, Ecological Services, Panama City, Florida.

An **interagency team** met on June 26, 2000, to discuss issues, goals, and objectives for the plan. The following persons attended:

Dave Brownlie, Regional Fire Ecologist, Tall Timbers Research Station, USFWS, Tallahassee, Florida;
James Burnett, Refuge Manager, St. Marks NWR, St. Marks, Florida;
David Cook, Florida Fish and Wildlife Conservation Commission, Tallahassee, Florida;
Bob Eaton, former Administrative Forester/Fire Management Officer, St. Marks NWR;
Gary Knight, Florida Natural Areas Inventory, Tallahassee, Florida;
Harold Morrow, former Assistant Refuge Manager, St. Marks NWR;
Ed Oaksford, U.S. Geological Survey, Tallahassee, Florida;
Steve Ovenden, former Natural Resource Planner, St. Marks NWR;
Joe Reinman, Wildlife Biologist, St. Marks NWR;
Jim Stevenson, Florida Department of Environmental Protection, Tallahassee, Florida; and
Robin Will, Refuge Ranger, St. Marks NWR.

A **public use review** advisory team met on April 27-29, 2001, and included:

Robin Will, Refuge Ranger, St. Marks NWR;
Cheryl Simpson, Chief of Visitor Services, USFWS Regional Office, Atlanta, Georgia;
Garry Tucker, Visual Information Specialist, USFWS Regional Office, Atlanta, Georgia; and
Donna Stanek, Visual Information Specialist, USFWS, Regional Office, Atlanta, Georgia.

A **Wilderness Review** was conducted on October 16-18, 2001, by the following refuge staff:

James Burnett, Refuge Manager;
Bob Eaton, former Administrative Forester/Fire Management Officer;
Michael Keys, Biological Technician;
Harold Morrow, former Assistant Manager;
Joe Reinman, Wildlife Biologist; and
Robin Will, Refuge Ranger.

A **Cultural Review** (advisory) Team met on February 4-5, 2003. It included the following:

Refuge Staff

Larry Anderson, Park Ranger;
James Burnett, Refuge Manager;
Mary Morris, Natural Resource Planner;
Joseph Reinman, Wildlife Biologist; and
Robin Will, Refuge Ranger.

Other Team Members

Henry Baker, formerly of Division of Historical Resources, Bureau of Archaeologic Research, Department of State, Tallahassee, Florida;
Dr. Judy A. Bense, Chair, Department of Anthropology, University of West Florida, Pensacola, Florida;
Richard "Rick" Kanaski, Regional Archaeologist, USFWS, Savannah, Georgia;
John Phillips, Research Associate, Archaeology Institute, University of West Florida, Pensacola, Florida;
David Roddenberry, Wakulla County Historical Society, Crawfordville, Florida;
Joe White, former Refuge Manager, St. Marks NWR, Tallahassee, Florida;
Brenda Swann, Division of Historical Resources, Bureau of Archeological Research, Department of State, Tallahassee, Florida; and
Mike Russo, National Park Service, Southeast Archaeological Center, Tallahassee, Florida.

The **Comprehensive Conservation Plan Team** (a.k.a Planning Team) was comprised of the following staff (and former staff):

James Burnett, Project Leader
Terry Peacock, Refuge Manager;
Mary Morris, Natural Resource Planner and Planning Team Leader;
Joe Reinman, Wildlife Biologist;
Michael Keys, Wildlife Biologist;
Robin Will, Refuge Ranger;

Larry Anderson, Park Ranger;
Heidi Hubbs, Fire Management Officer;

Jeff Howland, former Assistant Refuge Manager;
Harold Morrow, former Assistant Refuge Manager;

Marc Koopman, former GIS Analyst;
Bob Eaton, former Administrative Forester/Fire Management Officer;
Shawn Gillette, former Volunteer Coordinator; and
Steve Ovenden, former Natural Resource Planner.

The following tribes were notified of the comprehensive conservation planning process and given the opportunity to participate and comment:

Miccosukee Tribe of Indians of Florida;
Seminole Tribe of Florida;
Seminole Nation of Oklahoma;
Poarch Band of Creek Indians of Alabama; and
Muscogee (Creek) Nation of Oklahoma.

Appendix VI. Compatibility Determinations

Refuge Name: St. Marks National Wildlife Refuge

Refuge Uses: The following uses were evaluated to determine their compatibility with the System's mission and the purpose of the refuge: 1) environmental education and interpretation; 2) boating in refuge waters (motorized and human-powered); 3) hiking, backpacking, jogging and walking; 4) horseback riding; 5) bicycling; 6) camping; 7) research and surveys; 8) plant gathering; 9) hunting (big game, upland game, and migratory bird); 10) wildlife observation and photography; 11) picnicking; 12) fishing; 13) forest management; 14) mosquito management; and 15) placement and operation of a United States Coast Guard communications building. A description of each use and its anticipated biological impact is presented in this Compatibility Determination.

Establishing and Acquisition Authorities:

Executive Order 5740 - established St. Marks Migratory Bird Refuge on October 31, 1931
Presidential Proclamation No. 1982 - established the Executive Closure Area on December 24, 1931
Executive Order 7222 - added acreage on November 1, 1935
Executive Order 7749 - added acreage on November 22, 1937
Presidential Proclamation No. 2264 - December 13, 1937 - expanded Executive Closure Area
Executive Order 7977 - added acreage on September 19, 1938
Presidential Proclamation No. 2416 July 25, 1940 - changed name to St. Marks National Wildlife Refuge
Executive Order 9119 - added acreage on April 1, 1942
Secretary's Order - modified the Executive Closure Area on October 22, 1953
Secretary's Order - enlarged and established a new closure order boundary on October 15, 1960.
16 U.S.C. 715d (Migratory Bird Conservation Act of 1929)
16 U.S.C. 461k-1 (Refuge Recreation Act of 1962)

Refuge Purposes: These purposes and the mission of the National Wildlife Refuge System are fundamental to determining the compatibility of proposed uses of the refuge. The purposes of the refuge are as follows:

"...as a refuge and breeding ground for wild animals and birds..." (Executive Order 5740);
"...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." (Migratory Bird Conservation Act);
"...suitable for (1) incidental fish and wildlife-oriented recreation development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species..." (Refuge Recreation Act);
"...for "conservation, management, and restoration of the fish, wildlife, and plant resources and their habitats for the benefit of present and future generations of Americans (National Wildlife System Administration Act); and
"...certain lands in the St. Marks Wildlife Refuge, Florida which comprise approximately seventeen thousand seven hundred and forty-six acres...as the St. Marks Wilderness. (Public Law 92-363).

National Wildlife Refuge System Mission: The mission of the System, as defined by the National Wildlife Refuge System Improvement Act of 1977, is:

“... to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.”

Other Applicable Laws, Regulations, and Policies:

Antiquities Act of 1906 (34 Stat. 225)
Migratory Bird Treaty Act of 1918 (15 U.S.C. 703-711; 40 Stat. 755)
Migratory Bird Conservation Act of 1929 (16 U.S.C. 715r; 45 Stat. 1222)
Migratory Bird Hunting Stamp Act of 1934 (16 U.S.C. 718-178h; 48 Stat. 451)
Refuge Trespass Act of June 25, 1948 (18 U.S.C. 41; 62 Stat. 686)
Fish and Wildlife Act of 1956 (16 U.S.C. 742a-742j; 70 Stat. 1119)
Refuge Recreation Act of 1962 (16 U.S.C. 460k-460k-4; 76 Stat. 653)
Wilderness Act of 1964 (16 U.S.C. 1131-1136; 78 Stat. 890)
Land and Water Conservation Fund Act of 1964
National Historic Preservation Act of 1966, as amended (16 U.S.C. 470, et seq.; 80 Stat. 915)
National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd, 668ee; 80 Stat. 927)
National Environmental Policy Act of 1969, NEPA (42 U.S.C. 4321, et seq; 83 Stat. 852)
Use of Off-Road Vehicles on Public Lands (Executive Order 11644, as amended by Executive Order 10989)
Endangered Species Act of 1973 (16 U.S.C. 1531 et seq; 87 Stat. 884)
Refuge Revenue Sharing Act of 1935, as amended in 1978 (16 U.S.C. 715s; 92 Stat. 1319)
The Property Clause of the U.S. Constitution Article IV 3, Clause 2
The Commerce Clause of the U.S. Constitution Article 1, Section 8
The National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57, USC668dd)
Executive Order 12996, Management and General Public Use of the National Wildlife Refuge System, March 25, 1996

Compatibility determinations for each description listed were considered separately. Although the preceding sections from “Uses” through “Other Applicable Laws, Regulations and Policies” are only written once within the plan, they are part of each descriptive use and become part of that compatibility determination if considered apart from the comprehensive conservation plan.

Description of Use:

Environmental Education and Interpretation

Environmental education and interpretation comprise a variety of activities and facilities that seek to increase the public’s knowledge and understanding of wildlife and to promote wildlife conservation. These are tools used to inform the public of resource values and issues. Examples of environmental education activities include staff or teacher-led events, student and teacher workshops and nature studies. Interpretive programs and facilities include special events, visitor center displays, interpretive trails, visitor contact stations, auto tour routes and signs.

Availability of Resources: Facilities, such as visitor centers, trails and environmental education shelters require funding to build and staff to maintain them, but they are a necessary expense to carry-out the refuge's mission. The management of a volunteer program is essential to implement the environmental education and interpretive programs. A full-time refuge ranger position and a small budget are allocated to this task. Another full-time ranger supervises the volunteer coordinator, conducts programs, and is responsible for visitor use and facilities.

Anticipated Impacts of the Use: The use of the refuge for on-site, hands-on, action-oriented activities by large groups to accomplish environmental education objectives may impose low level impacts on the sites used for the activities. Impacts may include trampling of vegetation and temporary disturbance to wildlife species in the immediate use area. Such impacts will not be permanent or long-lasting. Most of the interpretive activities are self-guiding and pose minimal threat to wildlife and habitat.

Public Review Comment: Public meetings were held on February 16, 22, and 23, 2006. The public review and comment period coincided with the review of the Draft Comprehensive Conservation Plan and Environmental Assessment for St. Marks National Wildlife Refuge.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: Activities should be held on sites where minimal impact will occur. Periodic evaluation of the sites and program should be done to assess whether the program objectives are being met and whether resources are being degraded. If adverse impacts become evident, environmental education and interpretive activities may need to be rotated or moved. Certain areas of the refuge may be restricted seasonally for breeding or nesting purposes or to protect habitat.

Justification: Environmental education and interpretation are priority public uses under the National Wildlife Refuge System Improvement Act. The refuge uses environmental education and interpretation to motivate citizens of all ages to take resource protection actions. Environmental education and interpretation can have positive outcomes, such as instilling a land conservation ethic in visitors, developing support for the refuge, and lessening vandalism, poaching and littering. Through these combined activities, the refuge reaches a diverse group of 280,000 visitors annually.

Mandatory 15-year Re-evaluation Date: 08/09/2021

Description of Use:

Boating in refuge waters (motorized and human-powered)

There are some 2,500 acres of refuge waters contained within the impoundment system and numerous scattered small ponds and lakes on the refuge. Seasonal fishing from motorboats with restricted motor sizes and non-motorized boating for wildlife observation, mostly canoeing, occurs within these waters. Fresh-water fishing, wildlife observation, and photography are companion activities

Availability of Resources: The cost of allowing this use on the refuge is absorbed within the refuge operating budget and does not require additional staff for enforcement or other purposes.

Anticipated Impacts of the Use: The restricted use of motorized and human-powered boats in refuge impoundments, lakes, and ponds will not adversely impact refuge purposes or objectives. Impacts may include wildlife disturbance, littering, vandalism, water pollution from outboard motors, vegetation disturbance, and human/alligator encounters.

Public Review Comment: Public meetings were held on February 16, 22, and 23, 2006. The public review and comment period coincided with the review of the Draft Comprehensive Conservation Plan and Environmental Assessment for St. Marks National Wildlife Refuge.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: Daylight use only. Anglers may fish and boat in Panacea Unit ponds and Otter Lake year-round, but vehicle use to these ponds is prohibited from May 15 through March 15 annually. Impoundments and all ponds and lakes on the St. Marks Units are closed to boating from October 15 to March 15. Airboats, personal watercraft, and hovercraft are prohibited from refuge waters and may not be launched from refuge boat ramps at Wakulla Beach or Lighthouse Road. Outboard motor sizes are restricted to 10 horsepower or less in refuge pools and lakes. To reduce the potential for invasive weed (hydrilla and Eurasian water-milfoil) introduction into the refuge pools, prohibit the use of trailers to launch boats on the St. Marks Unit and limit motors to electric trolling motors. No boating zones may be established and enforced around sensitive areas, such as tern platforms, bird rookeries and roosts, and other areas as necessary.

Justification: Restricted motorized and human-powered boating for fishing and wildlife observation is a low impact and low cost activity. Boating provides access to fishing, a priority public use. Since fish and wildlife observation is an integral part of the boating experience, it is considered a wildlife-dependent activity.

Mandatory 10-year Re-evaluation Date: 08/09/2016

Description of Use:

Hiking, backpacking, jogging, and walking

More than 150 miles of refuge roads, levees, and developed trails are used by many visitors for walking, hiking, backpacking, and jogging. The refuge also contains a 43-mile segment of the Florida National Scenic Trail (FNST) and 1.5 miles of interpretive trails.

Availability of Resources: The roads and levees are maintained for refuge purposes and therefore do not constitute additional cost for these activities, with the exceptions of the FNST and the four interpretive trails, which are maintained by a combination of volunteers and refuge staff.

Anticipated Impacts of the Use: Impacts from these activities could include littering, vegetation trampling, and wildlife disturbance.

Public Review Comment: Public meetings were held on February 16, 22, and 23, 2006. The public review and comment period coincided with the review of the Draft Comprehensive Conservation Plan and Environmental Assessment for St. Marks National Wildlife Refuge.

Determination (check one below):

- Use is Not Compatible
 Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: Hiking, jogging and walking are restricted to daylight hours. Backpackers hiking the entire portion of the FNST within the refuge are allowed to remain overnight under special use permit. Certain areas of the refuge may be restricted seasonally for breeding or nesting purposes or to protect habitat. Pets must be kept on a leash at all times.

Justification: These activities are low impact and considered to be wildlife-dependent. Observation of wildlife is enhanced by using the many trails offered at the refuge.

Mandatory 10-year Re-evaluation Date: 08/09/2016

Description of Use:

Horseback Riding

Horseback riding is an existing use at the refuge that facilitates wildlife observation. As proposed, horseback riding will occur only on certain refuge roads and levees. There are approximately 150 miles of refuge back country roads that are used by horseback riders for pleasure and wildlife observation. The amount of parking for horse trailers limits use on the refuge. Use is light and sporadic, occurring mostly during cooler weather (November through April), particularly on weekends. Horseback riding is allowed in areas near the refuge, such as Apalachicola National Forest and the St. Marks Rail Trail.

Availability of Resources: Based on existing refuge expenditures for managing visitor use, funding is adequate to ensure compatibility and to administer and manage the recreational use listed.

Anticipated Impacts of Use: A literature review was conducted to evaluate the potential effects of horseback riding on wildlife, habitat, human health, cultural resources, and other refuge uses. Although wildlife disturbance from horseback riding is not well-documented, some studies suggest that many wildlife species are habituated to livestock and that horseback wildlife observers can approach wildlife at closer distances than by other forms of travel. Any form of approach is expected to cause some disturbance, which will vary according to the species affected and the type, level, frequency, and duration of disturbance, as well as the time of day or year that it occurs.

Horseback riding has both direct and indirect effects on habitat. Trampling causes mortality of plant (and animal) species by crushing. Indirect effects result when soil is compacted and plants cannot re-establish. Grazing can reduce vegetation. There is debate within the literature over whether horse hair or feces can spread exotic weed seed. Any trail or road can be a conduit for the introduction of exotic plants, since exposed soil and abundant sunlight provide favorable conditions for establishment.

Compacting and loosening of soils occurs from stock riding, more so in moist or wet soils. Therefore, trails should be established in well-drained, upland sites. Roads and trails for public access affect hydrologic drainage patterns. Horseback riding is proposed to continue on existing, designated refuge roads.

While it is possible for horses to transmit parasitic diseases, particularly *Cryptosporidium parvum* and *Giardia duodenalis*, to humans via the water supply, these diseases are usually spread by pregnant mares and foals under 6 months old, not through adult horse guts. Horse manure is not harmful to human health, although it can cause conflicts with other trail users since it can be odorous, unaesthetic, and a nuisance.

While there can be user group conflicts or safety issues resulting from hikers, cyclists, and horseback riders using the same roads and levees, these are not anticipated effects due to the current levels of use. Horseback travel on the designated roads and levees is considered safe under current conditions and level of use. Because all refuge trails traverse wetlands for some or all of their length, horseback riding will be permitted only on designated roads and levees and prohibited on established, interpretive hiking trails and wilderness trails.

Public Review Comment: Public meetings were held on February 16, 22, and 23, 2006. The public review and comment period coincided with the review of the Draft Comprehensive Conservation Plan and Environmental Assessment for St. Marks National Wildlife Refuge.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: Horseback travel to facilitate priority public use is only compatible on designated roads and levees as indicated on the following three maps. Horses are not allowed on foot trails. Horseback riding is only allowed between sunrise and sunset (normal refuge hours). Camping and overnight parking are prohibited. Group size is limited to a maximum of eight riders who travel no more than two abreast. Horseback riding is prohibited during deer gun hunting season in all refuge hunt areas. All roads will be monitored annually to determine if they meet the compatibility criteria. Monitoring will be designed to assess the long-term effects of horse riding on refuge resources, visitor use, and route maintenance needs. Law enforcement patrols will be conducted throughout the year. The patrols will promote compliance with refuge regulations, monitor public use patterns and public safety, and document visitor interactions. Patrols will include recording visitor numbers, vehicle numbers, visitor activities, and activity locations to document the current and future level of refuge use. No corralling, tethering or hitching of horses along trails is allowed. No horseback riding is allowed in the Wilderness Areas. The east levee of Mounds Pool #3 is closed seasonally to all visitor use, including horseback riding, to prevent waterfowl disturbance. Other areas of the refuge may be closed to the public seasonally to protect certain species or habitat. Riders may gain entrance to the refuge road system only at designated access points.

Justification: While not listed as a primary, wildlife-dependent recreational use under the National Wildlife Refuge Improvement Act, as amended, horseback riding is believed to be a compatible public use under the stipulations outlined in this compatibility determination. Primary reasons for this determination include the following: wildlife observation can be an element of horseback riding; horseback riding allows the refuge to reach a target audience that it would not otherwise reach; horseback riders are potential partners and a potential source of support for the wildlife refuge; and impacts associated with horseback riding are not believed to exceed impacts already caused by other public use activities.

Mandatory 10-year Re-evaluation Date: 08/09/2016

Description of Use:

Bicycling

Both road and mountain bike routes are available to bicycle riders with about 143 miles of back-country roads, 19 miles of levees and 8 miles of paved roads on the refuge.

Availability of Resources: The roads and levees are maintained for refuge purposes and do not incur any additional costs for bicycling.

Anticipated Impacts of the Use: Minor impacts may occur, such as littering and vegetation and wildlife disturbance. Refuge law enforcement officers patrol regularly and refuge staff regularly pick-up litter. A refuge-wide coastal cleanup is held annually with staff and volunteers.

Public Review Comment: Public meetings were held on February 16, 22, and 23, 2006. The public review and comment period coincided with the review of the Draft Comprehensive Conservation Plan and Environmental Assessment for St. Marks National Wildlife Refuge.

Determination (check one below):

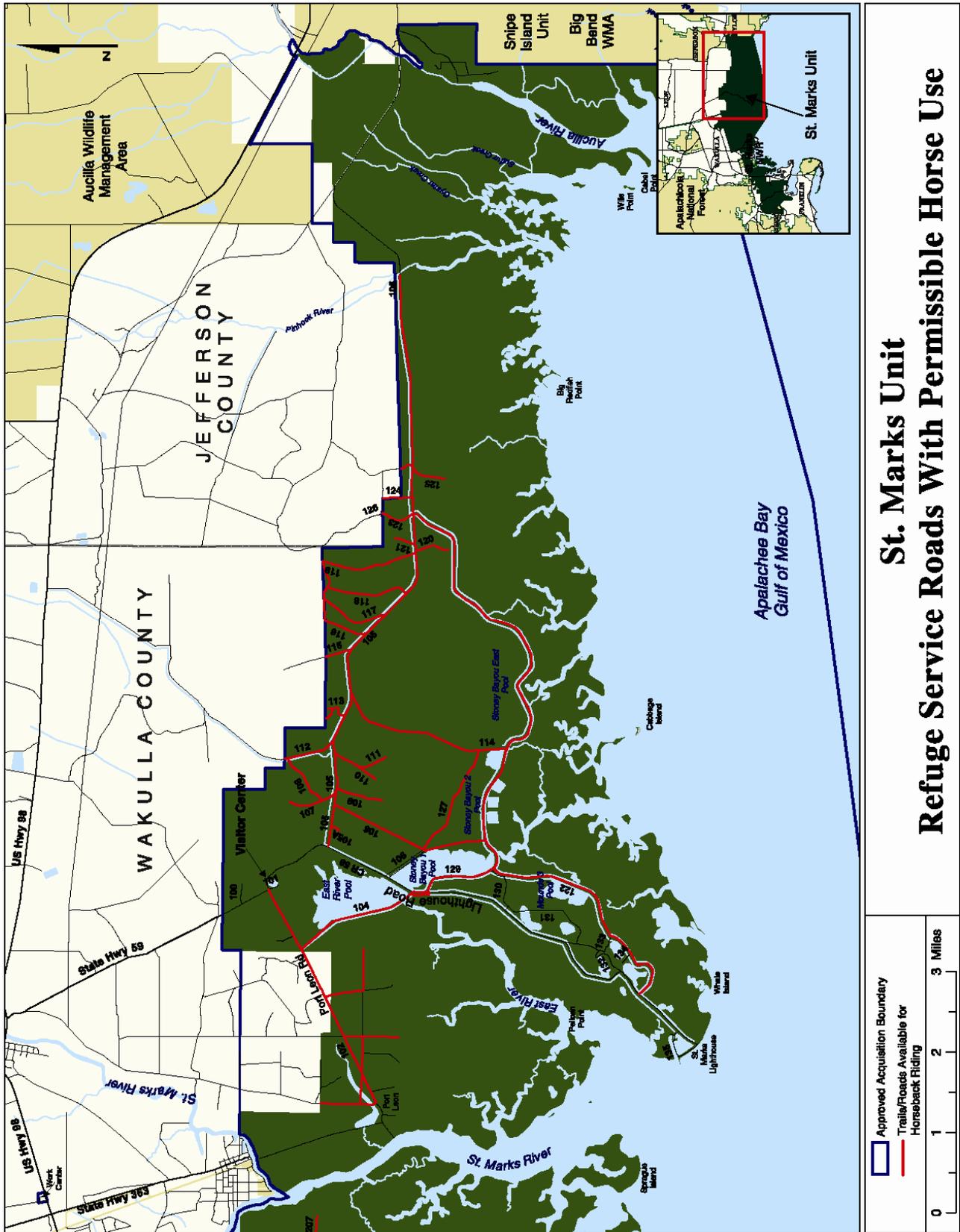
- Use is Not Compatible
 Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: Bicycling is not allowed in Wilderness Areas of the refuge. Bicycling is restricted to refuge-maintained roads and levees. Non-refuge sponsored groups of more than 10 cyclists must apply for a special use permit. Only daylight use is allowed. Certain areas of the refuge may be restricted seasonally for breeding or nesting purposes or to protect habitat.

Justification: Bicycling on roads and levees is considered a low impact, wildlife-dependent use. Many parts of the refuge are unavailable for day use without bicycle access since distances are too great for access by foot.

Mandatory 10-year Re-evaluation Date: 08/09/2016

St. Marks Unit service roads with permissible horse use

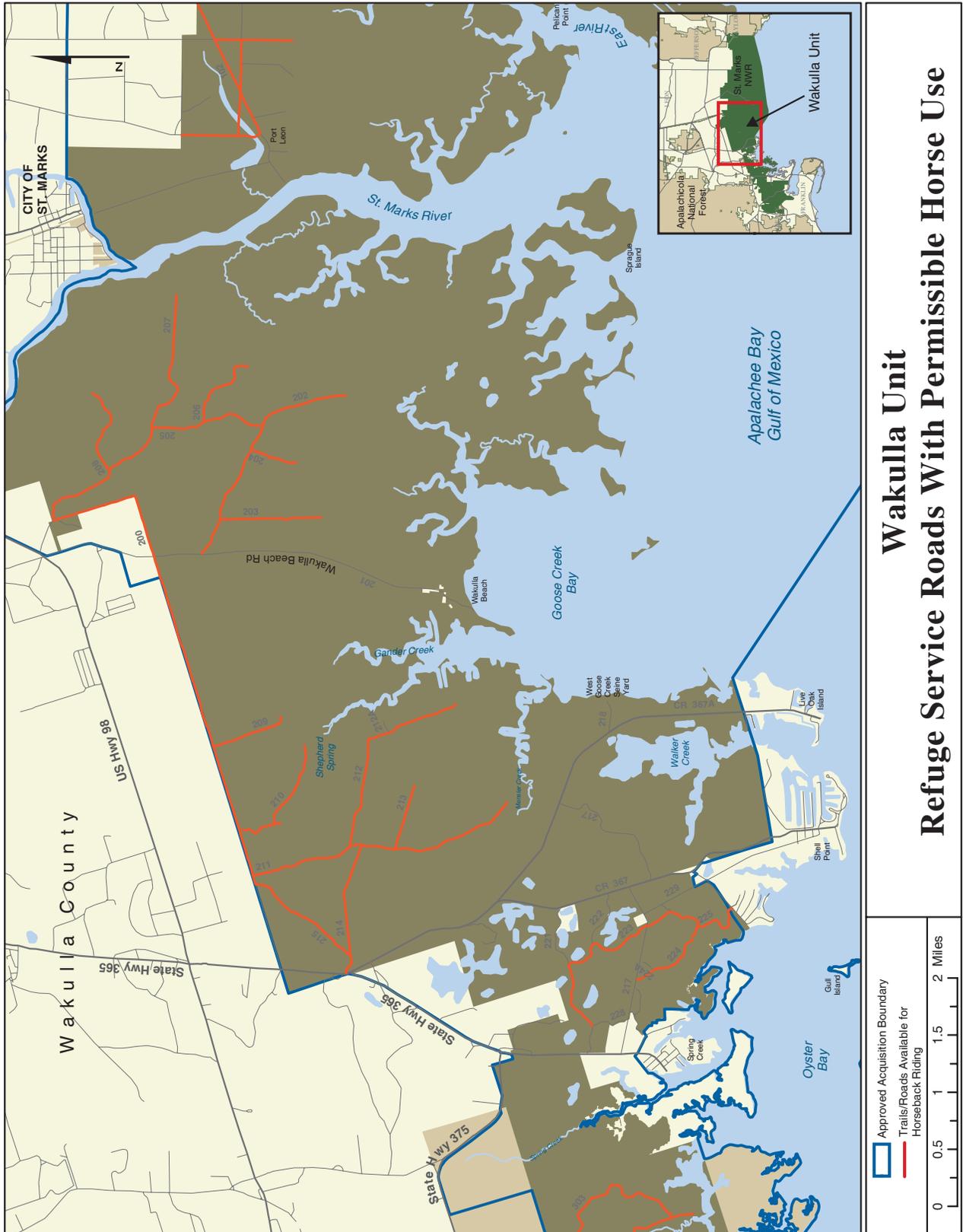


St. Marks Unit
Refuge Service Roads With Permissible Horse Use

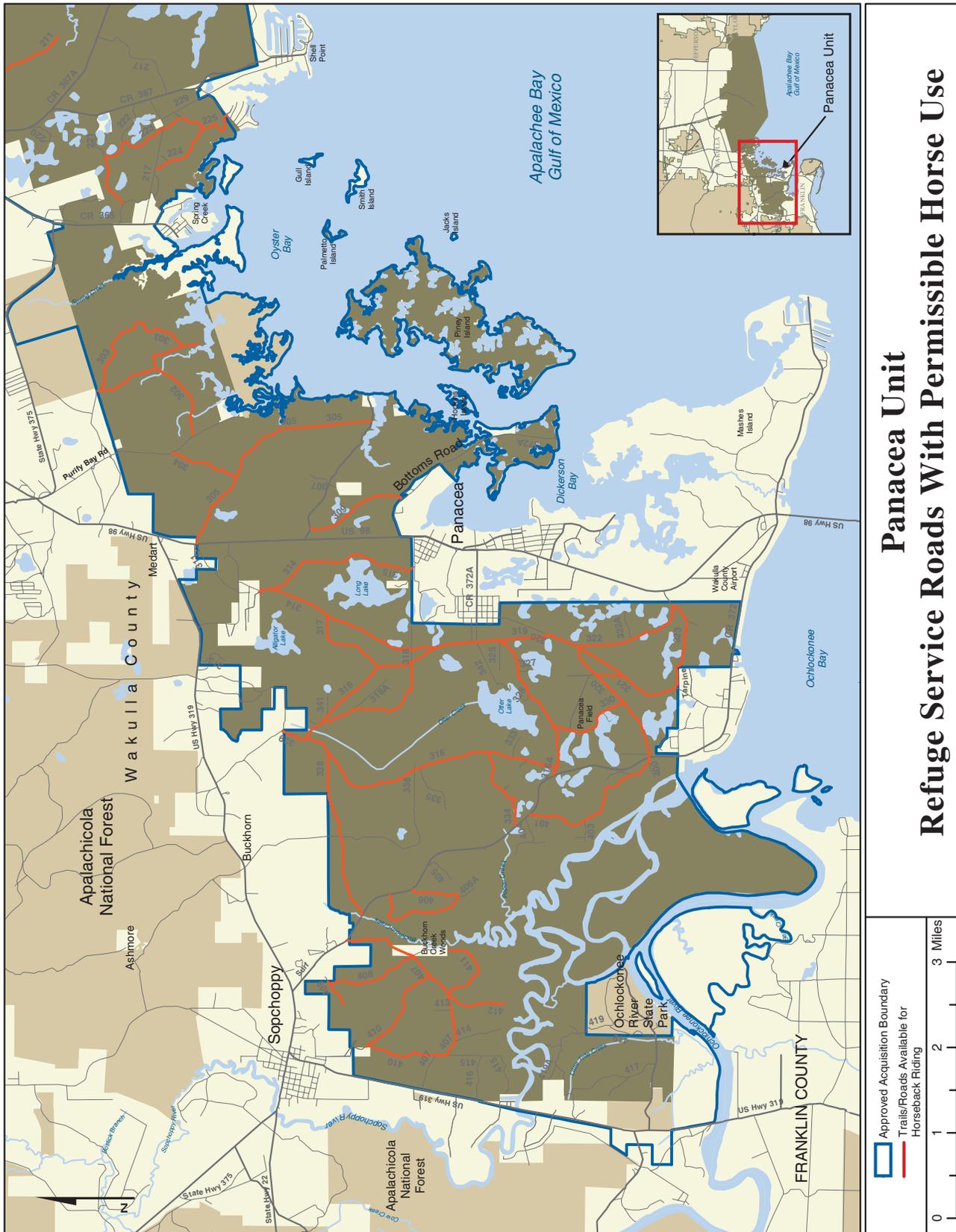
Approved Acquisition Boundary
 Trails/Roads Available for Horseback Riding

0 1 2 3 Miles

Wakulla Unit service roads with permissible horse use



Panacea Unit service roads with permissible horse use



Description of Use:*Camping*

A 42-mile-portion of the Florida National Scenic Trail (FNST) transverses the refuge. Use of the camp sites is by permit only and is restricted to persons who hike the entire length of the trail through the refuge (through hikers) on the FNST. Backpacking and wildlife observation are companion activities.

Availability of Resources: A refuge staff position is allocated to maintenance of the trail and is assisted by refuge volunteers and the Florida Trail Association.

Anticipated Impacts of the Use: Some impacts, such as littering, vegetation trampling, and wildlife disturbance, can be expected, but these are not anticipated to be significant. The potential for accidental wildfires exists. The use of these primitive camp sites by through hikers on the FNST will not adversely impact refuge purposes and objectives. This use is at a low level and is not expected to substantially increase over the next 15 years.

Public Review Comment: Public meetings were held on February 16, 22, and 23, 2006. The public review and comment period coincided with the review of the Draft Comprehensive Conservation Plan and Environmental Assessment for St. Marks National Wildlife Refuge.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: This use is restricted to through hikers on the refuge segment of the FNST. Permits are required in advance. No open fires are permitted. All litter/garbage must be carried-off by hikers. Camping is only permitted in designated sites. Certain areas of the refuge may be restricted seasonally for breeding or nesting purposes or to protect habitat. Specific camp sites may close temporarily during big game hunts or prescribed burns.

Justification: Primitive camping in designated camp sites along the FNST is a low-impact and low-cost activity on St. Marks Refuge. The FNST and these designated primitive camp sites are maintained by the refuge with assistance by the Florida Trail Association. It is deemed a wildlife-dependent activity on the refuge since wildlife observation is an integral part of the hiking/backpacking experience. Camping allows access through the trail.

Mandatory 10-year Re-evaluation Date: 08/09/2016

Description of Use:*Research and surveys*

This includes scientific research, inventory or monitoring and scientific collecting conducted by non-refuge personnel on refuge lands. The refuge is often used for biological research, for example by Florida State University, the University of Florida, the Florida Fish and Wildlife Conservation Commission and others.

Availability of Resources: The cost of most field studies is borne by the researchers with the exception of staff time to review proposals, issue a special use permit, and monitor the project. These are considered routine duties of biologists and managers.

Anticipated Impacts of the Use: The collection or monitoring of field data during a research project may cause mortality to some target species. Minor habitat and temporary wildlife disturbance may also occur. Research project impacts are minimized by strict monitoring of all projects by refuge personnel.

Public Review Comment: Public meetings were held on February 16, 22, and 23, 2006. The public review and comment period coincided with the review of the Draft Comprehensive Conservation Plan and Environmental Assessment for St. Marks National Wildlife Refuge.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: All research proposals are reviewed by refuge staff before approval is given. A special use permit is prepared for each project, which specifies the purpose and duration of the project, location of field work, and any special conditions that the permittee is required to follow. Refuge personnel regularly monitor the progress of all field work and all permittees are required to submit an annual report of work accomplished and/or a final report of the study.

Justification: Research is important because it provides the Service with scientific information that can be used to manage natural resources. Species identification, resource inventories, and resource monitoring provide valuable data for refuge operations. Access to current and state-of-the-art research can aid management decisions.

Mandatory 10-year Re-evaluation Date: 08/09/2016

Description of Use:

Plant gathering

This use is defined as the collection of berries, fruits, grasses, marsh plants (e.g., cattails or sweetgrass), mushrooms, nuts, roots, or other plants, plant parts, or plant products for non-subsistence and non-research purposes. Currently, some entities collect plant seeds or parts for management of other conservation lands.

Availability of Resources: There is no additional cost to the refuge for this activity. Special use permits are issued as routine duties of refuge staff.

Anticipated Impacts of the Use: Impacts from these activities could potentially include the taking of non-target species and the temporary disturbance of vegetation and wildlife.

Public Review Comment: Public meetings were held on February 16, 22, and 23, 2006. The public review and comment period coincided with the review of the Draft Comprehensive Conservation Plan and Environmental Assessment for St. Marks National Wildlife Refuge.

Determination (check one below):

- Use is Not Compatible
 Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: Any plant gathering activities will be controlled through a special use permit.

Justification: There are instances where a trust species (e.g., wiregrass) may benefit by establishment in places off-site of the refuge. The collecting of seeds to plant on other conservation lands may help restoration goals.

Mandatory 10-year Re-evaluation Date: 08/09/2016

Description of Use:

Hunting (big game, upland game, and waterfowl)

Big game hunting consists of refuge-sponsored hunts for deer, wild turkey and feral hogs. Upland game hunting consists of refuge-sponsored small game (e.g., gray squirrels, rabbits, raccoons, and hogs) hunts. Piney Island is open to migratory game bird hunting (e.g., ducks, coots, and geese).

Availability of Resources: The cost of administering the hunt program for fiscal year 2004 is estimated to be about \$43,000 of which only 20 percent is covered by fees collected from hunters. Refuge law enforcement, public use, administrative, managerial, and biological staff all allocate a portion of their time to this program. Maintenance of roads and building of check stations also are costs absorbed within the refuge operating budget.

Anticipated Impacts of the Use: The harvest of feral hogs on the refuge is beneficial to native wildlife since hogs compete for mast, destroy native plants and prey upon nests, small vertebrates and invertebrates. Deer hunting during refuge-sponsored hunts keeps the herd at a healthy population level commensurate with available habitat. Spring turkey hunting can disrupt nesting. Impacts of recreational small game hunting include harvest of target species--gray squirrels, hogs and raccoons. In addition to the harvest of legal game, killing of non-target species, such as snakes, is known to occur. Other impacts of hunting may include littering, disturbing wildlife, trampling vegetation, and removing dead/down wood.

No significant impacts are anticipated with the Piney Island hunt. The island does not appear to be used by threatened or endangered species (e.g., bald eagle, wood storks) to any extent or regular degree. There is no evidence to suggest that past hunting practices have had any impact on these species. Based upon available habitat and the small number of hunters using Piney Island during past seasons, it is unlikely that a continuation of waterfowl hunting would affect duck, coot, or geese populations in any measurable way. There could be incidental take of non-target waterfowl during the hunts. There would also be some disturbance, such as trampling of vegetation, etc., to tidal and upland habitats on the island. Disturbance would likely be minimal due to the small number of hunt participants.

Public Review Comment: An Environmental Assessment and Finding of No Significant Impact were issued on the Piney Island hunt as an amendment to the Hunt Plan. Public meetings were held on February 16, 22, and 23, 2006. The public review and comment period coincided with the review of the Draft Comprehensive Conservation Plan and Environmental Assessment for St. Marks National Wildlife Refuge.

Determination (check one below):

- Use is Not Compatible
 Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: Hunting will be in accordance with applicable state regulations and the refuge Hunt Plan. For all hunts except upland (small game), weapon restrictions are in accordance with State of Florida regulations. Vehicles are restricted to existing roads. Spring turkey hunting is restricted to a portion of the state season to minimize nest disturbance. The use of island plants for duck blinds is prohibited. All hunts will be designed to provide quality user opportunities based upon estimated wildlife population levels and biological parameters. Hunt season dates and bag limits will be adjusted as needed to achieve balanced population levels within carrying capacities, regardless of impacts to user opportunities. As additional data are collected and the Hunt Plan is revised, additional refuge-specific regulations could be implemented. These regulations could include, but may not be limited to, season dates that differ from those in surrounding state zones, refuge permit requirements, and closed areas on a permanent or seasonal basis to reduce disturbance to specific wildlife species or habitats, such as bird rookeries, wintering waterfowl, or threatened/endangered species, or to provide for public safety.

Justification: Under the National Wildlife Refuge System Improvement Act hunting is a priority public use. Hunting is an acceptable form of wildlife-dependent recreation compatible with purposes for which the refuge was established. The harvest of surplus animals is one tool used to maintain wildlife populations at a level compatible with habitat. Hunting of feral hogs and deer is beneficial to native species, including deer, and is therefore considered compatible with refuge purposes. Turkey hunting is a wildlife-dependent activity that does not negatively impact the refuge turkey population.

Mandatory 15-year Re-evaluation Date: 08/09/2021

Description of Use:

Wildlife observation and photography

Non-consumptive wildlife observation uses include bird watching and nature photography by walking or using motorized vehicles, boats, bicycles or horses. Foot travel is generally allowed on refuge roads, levees and trails. Most motor vehicle use occurs on Lighthouse Road.

Availability of Resources: Levees and trails are mowed and patrolled for refuge purposes and recreational use and require no additional maintenance costs. Additional platforms, photography blinds or towers to encourage these uses on the refuge would involve new construction costs. Currently, under a trial fee program, the refuge receives 80 percent of the four dollar entrance fee receipts. This may be used to support the six priority public uses identified in the National Wildlife Refuge Improvement Act.

Anticipated Impacts of the Use: Some violations of refuge regulations are anticipated, such as wildlife disturbance, collecting, poaching, plant removal, littering and vandalism. Some animals that cross refuge roads may be killed or injured by vehicles.

Public Review Comment: Public meetings were held on February 16, 22, and 23, 2006. The public review and comment period coincided with the review of the Draft Comprehensive Conservation Plan and Environmental Assessment for St. Marks National Wildlife Refuge.

Determination (check one below):

Use is Not Compatible
 Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: Law enforcement patrol of public use areas should continue to minimize violations of refuge regulations. The refuge is closed overnight. Areas, such as Mounds Pool #3, may be closed to the public seasonally to protect wintering waterfowl from disturbance. Certain areas of the refuge may be restricted seasonally for breeding or nesting purposes or to protect habitat.

Justification: These are priority public uses under the National Wildlife Refuge System Improvement Act.

Mandatory 15-year Re-evaluation Date: 08/09/2021

Description of Use:

Picnicking

There are presently picnic sites with tables, shelters, and restroom facilities at the Otter Lake Recreation Area (Panacea Unit) and at Picnic Pond (St. Marks Unit).

Availability of Resources: The two designated picnic sites and associated facilities are maintained by refuge staff, contractors, and volunteers.

Anticipated Impacts of the Use: No significant impacts are anticipated since picnicking is restricted to two small areas of the refuge. Some littering, vandalism, plant removal, and feeding/disturbance of wildlife have been noted in the past. Violations are infrequent and usually confined to the immediate vicinity of these two areas. Litter is controlled through the use of waste baskets and by waste pickup by refuge and contracted staff and by volunteers. Informal picnicking at other non-designated sites should not result in significant impacts. Most persons stay on the high-visibility roads and parking areas, which are patrolled by law enforcement.

Public Review Comment: Public meetings were held on February 16, 22, and 23, 2006. The public review and comment period coincided with the review of the Draft Comprehensive Conservation Plan and Environmental Assessment for St. Marks National Wildlife Refuge.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: Law enforcement patrol of the picnic areas should minimize any violations of refuge regulations. No stipulations are needed.

Justification: These areas give refuge visitors a place to rest and observe wildlife around these sites with minimal disturbance to wildlife. These sites provide mobility impaired visitors with access to ponds and lakes where animal life is plentiful.

Mandatory 10-year Re-evaluation Date: 08/09/2016

Description of Use:

Fishing

Recreational freshwater fishing is allowed on refuge lakes, ponds, and impoundments. While there are access points and boat ramps, the refuge currently does not have jurisdiction over saltwater fishing. Freshwater fishing occurs primarily on the St. Marks and Panacea Units of the refuge. Visitors fish from the banks of the refuge waters or by boat. Crabbing (blue crabs) occurs in some of the tidal areas on the refuge.

Availability of Resources: Staff resources are adequate for allowing this use. This is an established part of law enforcement officer duties. Litter control is handled by refuge staff.

Anticipated Impacts of the Use: The primary impacts of this use are disturbance to and the taking of non-target wildlife species, vandalism (e.g., removal of stoplogs from water control structures), littering, habitat disturbance (e.g., trampling of bank vegetation) and water pollution from boat motors. Some wildlife may be injured or killed by discarded fishing line and hooks. Fishing could be affected when the impoundments are drawn down or salt water is introduced to manage for waterfowl, their primary purpose.

Public Review Comment: Public meetings were held on February 16, 22, and 23, 2006. The public review and comment period coincided with the review of the Draft Comprehensive Conservation Plan and Environmental Assessment for St. Marks National Wildlife Refuge.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: Adherence to state fishing laws and regulations should help maintain fish populations at a healthy, sustainable level. Disturbance to non-target species and water pollution problems are being minimized by an electric trolling boat motor restriction for refuge impoundments. Fishing is restricted to daylight hours. Boat launching via trailer is precluded in the impoundments of the St. Marks Refuge to reduce the potential for spread of the highly invasive aquatic weeds, hydrilla, and Eurasian water-milfoil. Closure of the impoundments and

sensitive areas within refuge waters (e.g., East River wading bird rookery, Mounds Pool #3) may be necessary at certain times of the year to protect the wildlife resources. Fishing from boats is restricted to March 15 through October 15 in impoundments each year to protect migratory and wintering waterfowl. Crabbing is prohibited in refuge pools and impoundments along Lighthouse Road. Vehicle access to the Panacea Unit lakes from refuge road #316 is closed from March 15 to May 15 annually.

Justification: Fishing is a priority public use under the National Wildlife Refuge System Improvement Act and a wildlife-dependent activity that is compatible with refuge purposes.

Mandatory 15-year Re-evaluation Date: 08/09/2021

Description of Use:

Forest Management

The forest management program on the refuge is outlined in the document “A Wildlife Management Plan for the Forested Uplands of the St. Marks National Wildlife Refuge” (1989). This document is proposed to be revised and incorporated within a new Habitat Management Plan. Primary management techniques include prescribed burning, reforestation, and stand improvement in pine habitats.

Availability of Resources: The present Forest Management Plan and the comprehensive conservation plan propose a forest management program that would use improvement of timber stands to promote the enhancement of habitats for both threatened and endangered species, migratory birds, and resident wildlife. Additional funding and staffing will be required to develop annual forest prescriptions, inventory forest stands, create a habitat management plan and conduct timber thinning. However, significant portions of this work can be accomplished with existing resources.

Anticipated Impacts of the Use: The overall biological impacts of the forest management program are beneficial. Forest management enhances wildlife habitat by using techniques that mimic natural conditions. Threatened and endangered animals and plants and other native species should benefit from implementation of the plan. Some short-term, adverse effects can occur to certain individuals during timber harvests; however, as detailed in the Forest Management Plan, the anticipated biological benefits to the habitat outweigh these effects.

Public Review Comment: Public meetings were held on February 16, 22, and 23, 2006. The public review and comment period coincided with the review of the Draft Comprehensive Conservation Plan and Environmental Assessment for St. Marks National Wildlife Refuge.

Determination (check one below):

- Use is Not Compatible
 Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: Red-cockaded woodpecker (RCW) cavity and bald eagle nesting trees will be protected during timber thinning and prescribed burns. Fuels will be removed or otherwise neutralized at the bases of these trees during burns. Burning will be prohibited around bald eagle nest trees during nesting season (October 1 through fledging). Commercial harvests will be prohibited near nest sites of both species during nesting seasons. For RCWs, the nesting season is April 1 through fledging. The RCW Recovery Plan will be followed in implementing any forest management practices. Activities near flatwoods salamander habitat will be undertaken in accordance with consultation with the Service's Ecological Services Office in Panama City.

Gopher tortoise burrows and state-listed threatened and endangered plants will be identified and protected as much as possible during commercial harvests and fire line plowing. Protection and enhancement of wiregrass, a fire-dependent and keystone species of longleaf pine habitats, will be a priority.

All forest management activities will adhere to the approved, current refuge management plan entitled "A Wildlife Management Plan for the Forested Uplands of the St. Marks National Wildlife Refuge."

Justification: The management of refuge pinelands through prescribed fire and commercial harvest is designed to provide excellent wildlife habitat to mimic a relatively natural state and conditions. This objective is directly related to the purposes for which the refuge was established.

Mandatory 10-year Re-evaluation Date: 08/09/2016

Description of Use:

Mosquito Management

Wakulla County conducts limited mosquito control activities in rural communities within and adjacent to the refuge. Ordinarily, no activities are conducted on the refuge. However, the county has proposed an arthropod management plan that would permit the county to control mosquitoes on refuge lands under special circumstances. Eastern Equine Encephalitis, St. Louis Encephalitis, and recently, West Nile Virus are established and recurring diseases in the region of the refuge. Although these diseases most often occur in horses, they may cause serious, life-threatening illness in humans. The county's plan proposes treatment on the refuge only if surveillance, including landing rate counts and larval dips, indicate disease-carrying species of refuge-based mosquito population numbers exceed the state standard for requiring treatment. The only control material proposed is *Bacillus thuringiensis israelensis* (BTI), a larvicide. No chemical spraying is contemplated.

Availability of Resources: All aspects of any mosquito control actions will be financed and administered by Wakulla County. No additional refuge resources will be needed for mosquito control.

Anticipated Impacts of Use: BTI is a microbial larvicide that is applied to aquatic habitats where mosquito larvae occur. This bacterium produces a crystal-containing spore that causes fragment toxicity when ingested by the mosquito larvae. It is species-specific affecting the larvae of mosquitoes, black flies, and midges. It poses a minimal threat to non-target, vertebrate and invertebrate species. Experimental testing has shown no demonstrated effect against other aquatic insects, including dragonflies, damselflies, mayflies, stoneflies, caddis flies, and water beetles. Other invertebrates, such as *Daphnia*, cyclops, rotifers, and crustaceans are also not susceptible to BTI. There are no known mammalian health effects resulting from BTI. It is not a phytotoxic and has shown no effect on seed germination or plant vigor.

Public Review Comment: Public meetings were held on February 16, 22, and 23, 2006. The public review and comment period coincided with the review of the Draft Comprehensive Conservation Plan and Environmental Assessment for St. Marks National Wildlife Refuge.

Determination (check one below):

- Use is Not Compatible
 Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: Prior to initiation of any control efforts, surveillance must be used according to the Florida Department of Environmental Protection's standards that establish a need for control of disease-carrying mosquitoes. The Service's Interim Mosquito Guidance (2005) or subsequent amended guidance will be followed. An approved pesticide use proposal is required prior to application of a pesticide to Refuge System lands. BTI is the only control agent to be used on refuge property. Any aerial spraying off refuge lands must be planned and executed considering wind and flight pattern to avoid drift onto refuge lands. Prior to initiation of any control action on refuge lands, a Section 7 Endangered Species Act consultation must be completed.

Justification: Mosquito control is generally not practiced on the refuge. If mosquito populations are elevated due to storm events or disease outbreaks, mosquito control may be required in the future. Because several small towns or communities are within or adjacent to the refuge, it will be difficult to have effective spraying in the county if the refuge lands are not included. Control actions outside refuge boundaries are likely to be conducted by use of adulticide chemicals that do have harmful effects on non-target species. Chemical spraying of private lands interspersed near refuge lands is likely to affect refuge lands due to drift. It may, in some cases, be preferable to do larvicidal control on the refuge instead of spraying adulticides adjacent to the refuge.

Mandatory 10-year Re-evaluation Date: 08/09/2016

Description of Use:

Placement and Operation of a United States Coast Guard (USCG) Communications Building

Placement and operation of an 8- x 40-foot USCG communications trailer approximately 200 feet behind the Mounds restroom. This trailer will be operated primarily on weekends during the summer, but it might also be used during other heavy boating use periods. This trailer will replace facilities formerly available to the flotilla in the St. Marks Lighthouse.

Availability of Resources: Electrical power, installation, maintenance, and cleaning of the site will be the responsibility of the USCG Auxiliary.

Anticipated Impacts of the Use: The use of this area for the communication building has negligible effects on wildlife, refuge visitors, or existing uses of the building. It will add to the security of the site by having responsible volunteers with available communication equipment present during heavy use periods. It will also provide for added safety for the boating public. It is close to two known archaeological sites. The project has been reviewed by the Regional Archaeologist and determined to not adversely impact these sites.

Public Review and Comment: A notice was published in *The Wakulla News* on February 6, 2003, with an invitation for comments due by February 20, 2003. No comments were received and the trailer was installed. This compatibility determination was reviewed in 2006. Public meetings were held on February 16, 22, and 23, 2006. The public review and comment period coincided with the review of the Draft Comprehensive Conservation Plan and Environmental Assessment for St. Marks National Wildlife Refuge.

Determination (check one below):

- Use is Not Compatible
 Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: There will be no digging or ground disturbance on site. The building will be painted a brown or gray color compatible with the environment of the site. The Coast Guard Auxiliary will maintain the area in a clean and neat condition, removing any trash or debris from the site on a daily basis. Radios or other equipment will be muted to the extent that visitors outside of the trailer cannot hear them.

Justification: The Coast Guard Auxiliary, St. Marks Flotilla, has used the St. Marks Lighthouse for a number of years for dispatching safety patrols and rescue personnel. Due to recent renovations and Coast Guard plans to transfer this structure to the Fish and Wildlife Service, this facility has been lost to them. Because of the remoteness and lack of coastal access to the east of the lighthouse, it is important for marine safety that the Flotilla maintains a presence near the St. Marks Lighthouse. Location of the communication site near the bathroom will permit use of antennas on the Mounds tower and still be within a mile of the lighthouse boat ramp. The location of this site at the Mounds restroom ensures that there will not be additional disturbance to wildlife or habitats or to refuge visitors. It will in no way materially detract from the Service mission or refuge purposes.

Mandatory 10-year Re-evaluation Date: 08/09/2016

Other Uses - In 1994, beekeeping and boating in state waters (i.e., motorized, commercial, and sport) were determined to be incompatible uses. The latter use pertained to a prohibition of airboats, personal watercraft, and air-cushioned hovercraft from all State of Florida waters within the administrative boundary of the refuge, particularly, the Executive Closure Area and all refuge marshes.

References

- Atwill, E. R., N. K. McDougald, L. Perea. 2000. Cross-sectional Study of Fecal Shedding of *Giardia duodenalis* and *Cryptosporidium parvum* Among Packstock in the Sierra Nevada Range. *Equine Veterinary Journal*. 32(3):247-252.
- Atwill, Edward, R. 1995. Microbial Pathogens Excreted by Livestock and Potentially Transmitted to Humans Through Water.
- Atwill, Edward R. et al. 2002. Transport of *Cryptosporidium parvum* Oocysts Through Vegetated Buffer Strips and Established Filtration Efficiency. *Applied and Environmental Microbiology*. November 2002: 5517-5527.
- Benninger-Truax, Mary. et al. 1992. Trail Corridors as Habitat and Conduits for Movement of Plant Species in Rocky Mountain National Park, Colorado, United States of America. *Landscape Ecology* 6: 269-278.
- Cook, Haven B. Personal Communication with Haven B. Cook, U. S. Forrest Service, Apalachicola National Forest, June 3, 2003.
- Dehring, Faith J. and Frank J. Mazzoti. 1997. Impacts of Equestrian Trails on Natural Areas. University of Florida, Wildlife Ecology and Conservation Department, publication WEC-122, Gainesville, Florida.
- DeLong, Anita K. and Janet T. Schmidt. 2000. Draft Literature Review: Effects of Human Disturbance on Wildlife with Emphasis on Wildlife-Dependent Recreation Relevant to Stillwater National Wildlife Refuge
- Fio, Laurie and Atwill, Rob. 1998. *Cryptosporidium* in the Water- Are Horses to Blame? *The Horse Report* 16(4):1,4-7, 12.
- Hendee, John C. et al. *Wilderness Management*, Chapter 16, 457-462.
- Johnson, E. et al. 1997. The Prevalence of Shedding of *Cryptosporidium* and *Giardia* spp. Based on a Single Fecal Sample Collection From Each of 91 Horses Used for Backcountry Recreation. *Veterinary Diagnostic Investigation* 9:56-60.
- Quinn, Adda. 2000. Does Horse Manure Pose a Risk to Human Health? Bay Area Equestrian Network. [Http://www.bayquest.com/horsetalk/manure/htm](http://www.bayquest.com/horsetalk/manure/htm)
- Quinn, Adda. Horse Trails and Other Environmental Issues. *EnviroHorse*. [Http://californiastatehorsemen.com/enviro-oth-envro.htm](http://californiastatehorsemen.com/enviro-oth-envro.htm).
- Quinn, Adda. Environmental Aspects of Horses on Trails. *EnviroHorse*. [Http://californiastatehorsemen.com/enviro_aspects.htm](http://californiastatehorsemen.com/enviro_aspects.htm)
- U.S. Fish and Wildlife Service, Horseback Riding Compatibility Determinations for Canaan Valley, Arthur R. Marshall Loxahatchee, Stillwater and Little Pend Orielle National Wildlife Refuges.
- Weir, Donald V. 2000. Impacts of Non-motorized Trail Use. Edmonton, Alberta, Canada.

Approval of Compatibility Determinations:

The signatures of approval cover all the compatibility determinations considered within the Comprehensive Conservation Plan for St. Marks National Wildlife Refuge. If one of the described uses is considered for compatibility outside of the plan, the approval signatures become part of that determination.

Refuge Manager: **Signed** 6/19/06
(Signature/Date)

Project Leader: **Signed** 6/19/06
(Signature/Date)

Regional Compatibility Coordinator: **Signed** 7-5-06
(Signature/Date)

Refuge Supervisor: **Signed** 8-6-06
(Signature/Date)

Regional Chief, National Wildlife Refuge System, Southeast Region: **Signed** 8-9-06
(Signature/Date)

Appendix VII. Conservation Easements and Fee Simple Properties Managed by the Refuge

Conservation easements and fee simple property – Florida

Identifier	County	Fee Acres	Easement Acres
FG1	Gadsden	0.00	50.88
FG2	Gadsden	0.00	34.00
Fee1	Madison	95.54	0.00
FM1	Madison	0.00	354.41
FM2	Madison	0.00	85.76
FM3	Madison	0.00	56.02
FM4	Madison	0.00	267.85
FS1	Suwannee	0.00	50.00
TOTAL		95.54	898.92

Conservation easements – Georgia

Identifier	County	Easement Acres
GB1	Brooks	208.42
GB2	Brooks	14.20
GB3	Brooks	55.28
GD1	Decatur	12.47
GD2	Decatur	132.07
GG1	Grady	53.35
GT1	Thomas	57.84
GT2	Thomas	61.75
GT3	Thomas	22.42
TOTAL		617.81

Appendix VIII. Exotic Species Locations and Treatment

Exotic species locations and treatment

Map Number	Primary Pest Species	Scientific Name	Comments	Latitude	Longitude
1	glossy privet	<i>Ligustrum lucidum</i>	scattered shrubs	30 07 14.68038	-83 58 38.80506
2	Cogongrass	<i>Imperata cylindrica</i>	continue treatment	30 07 19.07933	-83 58 34.33876
3	Chinese tallow	<i>Sapium sebiferum</i>	low density, private	30 08 50.41151	-83 58 05.38802
4	torpedo grass	<i>Panicum repens</i>	in canal, small infestation	30 06 56.90322	-84 05 15.08903
5	Lantana	<i>Lantana camara</i>	largest concentration	30 06 41.51117	-84 07 07.20764
6	Chinese tallow	<i>Sapium sebiferum</i>	largest concentration	30 05 05.89250	-84 09 44.78069
7	Chinese tallow	<i>Sapium sebiferum</i>	isolated young plants	30 05 14.36831	-84 09 59.71536
8	Chinese tallow	<i>Sapium sebiferum</i>	isolated mature plants	30 05 29.06851	-84 09 42.14606
9	Chinese tallow	<i>Sapium sebiferum</i>	isolated mature plants	30 05 21.88212	-84 09 55.91462
10	Chinese tallow	<i>Sapium sebiferum</i>	isolated young plants	30 05 10.32061	-84 09 42.11773
11	Chinese tallow	<i>Sapium sebiferum</i>	largest concentration	30 04 58.51488	-84 09 45.88898
12	Chinaberry	<i>Melia azedarach</i>	isolated resprouts	30 04 26.10023	-84 10 46.37428

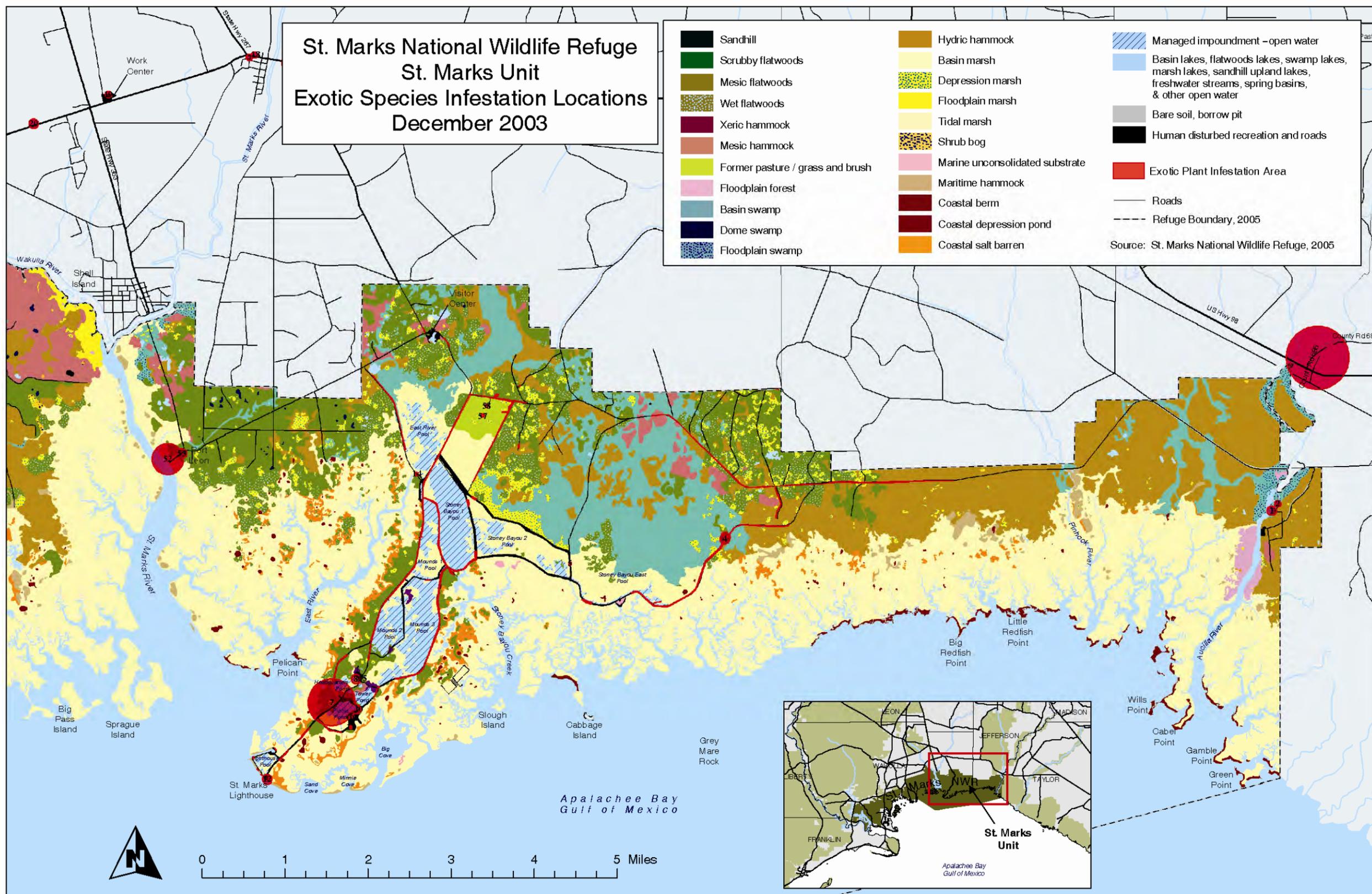
Map Number	Primary Pest Species	Scientific Name	Comments	Latitude	Longitude
13	Cogongrass	<i>Imperata cylindrica</i>	needs retreatment	30 06 58.32889	-84 05 14.57246
14	Japanese climbing fern	<i>Lygodium japonicum</i>	on concrete spillway	30 07 37.32452	-84 08 58.30670
15	ornamental bamboo	<i>Bambusa spp.</i>	clumping variety	30 05 29.31191	-84 09 39.52919
16	Chinese tallow	<i>Sapium sebiferum</i>	more survey needed	30 11 54.61163	-84 10 33.25512
17	air potato	<i>Dioscorea bulbifera</i>	private lands	30 11 58.03375	-84 11 00.10039
18	air potato	<i>Dioscorea bulbifera</i>	private lands, large infestation	30 11 59.56440	-84 10 56.30308
19	Cogongrass	<i>Imperata cylindrica</i>	retreatment continuing	30 11 34.63026	-84 12 42.30630
20	Cogongrass	<i>Imperata cylindrica</i>	on DOT lands	30 11 16.24312	-84 13 36.43637
21	wild taro	<i>Colocasia</i>	only known taro on river	30 10 42.06857	-84 14 45.05467
22	Chinese tallow	<i>Sapium sebiferum</i>	isolated, private lands	30 10 43.23655	-84 14 45.14161
23	coral ardisia	<i>Ardisia crenata</i>	mostly controlled, retreat	30 06 41.35439	-84 15 30.07073
24	coral ardisia	<i>Ardisia crenata</i>	mostly controlled, retreat	30 06 41.88802	-84 15 32.13785
25	coral ardisia	<i>Ardisia crenata</i>	mostly controlled, retreat	30 06 40.68918	-84 15 34.68276
26	Chinese wisteria	<i>Wisteria sinensis</i>	mostly controlled, retreat	30 06 35.62168	-84 15 30.33234

Map Number	Primary Pest Species	Scientific Name	Comments	Latitude	Longitude
27	Chinese tallow	<i>Sapium sebiferum</i>	mostly controlled, retreat	30 06 31.67330	-84 15 34.45430
28	Lantana	<i>Lantana camara</i>	on ROW, retreat	30 06 33.53965	-84 15 32.58587
29	Japanese climbing fern	<i>Lygodium japonicum</i>	monitor annually, retreat	30 07 36.48652	-84 16 09.55250
30	Japanese climbing fern	<i>Lygodium japonicum</i>	monitor annually, retreat	30 08 28.31309	-84 16 11.08070
31	Japanese climbing fern	<i>Lygodium japonicum</i>	monitor annually, retreat	30 08 32.64875	-84 15 56.33878
32	Japanese climbing fern	<i>Lygodium japonicum</i>	monitor annually, retreat	30 08 39.01981	-84 15 32.59440
33	Mimosa	<i>Albizia julibrissin</i>	monitor annually, retreat	30 04 25.79459	-84 24 17.37338
34	Japanese climbing fern	<i>Lygodium japonicum</i>	mostly controlled, retreat	29 59 56.06369	-84 29 13.00510
35	Japanese climbing fern	<i>Lygodium japonicum</i>	mostly controlled, retreat	29 59 55.27752	-84 29 22.41035
36	Japanese climbing fern	<i>Lygodium japonicum</i>	moderate, retreat	30 02 31.12091	-84 28 14.14294
37	Japanese climbing fern	<i>Lygodium japonicum</i>	moderate, retreat	30 02 37.53452	-84 28 03.74848
38	Japanese climbing fern	<i>Lygodium japonicum</i>	more survey work needed	30 02 56.52503	-84 27 44.52037
39	air potato	<i>Dioscorea bulbifera</i>	largest concentration	30 02 27.40589	-84 23 18.81550
40	golden bamboo	<i>Phyllostachys aurea</i>	isolated, retreat	30 04 54.26195	-84 19 17.78736

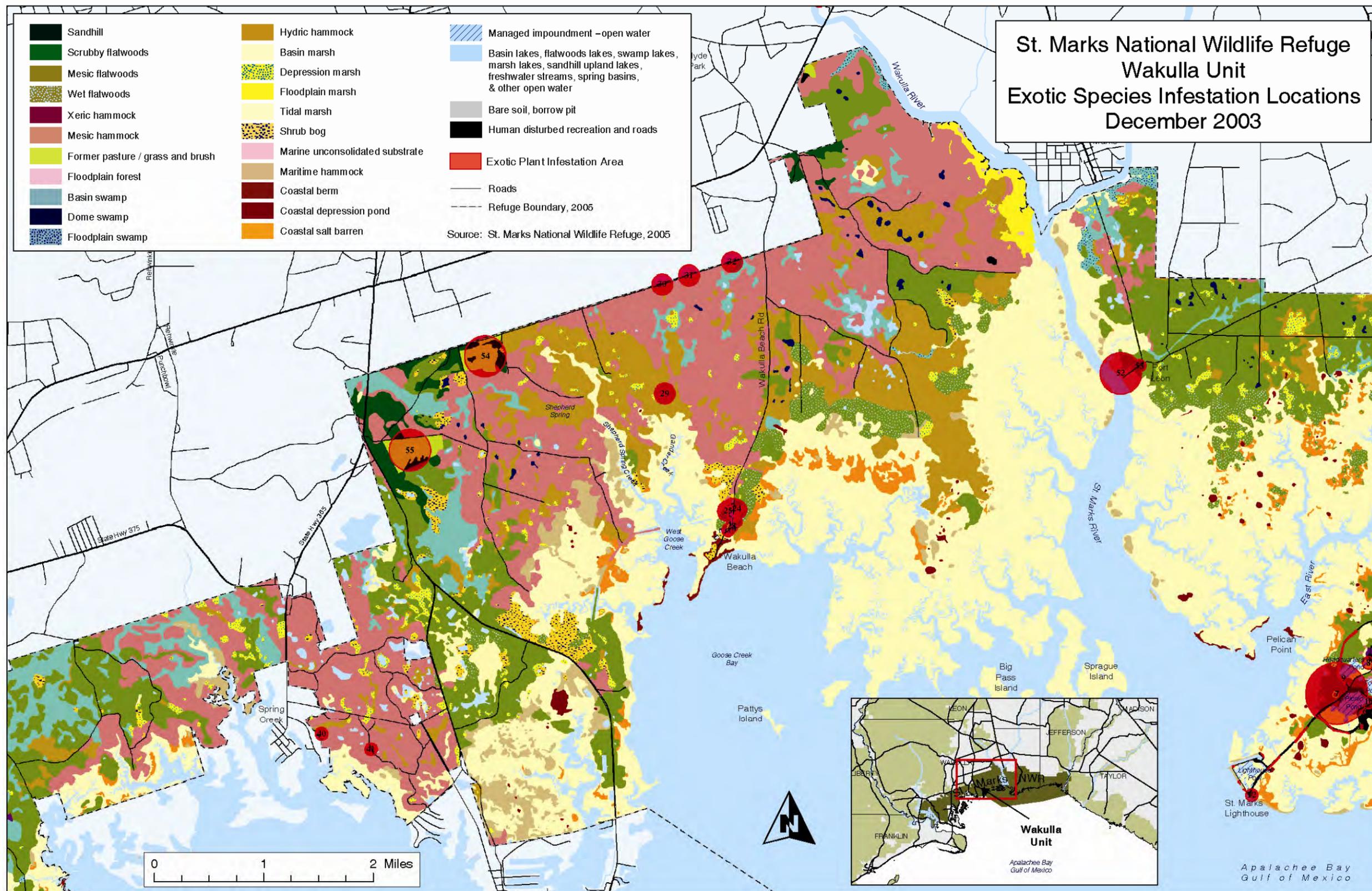
Map Number	Primary Pest Species	Scientific Name	Comments	Latitude	Longitude
41	Japanese climbing fern	<i>Lygodium japonicum</i>	moderate, retreat, survey	30 04 46.93973	-84 18 50.59256
42	Mimosa	<i>Albizia julibrissin</i>	moderate, retreat, survey	30 01 31.38978	-84 29 52.30655
43	Chinese tallow	<i>Sapium sebiferum</i>	moderate, retreat, survey	30 01 27.14369	-84 29 48.52385
44	Chinese tallow	<i>Sapium sebiferum</i>	private lands	30 01 33.48602	-84 24 14.53932
45	Chinese tallow	<i>Sapium sebiferum</i>	isolated, monitor, retreat	30 00 17.63903	-84 24 15.48374
46	Japanese climbing fern	<i>Lygodium japonicum</i>	moderate, retreat	30 03 43.74781	-84 25 28.91604
47	Chinese wisteria	<i>Wisteria sinensis</i>	mostly controlled, check	30 03 43.58045	-84 25 33.84102
48	Japanese climbing fern	<i>Lygodium japonicum</i>	dense on private lands	30 03 37.96456	-84 28 36.41693
49	Mimosa	<i>Albizia julibrissin</i>	moderate, retreat	30 04 15.06360	-84 23 31.87079
50	Mimosa	<i>Albizia julibrissin</i>	moderate, retreat	30 03 43.02454	-84 25 15.54355
51	Japanese climbing fern	<i>Lygodium japonicum</i>	additional survey needed	30 04 33.70660	-84 24 35.78429
52	Phragmites	<i>Phragmites australis</i>	only known in area, treat	30 07 46.49700	-84 11 58.74403
53	Japanese climbing fern	<i>Lygodium japonicum</i>	moderate, survey, retreat	30 07 50.10143	-84 11 48.39868
54	Bahiagrass	<i>Paspalum notatum</i>	old field restoration	30 07 54.05455	-84 17 48.40022

Map Number	Primary Pest Species	Scientific Name	Comments	Latitude	Longitude
55	Bahiagrass	<i>Paspalum notatum</i>	old field restoration	30 07 09.25381	-84 18 29.65360
56	Bahiagrass	<i>Paspalum notatum</i>	old field restoration	30 00 38.89753	-84 25 25.58975
57	Bahiagrass	<i>Paspalum notatum</i>	old field, future restore	30 08 13.94394	-84 08 10.61491
58	Cogongrass	<i>Imperata cylindrica</i>	new infestation, retreat	30 08 19.83696	-84 08 07.84280
59	wild taro	<i>Colocasia esculenta</i>	new infestation, treat	29 59 04.89768	-84 24 03.18276
60	Chinese wisteria	<i>Wisteria sinensis</i>	mostly controlled	29 59 08.81480	-84 24 37.73876
61	Bahiagrass	<i>Paspalum notatum</i>	old field restoration	30 00 38.89753	-84 25 25.58975
62	Bahiagrass	<i>Paspalum notatum</i>	old field restoration	30 00 38.89753	-84 25 25.58975

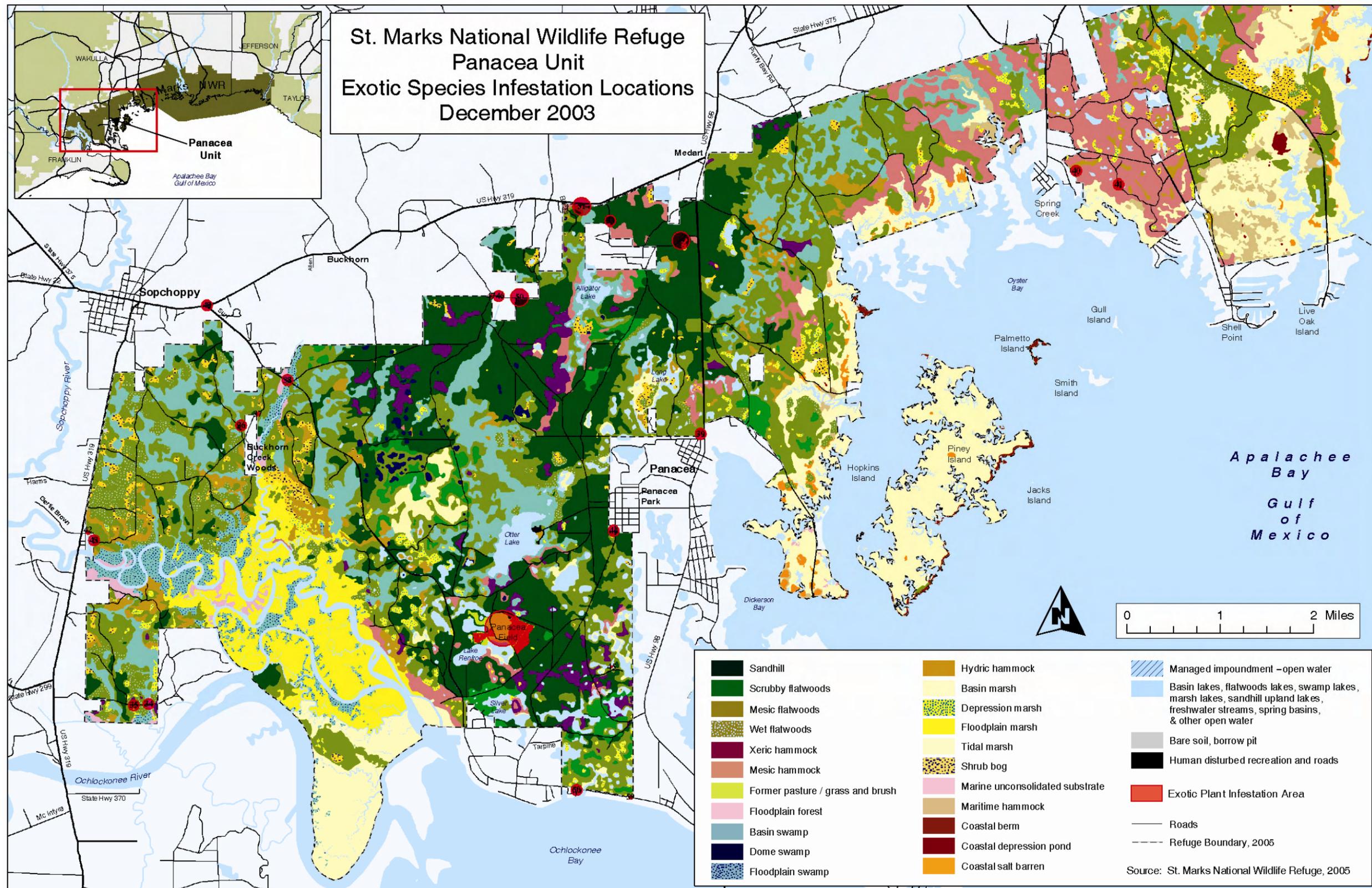
St. Marks Unit exotic species infestation locations December 2003



Wakulla Unit exotic species infestation locations December 2003



Panacea Unit exotic species infestation locations December 2003



Appendix IX. Existing and Potential Partners

Existing Partners

Federal Agencies:

Coast Guard
Coast Guard Auxiliary
Customs
Department of Agriculture
USDA Forest Service - Supervisor, Florida National Forests
USDA Forest Service, Apalachicola National Forest
Department of Defense, Eglin Air Force Base, Jackson Guard
Department of Homeland Security
Department of the Interior
National Park Service, Archaeological Center
Bureau of Land Management (lighthouse issues)
Geological Survey, Florida Integrated Science Center
Marshal's Service
Environmental Protection Agency

State Agencies:

Florida Department of Agriculture, Division of Forestry
Blackwater State Forest
Tate's Hell State Forest
Wakulla State Forest
Florida Department of Environmental Protection
Office of Greenways and Trails
Office of Coastal and Aquatic Managed Areas, Big Bend Seagrasses Aquatic Preserve
Division of State Lands, Bureau of Invasive Species
Division of Recreation and Parks
Ochlockonee River State Park
Wakulla Springs State Park
Florida Department of Transportation
Florida Fish and Wildlife Conservation Commission
Division of Habitat and Species Conservation:
Imperiled Species Management Section
Terrestrial Habitat Conservation and Restoration Section
 Big Bend Wildlife Field Office
Species Conservation Planning Section
Division of Hunting and Game Management, Game Species Management Section,
 North Florida Waterfowl Field Section
Bureau of Wildlife Management, Big Bend Wildlife Field Office
Division of Law Enforcement
Apalachicola River Wildlife and Environmental Area
Tate's Hell Wildlife Management Area
Florida Natural Areas Inventory
Florida State University Magnetic Field Laboratory
Northwest Florida Water Management District

Suwannee River Water Management District
University of Florida, School of Forestry and Natural Resources Conservation
University of Florida, Agricultural Extension Offices (Wakulla and Jefferson Counties)
University of Georgia, Southeastern Cooperative Wildlife Disease Study

Local Government Agencies:

Apalachee Bay Volunteer Fire Department
Crawfordville Volunteer Fire Department
Leon County Solid Waste Department
Medart Volunteer Fire Department
Ochlockonee Volunteer Fire Department
Panacea Volunteer Fire Department
Sopchoppy Volunteer Fire Department
St. Marks Volunteer Fire Department
Taylor County Board of County Commission (Aucilla Boat Ramp)
U.S. Filter (Solid Waste Contractor for Wakulla County)
Wakulla Station Volunteer Fire Department
Wakulla County
Emergency Operation Control
Planning Department, Grants Department
Tourist Development Council
Sheriff's Department
Parks and Recreation Department

Others:

Apalachee Audubon Society
Apalachee Land Conservancy
Coastal Optimist Club
Community Classroom Consortium, Inc.
Florida Disabled Outdoors Organization
Florida Forestry Association
Florida Project Learning Tree
Florida Trail Association
Joseph W. Jones Ecological Research Center
Leon Association for Science Teaching
North Florida Prescribed Fire Council
Prescribed Fire Training Center
Rotary Club
Shadeville Elementary School
St. Joe Land Company
St. Marks Refuge Association, Inc.
Tall Timbers Research Station
The Conservation Fund
The Nature Conservancy
Apalachicola Bluffs and Ravines Preserve
The Trust for Public Land
Tallahassee Museum of History and Natural Science
St. Francis Wildlife Center
VISIT FLA

Wakulla County Chamber of Commerce
Wakulla County Historical Society
Wakulla County United Fire Fighters Association
Wakulla County Red Cross

Potential Partners

Other Federal Agencies:

Department of Transportation, Federal Highway Administration

Others:

Coastal Plains Institute
The Georgia Conservancy
Gopher Tortoise Council
Gulf Specimen Marine Laboratory
Florida Bowhunters Council Florida Bowhunters Council
Leon County Tourist Development Council
Longleaf Alliance
Southern Trailriders Association

Appendix X. Inventory and Monitoring Efforts by Staff

This appendix outlines a list of biological inventory and monitoring efforts occurring within the past two years or currently in progress at St. Marks National Wildlife Refuge. The list contains inventory and monitoring activities conducted by refuge staff or by refuge staff with other partners, either administered through special use permits or conducted in whole or in part by volunteers under the direction of refuge staff.

Legend:

c - currently ongoing

d - conducted within past three years, but presently discontinued

s - ongoing, but sporadic effort applied

Wildlife Surveys:

Red-cockaded Woodpecker Annual Nesting Monitoring, Banding, and Complete Population Survey
(**c** - annually)

Wading Bird Nest Survey - Oyster Bay (**c** - annually)

Wood Duck Box Maintenance (**s** - annually by volunteers)

Waterfowl Use of Refuge Impoundments (**d** - last survey, January 2003)

Bald Eagle Nest Activity Survey (**c** - annually)

Migrating Monarch Butterfly Count and Tagging Program (**c** - seasonally by volunteers)

Big and Small Game Hunt Data Collection (**c** - seasonally)

Gopher Tortoise Burrow Survey and GPS Data Collection (**s** - occasionally by volunteers)

Habitat Surveys:

Exotic Invasive Plant Species Surveys and Site Monitoring (**c** - continual)

Timber Cruise (Forest Management Compartments) (**s** - sporadic)

Prescribed Fire Photo Point Monitoring (3 times per burn) (**c** - continual)

Refuge Impoundments Water Level Monitoring (**c** - continual)

IMPROVE Aerosol Visibility Monitoring Site (For Class I Airshed) (**c** - continual)

Special Use Permitted Research Projects:

This list represents a sample of the projects under permit from 2002 through 2004.

Applewhite/Florida State University - 41640-03009: study of local migration of periwinkle snails in tidal marshes of St. Marks Unit. (2003)

Bugna/Hsieh/Nemours/Florida Agricultural and Mechanical University, Center for Water Quality - 41640-03004: study of carbon cycles within organic materials of soils in coastal wetlands. (2003-2004)

Cook/Florida Fish and Wildlife Conservation Commission (FWC) - 41640-03002: long-term intensive survey of ephemeral wetlands across potential or highly likely refuge habitat for federally listed flatwoods salamanders. (2002-2007)

Enge/FWC - 41640-JR0401: study of flatwoods salamander sampling techniques to compare diurnal and nocturnal dip netting and funnel trapping methods. (2004)

Epler/Private Researcher - 41640-03005: collection of aquatic and semi-aquatic insects for production of an identification manual developed for Florida Department of Environmental Protection. (2002-2004)

Hale/University of Florida, Department of Zoology - 41640-03008: study of reproductive behavior of a brackish water fish, including fish composition sampling, aquatic vegetation sampling, and behavioral observations. (2003-2004)

Hight/U.S. Department of Agriculture - ARS Center for Biological Control - 41640-03003: study of exotic invasive cactus moth, including installation of moth traps, collection of adult and larval moths, and host plant material. (2003)

Ingram/University of Florida, Department of Entomology and Nematology - 41640-JH03003: study of methods of biological control for invasive exotic cactus moth utilizing native insect-pathogenic nematodes. (2003-2006)

Johnson/United States Geological Survey, Biological Research Division, Florida Caribbean Science Center - 41640-02011: thorough survey (and re-survey of historical locations) of all amphibian species throughout the refuge, including collection and monitoring for disease and deformity and voucher specimens. (2002-2008)

Kostka/Florida State University, Department of Oceanography - 41640-02012: collection of sediment cores and water samples within saltmarsh sites for nutrient cycling study. (2002-2005)

McLean/United States Geological Survey, National Wildlife Health Center - 41640-0001: research entitled "Understanding the Geography and Pathways of West Nile Virus," entailing capturing and blood sampling of migratory birds at St. Marks, as well as mosquito sampling. (2001-2003)

Palis/Private Contractor - 41640-00009: sampling ephemeral wetlands on refuge property and adjacent private lands for federally threatened flatwoods salamanders. (2002-2004)

Peterson/Bok Tower Gardens - 41640-MK03005: surveys and collection of seeds for propagation studies of locally endemic Godfrey's spiderlily in marshes along Wakulla and St. Marks Rivers. (2003)

Reichert/University of Tennessee, Knoxville - 41640-JH03002: study of nesting and habitat associations of a spider species. (2003)

Simek/FWC - 41640-03006: establishment and monitoring of bait stations and hair snares for a population study focusing on Florida black bear movements and abundance relative to U.S. Highway 98 within the Aucilla area. (2003-2004)

Sorrie/Longleaf Ecological Services - 41640-MK03007: survey of local endemic plant, Godfrey's spiderlily, in marshes along Wakulla and St. Marks rivers. (2002-2003)

State of Florida/Department of Environmental Protection - 41640-58864: installation of monitoring station for ground-level ozone concentrations. (2000-2005)

Surdick/University of Florida, Center for Wetlands - 41640-02013: sampling of small depressional cypress wetlands for plants, macro invertebrates, fish, water chemistry, and algae. (2002-2003)

Travis/Florida State University, Department of Biological Science - 41640-0008: field experiments, behavioral observations, and sampling of three brackish water fish species. (2002-2003)

United States Geological Survey, Water Resources Division - 41640-03001: installation of water gauge station south of Aucilla Boat Ramp to collect water quality, water level, and velocity data for the Aucilla River. (2003-2028)

Winn/Florida State University, Department of Biological Science - 41640-0006: field studies of genetic variation of longleaf pine sandhill plant species. (2002-2003)

Appendix XI. Wilderness Review Summary

Wilderness Review
St. Marks National Wildlife Refuge
October 16 - 18, 2001
(updated December 2003)

The Project Leader and staff met at St. Marks National Wildlife Refuge (NWR) on October 16 through 18, 2001 to gather information and conduct field exams for the refuge's wilderness review. The review team included:

James Burnett, Project Leader
Harold Morrow, Deputy Project Leader
Joe Reinman, Wildlife Biologist
Bob Eaton, Wildlife Biologist
Robin Will, Refuge Ranger
Mike Keys, Biological Technician (now Wildlife Biologist)

The wilderness review is a required component of the comprehensive conservation plan. The Wilderness Act defines a Wilderness Area as an area of federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is managed so as to preserve its natural conditions and which:

1. generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable;
2. has outstanding opportunities for solitude or primitive and unconfined type of recreation;
3. has at least 5,000 contiguous roadless acres or is of sufficient size to make practicable its preservation and use in an unimpaired condition; or is a roadless island;
4. does not substantially exhibit the effects of logging, farming, grazing, or other extensive development or alteration of the landscape, or its wilderness character could be restored through appropriate management, at the time of review; and
5. may contain ecological, geological, or other features of scientific, education, scenic, or historic value.

During the inventory phase of the wilderness review, the emphasis is on an assessment of wilderness character within the inventory unit. Special values (i.e., ecological, geological, scenic, historical) should be identified, but are not required. The determination to recommend (or not recommend) a Wilderness Study Area to Congress for wilderness designation will be made through the comprehensive conservation plan decision-making process.

Prior to the meeting, an analysis of land status, transportation system, and hydrographic information, the review team identified wilderness inventory units potentially meeting the Wilderness Study Area criteria. These units are identified in the following table and figure.

Lands evaluated as potential Wilderness Study Areas

Unit	Acreage
Sprague Island	200
Palmetto Island	9
Piney Island	1,094
Patty's Island	6
John's Island	17
Big Pass Island	52
Nisbet Island	597
Little Pass Island	4
Port Leon 2003 addition	1,200
West of St. Marks River	6,681

Wilderness Management

The wilderness management policy and regulations allow motorized access and use of mechanized equipment for administrative purposes only if such uses are the minimum necessary to accomplish wilderness objectives. For the purpose of analysis in the draft comprehensive conservation plan/environmental assessment, managers should assume that authorization of such uses would be temporary and rare in a wilderness area. If such restrictions would significantly limit the Service's ability to accomplish other resource management objectives, these impacts should be fully described in the environmental consequences of the draft comprehensive conservation plan/environmental assessment and would obviously be a factor for consideration in selecting a preferred alternative for the final comprehensive conservation plan.

Resource Management Issues

Fire Management

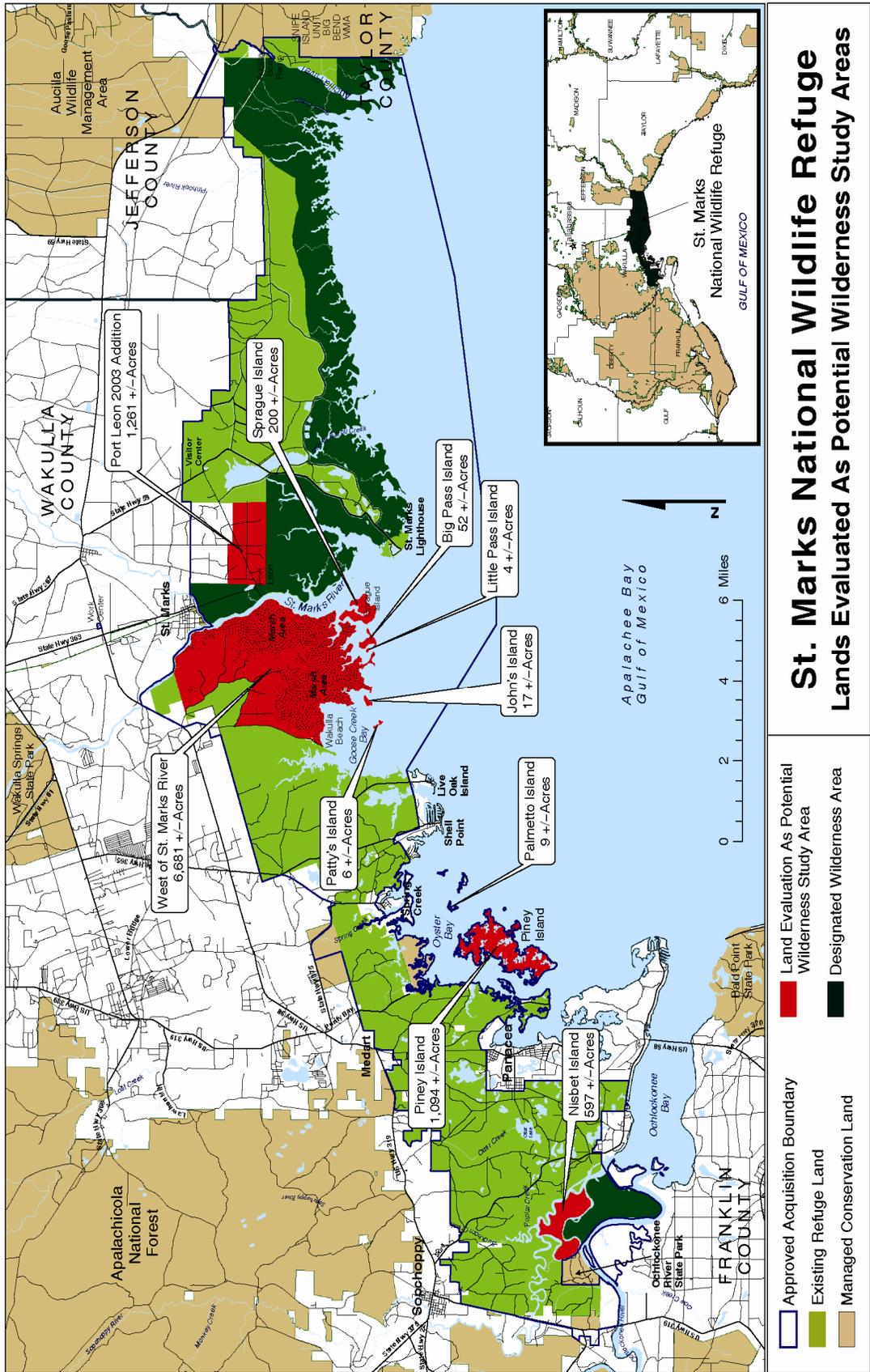
No prescribed burning takes place on any of the islands with the exception of Thom's Island (Congressionally designated wilderness in 1975). No wildland fires are suppressed on any of the islands.

The Port Leon addition will require extensive prescribed burning both to control fuel loading within planted pine stands and to aid the restoration and recovery of native ground cover. Most of the upland portions of the inventory area west of the St. Marks River are pine-dominated habitats that are frequently prescribed burned to meet wildlife habitat objectives and to control fuel loading.

Endangered Species

There are no known federally listed species on these islands; however, the threatened Gulf sturgeon may over winter in the marine habitat surrounding these islands. There are nesting bald eagles

Figure 33. Lands evaluated as potential Wilderness Study Areas



within the inventory area west of the St. Marks River and immediately adjacent to the Port Leon addition. Flatwoods salamanders have been documented in several ponds just east of the Port Leon acquisition and could possibly occur within the acquisition area as well.

Although habitat seems unsuitable, piping plovers may migrate or wander on the islands, but no surveys have been conducted to confirm this.

Public Use

There is minimal public use on these islands, but heavier public use in surrounding waters and interior tidal creeks (i.e., motor boating, sailing, hunting, and fishing). The area west of the St. Marks River is included in the Wakulla Unit permitted hunts and contains a segment of the Florida National Scenic Trail.

The Port Leon addition was for many years part of an adjacent state wildlife management area that was heavily hunted. The presence of a large and growing population of feral swine will probably require that hunting be reinstated for control and reduction of the population. A 2-mile segment of the Florida National Scenic Trail passes through the unit.

Navigable Waters

All of the inventory units on the refuge except the Port Leon addition are bounded by navigable waters: the Gulf of Mexico and the Sopchoppy and Dead Rivers. Most of Sprague Island, Piney Island, Nesbit Island, and the inventory area west of the St. Marks River consist of tidal marshes that are sovereign State land. The Service has limited authority to restrict activities, such as motor boating, on navigable water bodies.

Summary of Wilderness Inventory Findings

The wilderness review inventory team identified ten wilderness inventory units in the St. Marks National Wildlife Refuge. All but two of these are small islands located in the Gulf of Mexico.

The findings for each of the inventory units are summarized in the following sections:

Sprague Island meets the criteria for a wilderness study area (a roadless island of any size), but could not be practicably managed as wilderness because of location and close proximity to heavy motor boating activity. This heavy public use, combined with the size of the island, limits the opportunities for individuals to enjoy solitude or a primitive and unconfined recreational experience.

Palmetto Island meets the criteria for a wilderness study area (a roadless island of any size), but could not be practicably managed as wilderness because of location and close proximity to heavy motor boating activity. This heavy public use combined with the size of the island severely limits the opportunities for individuals to enjoy solitude or a primitive and unconfined recreational experience.

Piney Island meets the criteria for a wilderness study area (a roadless island of any size), but could not be practicably managed as wilderness because of location and close proximity to heavy motor boating activity. This heavy public use, combined with the size of the island, limits the opportunities to enjoy solitude or a primitive and unconfined recreational experience.

Patty's Island meets the criteria for a wilderness study area (a roadless island of any size), but could not be practicably managed as wilderness because of location and close proximity to heavy motor boating activity. This heavy public use, combined with the size of the island, severely limits the opportunities to enjoy solitude or a primitive and unconfined recreational experience.

John's Island meets the criteria for a wilderness study area (a roadless island of any size), but could not be practicably managed as wilderness because of location and close proximity to heavy motor boating activity. This heavy public use, combined with the size of the island, severely limits the opportunities to enjoy solitude or a primitive and unconfined recreational experience.

Big Pass Island meets the criteria for a wilderness study area (a roadless island of any size), but could not be practicably managed as wilderness because of location and close proximity to heavy motor boating activity. This heavy public use, combined with the size of the island, limits the opportunities to enjoy solitude or a primitive and unconfined recreational experience.

Nisbet Island meets the criteria for a wilderness study area (a roadless island of any size), but could not be practicably managed as wilderness because of location. There is heavy public use in the adjacent Ochlockonee River State Park with a large concentration of automobile traffic, which limits the opportunities to enjoy solitude or a primitive and unconfined recreational experience.

Little Pass Island meets the criteria for a wilderness study area (a roadless island of any size), but could not be practicably managed as wilderness because of location and close proximity to heavy motor boating activity. This heavy public use, combined with the size of the island, severely limits the opportunities to enjoy solitude or a primitive and unconfined recreational experience.

On December 8, the comprehensive conservation planning team met to discuss the Wilderness Review and goals, objectives, and strategies relating to designated wilderness areas on the refuge. A decision was made to revise the Wilderness Review to include two other areas. The results of this analysis are as follows:

The area termed West of St. Marks River meets the criteria for a wilderness study area due to the fact that it is larger than 5,000 acres of contiguous roadless area, but could not be practicably managed as wilderness because of its location and close proximity to heavy motor boating activity. Further, the most isolated upland sites are less than a half-mile from existing roads and most of the upland areas are much closer to roads. A convoluted boundary is required to obtain "5,000 contiguous *roadless* acres." Access to the wilderness study area is unrestricted by water and the river is used heavily for recreational boating. Lighting from the nearby town of St. Marks cannot be obscured and air traffic is noticeable. Air boat use is allowed on the river as is commercial fishing. Much of this area is *Juncus* marsh (e.g., black rush or needle rush) and there are legal issues relating to the Service's ability to regulate areas that are within the State of Florida's jurisdiction [i.e., State-owned bottom lands (to mean high tide line)].

The Port Leon 2003 addition is located south of Port Leon road and east of the St. Marks Wilderness area. It is not roadless and contains former industrial forest lands. Its condition has been severely altered by silviculture practices, including chaining, discing, bedding, planting with off-site species, ditching, and road building. Many years of restoration work requiring access and use of heavy mechanical equipment is required in this tract. Wilderness designation is not suitable here due to current habitat conditions and future management requirements.

Appendix XII. Intra-Service Section 7 Biological Evaluation

REGION 4 INTRA-SERVICE SECTION 7 BIOLOGICAL EVALUATION FORM

Originating Person: Mary Morris, Natural Resource Planner
Telephone Number: 850/925-6121 **E-Mail:** Mary_Morris@fws.gov
Date: June 29, 2005

PROJECT NAME: St. Marks National Wildlife Refuge Comprehensive Conservation Plan
and Environmental Assessment

I. Service Program:

- Ecological Services
- Federal Aid
 - Clean Vessel Act
 - Coastal Wetlands
 - Endangered Species Section 6
 - Partners for Fish and Wildlife
 - Sport Fish Restoration
 - Wildlife Restoration
- Fisheries
- Refuges/Wildlife

II. State/Agency: Florida, U.S. Fish and Wildlife Service

III. Station Name: St. Marks National Wildlife Refuge

IV. Description of Proposed Action: Implementation of the Comprehensive Conservation Plan.

The U.S. Fish and Wildlife Service developed a Comprehensive Conservation Plan (CCP) for St. Marks National Wildlife Refuge, a 68,931-acre refuge in Wakulla, Taylor and Franklin Counties, Florida. Implementation of the CCP will direct management actions on the refuge for the next 15 years.

The preferred alternative identified in the CCP outlines actions to improve refuge management. It supports the purposes for which the refuge was established and the missions of the refuge and Refuge System. The CCP identifies seven broad goals for habitat, wildlife, threatened and endangered species, visitor services, cultural resources, wilderness, and administration. Specific objectives and strategies for these goals are detailed. The goals, objectives, and strategies were developed to support international, national, and regional conservation plans and initiatives in partnership with other agencies, such as the Florida Fish and Wildlife Conservation Commission.

V. Pertinent Species and Habitat:

A. Include species/habitat occurrence map: Not available for most species.

B. Complete the following table:

SPECIES/CRITICAL HABITAT	STATUS¹
Gulf sturgeon	T
flatwoods salamander	T
American alligator	T, S/A
loggerhead sea turtle	T
green sea turtle	E
leatherback sea turtle	E
Kemp's ridley sea turtle	E
eastern indigo snake	T
piping plover	T
bald eagle	T
wood stork	E
red-cockaded woodpecker	E
Florida manatee	E
purple bankclimber (<i>Elliptoideus sloatianus</i>)	T
Ochlockonee moccasinshell (<i>Medionidus simpsonianus</i>)	E

¹STATUS: E=endangered, T=threatened, PE=proposed endangered, PT=proposed threatened, CH=critical habitat, PCH=proposed critical habitat, C=candidate species, S/A=Similar Appearance

VI. Location:

A. Ecoregion Number and Name: 30 Northeast Gulf Watershed

B. County and State: Jefferson, Wakulla and Taylor Counties, Florida

C. Section, township, and range (or latitude and longitude): Townships 45 – 65, Ranges 3W – 4E

D. Distance (miles) and direction to nearest town: Adjacent to towns of St. Marks, Sopchoppy, and Panacea, Florida.

E. Species/habitat occurrence:

Wood storks use the open wetland and freshwater marsh habitats of the refuge. They use Ochlocknee Bay, Otter Lake, and freshwater impoundments for roosting and foraging. The American alligator population is estimated at six thousand. They are found throughout the wetlands. Red-cockaded woodpeckers occupy suitable, upland pine habitat on the refuge. There are few documented records of eastern indigo snakes on the refuge, yet suitable habitat (upland longleaf pine) does exist. Individual flatwoods salamanders have been observed within the St. Marks unit in slash pine flatwoods and sawgrass ponds. There are 15 active or recently active bald eagle nesting territories on the refuge, with concentrated use between autumn and spring. Adult bald eagles likely forage throughout the refuge.

VII. Determination of Effects:

A. Explanation of effects of the action on species and critical habitats in item V. B:

SPECIES/ CRITICAL HABITAT	IMPACTS TO SPECIES/CRITICAL HABITAT
Gulf sturgeon	The project is not likely to adversely affect the species.
flatwoods salamander	The project is not likely to adversely affect the species.
American alligator	The project is not likely to adversely affect the species.
loggerhead sea turtle	The project is not likely to adversely affect the species.
green sea turtle	The project is not likely to adversely affect the species.
leatherback sea turtle	The project is not likely to adversely affect the species.
Kemp's ridley sea turtle	The project is not likely to adversely affect the species.
eastern indigo snake	The project is not likely to adversely affect the species.
piping plover	The project is not likely to adversely affect the species.
bald eagle	The project is not likely to adversely affect the species.
wood stork	The project is not likely to adversely affect the species.
red-cockaded woodpecker	The project is not likely to adversely affect the species.
Florida manatee	The project is not likely to adversely affect the species.
purple bankclimber	The project is not likely to adversely affect the species.
Ochlockonee moccasinshell	The project is not likely to adversely affect the species.

A. Prescribed burning and thinning of overstory pines will benefit red-cockaded woodpeckers, bald eagles, flatwoods salamanders, and eastern indigo snakes by improving the understory conditions of pine flatwoods and perpetuating habitat in the long term. Potential adverse impacts to these reptiles could occur during burning or fire line plowing. Potential adverse impacts could occur to bald eagle nests or red-cockaded woodpecker cavity trees. All impacts are offset by the improvement to the habitat expected to result from habitat management. Thinning will also improve habitat and nest trees for bald eagles and red-cockaded woodpeckers.

The management of red-cockaded woodpeckers involves capturing and handling, which presents an opportunity for mortality to occur. However, this risk is small and greatly outweighed by the benefits of increasing the population.

Measures to control invasive exotic plant species are proposed through herbicide application in combination with prescribed burning of pyric vegetation. Limited herbicide applications will be used to control monocultural stands of cattails within the manmade impoundments on the St. Marks Unit. Due to the limited quantity and specific application of pesticides, there will be no effect upon any of the listed species in item V.

Measures to control exotic animal species, particularly feral hogs, are proposed. Beneficial effects to habitats, especially to that of the flatwoods salamander, are an expected result.

Public use could have temporary, short-term effects on bald eagle nesting; however, nest sites may be closed seasonally to minimize disturbance by the public.

As the plan is implemented, suitable habitat for flatwoods salamanders, red-cockaded woodpeckers and eastern indigo snakes may be created as areas are restored and/or acquired.

B. Explanation of actions to be implemented to reduce adverse effects:

Project modification ideas may be found in recovery plans. Although Section 7 of Act prohibits only those actions by federal agencies, which are likely to jeopardize listed species or adversely modify critical habitat, the Service has a commitment to recovering listed species and trying to prevent the need to list additional species.

SPECIES/ CRITICAL HABITAT	ACTIONS TO MITIGATE/MINIMIZE IMPACTS
Gulf sturgeon	No actions to mitigate/minimize impacts to the species are needed or planned.
flatwoods salamander	Actions to minimize impacts to the species are discussed below.
American alligator	No actions to mitigate/minimize impacts to the species are needed or planned.
loggerhead sea turtle	No actions to mitigate/minimize impacts to the species are needed or planned.
green sea turtle	No actions to mitigate/minimize impacts to the species are needed or planned.
leatherback sea turtle	No actions to mitigate/minimize impacts to the species are needed or planned.
Kemp's ridley sea turtle	No actions to mitigate/minimize impacts to the species are needed or planned.
eastern indigo snake	Actions to minimize impacts to the species are discussed below.

SPECIES/ CRITICAL HABITAT	ACTIONS TO MITIGATE/MINIMIZE IMPACTS
piping plover	No actions to mitigate/minimize impacts to the species are needed or planned.
bald eagle	Actions to minimize impacts to the species are discussed below.
wood stork	No actions to mitigate/minimize impacts to the species are needed or planned.
red-cockaded woodpecker	Actions to minimize impacts to the species are discussed below.
Florida manatee	No actions to mitigate/minimize impacts to the species are needed or planned.
purple bankclimber (<i>Elliptoideus sloatianus</i>)	No actions to mitigate/minimize impacts to the species are needed or planned.
Ochlockonee moccasinshell (<i>Medionidus</i>)	No actions to mitigate/minimize impacts to the species are needed or planned.

B. Flatwoods salamander and eastern indigo snake - During timber harvest activities, log loading decks will be located outside the 450-meter radius buffer zone around potential flatwoods salamander breeding ponds. Where this is not feasible, the impacts of the log loading decks in pine flatwoods will be minimized by using a minimum number of decks, confining decks to ¼-acre or less and confining loading decks to existing grassed roads where possible. To reduce adverse impacts to flatwoods salamanders and indigo snakes from prescribed fire activities, the burning blocks have been aligned to take advantage of natural firebreaks, thereby minimizing the plowing of fire lines.

Bald eagle and Red-cockaded woodpecker - Burning around bald eagle nest trees will generally be conducted prior to October 1 or after nesting has ceased. Red-cockaded woodpecker cavity trees and bald eagle nest trees will be checked prior to burning. Fuels will be cleared around the base of the trees as necessary to prevent any impact of the fire on the trees. Fire will be set by hand around the most vulnerable cavity trees, with water on-hand, to minimize the chance of the tree igniting. Any active RCW cavity rendered unsuitable for use by RCW because of fire will be replaced within 72 hours, or as soon as practicable, by installing an artificial cavity.

The capture and handling of red-cockaded woodpeckers and installation and monitoring of artificial cavities will follow accepted protocol. The amount of handling and time in captivity for each bird will be kept to a minimum.

Following label restrictions minimizes the amount of pesticide use and maximizes effectiveness of treatments. The long-term beneficial impacts of herbicide use to combat invasive exotic species generally outweigh the short-term negative impacts of non-target damage, volatilization, soil activity, and toxicity to vertebrates and invertebrates.

VIII. Effect Determination and Response Requested:

SPECIES/CRITICAL HABITAT	DETERMINATION ¹			REQUESTED
	NE	NA	AA	
Gulf sturgeon		X		Concurrence
flatwoods salamander		X		Concurrence
American alligator		X		Concurrence
loggerhead sea turtle		X		Concurrence
green sea turtle		X		Concurrence
leatherback sea turtle		X		Concurrence
Kemp's ridley sea turtle		X		Concurrence
Eastern indigo snake		X		Concurrence
piping plover		X		Concurrence
bald eagle		X		Concurrence
wood stork		X		Concurrence
red-cockaded woodpecker		X		Concurrence
Florida manatee		X		Concurrence
purple bankclimber		X		Concurrence
Ochlockonee moccasinshell		X		Concurrence

¹DETERMINATION/ RESPONSE REQUESTED:

NE = no effect. This determination is appropriate when the proposed action will not directly, indirectly, or cumulatively impact, either positively or negatively, any listed, proposed, candidate species or designated/proposed critical habitat. Response Requested is optional but a "Concurrence" is recommended for a complete Administrative Record.

NA = not likely to adversely affect. This determination is appropriate when the proposed action is not likely to adversely impact any listed, proposed, candidate species or designated/proposed critical habitat or there may be beneficial effects to these resources. Response Requested is a "Concurrence".

AA = likely to adversely affect. This determination is appropriate when the proposed action is likely to adversely impact any listed, proposed, candidate species or designated/proposed critical habitat. Response Requested for listed species is "Formal Consultation". Response requested for proposed and candidate species is "Conference".

Signed  06/29/2005
 signature (originating station) date

Refuge Manager
 title

IX. Reviewing Ecological Services Office Evaluation:

A. Concurrence Nonconcurrency _____

B. Formal consultation required _____

C. Conference required _____

D. Informal conference required _____

E. Remarks (attach additional pages as needed):

Signed

signature

JR

7-13-05

date

title

Deputy Field Supervisor

office

Panama City, ES

FWS # 4-P-054177

Log 4370

Appendix XIII. Service's Response to Comments by Other Agencies and the Public on the Draft CCP/EA

Summary of Public Meetings on the Comprehensive Conservation Plan and Environmental Assessment for St. Marks National Wildlife Refuge

The public review and comment period for the Draft CCP/EA was from January – March 21, 2006. At least 56 persons attended three public meetings held on the draft CCP/EA during March 2006. Table 1 shows the locations and details of the public meetings:

Location	County	Date	Number of attendees	Number of Speakers
Panacea, FL Wakulla County Visitors Center	Wakulla	2-16-06	12	3
Crawfordville, FL County Commission Chambers	Wakulla	2-22-06	17	6
Tallahassee, FL FL DOT – Burns Auditorium	Leon	2-23-06	27	8
Totals			56	17

Refuge staff at the meetings included the following individuals:

James Burnett – Refuge Complex Manager
 Terry Peacock – St. Marks National Wildlife Refuge Manager
 Mary Morris – Natural Resources Planner
 Larry Anderson – Park Officer (Panacea only)
 Joseph Reinman – Wildlife Biologist
 Robin Will – Refuge Ranger
 David Moody – Refuge Ranger

Of the 17 speakers, 13 persons represented the following organizations: Gulf Specimen Marine Lab (1); Southern Trailriders Association (3); Florida Bowhunters Council (1); Florida Park Service (3); American Watercraft Association (2); and the St. Marks Refuge Association (3).

Thirty written comment letters were received by mail or email from 32 persons. Twenty-six written responses were from individuals and seven were from organizations. Of the seven organizations, three are governmental—The National Park Service, the Florida Department of Environmental Protection's Office of Intergovernmental Programs (State Clearinghouse), and the Office of

Greenways and Trails. The four other organizations are the Florida Wildlife Federation, the Tallahassee Area Convention and Visitors Bureau, the Florida Bowhunters Council, and the Defenders of Wildlife.

Notices of the plan's availability and public meeting were sent to over 500 persons on the St. Marks CCP mailing list, including six representatives of the following five tribes: The Miccosukee Tribe of Indians of Florida, Seminole Tribe of Florida, Seminole Nation of Oklahoma, Poarch Band of Creek Indians of Alabama, and the Muscogee (Creek) Nation of Oklahoma. No comments were received from the designated tribal liaisons.

The plan was circulated through the Florida State Clearinghouse to 10 state, regional, and local governments. The clearinghouse agencies review documents pursuant to Presidential Executive Order 12372, Gubernatorial Executive Order 95-359, the Coastal Zone Management Act, and the National Environmental Policy Act. Comments were received from only one Clearinghouse agency, the Florida Fish and Wildlife Conservation Commission (FWC). These comments were dated March 31, 2005, and were originally submitted by FWC during the Service's internal review of the CCP/EA. Major revisions of the Internal Review Draft were made in response to the FWC comments, but it does not appear that the later document, i.e., the Draft CCP/EA, was reviewed. The Florida State Clearinghouse commented in a letter dated March 10, 2006, that the Draft CCP/EA is consistent with the Florida Coastal Management Program. The letter was signed by Sally B. Mann, Director of the Office of Intergovernmental Programs, Florida Department of Environmental Protection.

Under the National Environmental Policy Act, the Service must respond to substantive comments received during the open comment period. This includes both written comments and oral statements made at public meetings. For purposes of this CCP/EA, a substantive comment is one that is within the scope of the proposed action and alternatives, which were considered under the EA, is specific to the proposed action, or is directly related to the proposed action. The comments submitted during the open comment period were evaluated, summarized, and grouped into the following categories:

- Fish, Wildlife, and Plant Populations
- Habitats, Land Protection, and Conservation
- Environmental Education and Visitor Services
- Refuge Administration
- Cultural Resources
- Alternatives
- General Refuge Support
- Plan Support and Criticism
- Compatibility Determinations

The Service's responses to the comments are provided by category. Editorial comments on text or grammar were incorporated as applicable.

Fish, Wildlife, and Plant Populations

Comment: A suggestion was made to plant agricultural crops to provide food for ducks, geese, and other wildlife.

Response: Migratory birds are a trust species for the wildlife refuge and it is refuge policy to provide a natural diversity of foods for waterfowl. The refuge has set aside and manages 11 impoundments for moist soils management and three wetland areas. It has been the experience of our wildlife biologists that it is neither practical nor effective to plant crops for ducks. There has been a nationwide decline of both geese and ducks. Geese do not use the refuge in large numbers anymore due to changes in the migratory patterns.

Comment: Florida Defenders of Wildlife – “We support the CCP’s emphasis on species of special concern, in particular the CCP’s recommended strategies for gopher tortoise and Florida black bear.”

Response: Comment noted.

Comment: Florida Defenders of Wildlife - “We support the CCP’s emphasis on migratory bird conservation. We particularly support the Service negotiating an agreement with the state that would allow the refuge to restrict public access around islands in Oyster Bay during critical nesting or migration periods. We encourage the Service, however, to accelerate this negotiation from 2015 to 2010.”

Response: The date has been changed to 2011, which will be 5 years from the anticipated approval date of the Final CCP.

Habitats, Land Protection, and Conservation

Watershed management

Comment: One person stated that they would like to see protection of St. Marks and Aucilla Rivers’ watersheds and sinks.

Response: To the extent that the refuge has jurisdiction over water quality, for waters within its boundaries, all attempts will be made to protect the watersheds and to work cooperatively with the lead agency for water quality protection, the Florida Department of Environmental Protection.

Comment: One person commented that the dikes should be removed.

Response: The primary purpose for which the refuge was established is to provide habitat and refuge for migratory birds. The dikes were established by the Civilian Conservation Corps many years ago for this purpose. Today, the refuge manages 11 impoundments and 3 wetland areas to provide a diversity of habitats. Since other wildlands are not always available to wildlife, the refuge manages a small percentage of its lands for this purpose.

Comment: Defenders of Wildlife – “...we are pleased that the Service intends to restore natural hydroperiods on the refuge. This will have tremendous beneficial effects on refuge habitat and species.”

Response: Comment noted.

Comment: One person opposes new roads and logging.

Response: The CCP does not propose new roads. Logging is done under the Service’s Forest Management Plan, which will be revised and incorporated in 2011. There will be opportunity for public comment when that plan is drafted.

Prescribed Fire

Comment: One speaker commented that the refuge’s prescribed fire intervals are too infrequent for habitats.

Response: Florida habitat types are highly dependent on fire for health and survival. We prescribe to burn all burnable acres on a 2- to 3-year rotation, with a few acres of special habitat, such as Pond Pine, on a 5-year rotation. Prescriptions are written for summer/growing season burns on a 2-year rotation prescribed by the refuge biologist for reduced intensities due to specialized habitat for the Flatwoods salamander.

Comment: Two persons oppose prescribed fire.

Response: Considered an integral part of the Service’s forest management program, prescribed fire is an ecological tool that offers two primary benefits. It provides for habitat management and it reduces threats to public health and safety from wildfires. Prescribed fire maintains healthy levels of fuel loads, limits the occurrence of catastrophic fires, and provides for the direction of smoke (away from population centers).

Comment: Two persons support the refuge’s prescribed fire program and complimented staff.

Response: Comment noted.

Comment: A representative of the Florida Park Service stated that his agency would like to work collaboratively and with FWC on prescribed fire and other resource goals.

Response: Comment noted. The Service welcomes a partnership with the State.

Exotic Species

Comment: One speaker supports an aggressive exotic species control program.

Response: The Service’s proposed alternative would provide for an aggressive exotic species control program.

Land Management Research and Demonstration (LMRD) area

Comment: Two individuals support the LMRD area designation and longleaf conservation. The Defenders of Wildlife also commented: We support creation of a Land Management Research and Demonstration Area on the refuge and believe it will provide much needed resources to the refuge and comparable habitats off-refuge.

Response: Comment noted.

Land Acquisition

Comment: The St. Marks Refuge Association, the Florida Wildlife Federation, and 8 individuals favor expanding the refuge's approved acquisition boundary to provide a buffer around the refuge. They stated that the plan should include a strategy for land acquisition to protect the 34,000-acre area identified for conservation. Another comment was made that land acquisition should be used to purchase lands around the Aucilla and St. Marks Rivers in order to protect these watersheds.

Response: The Draft CCP/EA only references land acquisition in relation to the last approved Land Protection Plan (2000). Some areas outside the refuge's approved acquisition boundary are identified in the Draft and Final CCP as proposed conservation focus areas. Strategies for conservation of these areas involve establishing partnerships with other government agencies, natural resource protection organizations, and neighboring landowners.

Comment: The Defenders of Wildlife supports purchasing the remaining land within the current approved acquisition boundary.

Response: The CCP includes provisions for this. Funding is dependent on Congressional action.

Environmental Education and Visitor Services

Comment: A representative of the Gulf Specimen Marine Laboratory asked to be included as a potential partner in research and environmental education efforts.

Response: The Gulf Specimen Marine Laboratory was added to the list of potential partners in Appendix IX.

Comment: One speaker asked that refuge staff continue partnerships with Wakulla County schools, particularly regarding cultural resources.

Response: This suggestion will be considered as the step-down plans for public use and cultural resources are developed and when the refuge staff develops themes for annual interpretive programs.

Comment: Defenders of Wildlife – We support environmental education on the refuge. We encourage the Service to include, in its angler education program, materials that warn the public of the fish consumption advisories and detail how fish species have become contaminated. Our experience has been that many refuges do not even have basic consumption advisories available.

Response: An advisory notice has been posted on our website, in our quarterly newsletters, and in our fishing regulations brochure. The advisory notices reference or link to the Florida Department of Health website: doh.state.fl.us/floridafishadvice. This website provides specific information regarding consumption of fish and shellfish in Florida waters.

Comment: The Florida Park Service commented that San Marcos de Apalache State Historic Park museum has room for a display and exhibit on the St. Marks Lighthouse.

Response: The refuge does not currently have resources to develop a display to give to the museum.

Hunting

Comment: One speaker would like to see hunting limited to 2 weeks per year.

Response: Our hunt program will not be reduced and a youth hunt program is proposed.

Comment: The Florida Bowhunters Council made several specific comments regarding the hunt program and annual regulations and asked to be made a partner with the refuge.

Response: Any revisions to the refuge hunt program will be addressed in the Hunt Plan step-down plan, which is scheduled to be revised in 2011. It will have an Environmental Assessment and opportunity for public comment will be provided.

Comment: A representative of the Florida Bowhunters Council would like to see the introduction of an atlatl hunt for hogs.

Response: The refuge does not propose to introduce this form of hunting.

Comment: One speaker mentioned that he supports the refuge's hunt program.

Response: Comment noted.

Comment: One person opposes recreational hunting.

Response: Comment noted. Hunting is one of the six wildlife-dependent public uses allowed on wildlife refuges. It is an historical public use on this refuge.

Comment: The plan lacks sufficient provisions to enhance waterfowl hunting.

Response: Hunting will be addressed in the refuge's step down plan. Our agency mission is wildlife first and the refuge was established as a refuge for migratory birds, particularly waterfowl. Although hunting is one of six priority public uses, it is allowed to the extent that is appropriate and compatible with the refuge's mission and purposes. Piney Island is currently open for waterfowl hunting and there are no plans to change this or expand waterfowl hunting opportunities on the refuge.

Comment: "Opportunities for public outreach exist through contacts with local Wakulla County agencies, such as the Ducks Unlimited Chapter, the County Commission, the Chamber of Commerce, the Wakulla Men's Club and national organizations not opposed to hunting, such as the National Rifle Association."

Response: The refuge partners with Ducks Unlimited for green-wing events and is a member of the Chamber of Commerce. Other partnership opportunities are noted.

Wildlife Observation

Comment: One speaker stated that he would like to have a special use permit to act as a tour guide for birdwatchers. Another stated that access and permits for commercial use should be allowed.

Response: The refuge currently has no provisions for commercial outfits on the refuge. The refuge has not evaluated the carrying capacity or environmental effects caused from public use.

Horseback riding (see also the compatibility determinations in Appendix VI.)

Comment: Three members of the Southern Trailriders Association commented that they would like to see group size limit stipulation in the compatibility determination for horseback riding changed from 5 to 25.

Response: Horseback riding is not a priority public use under current Service policy. The refuge is allowing historical use at present usage rates. The refuge is not looking to expand horseback riding. The group size has been changed from 5 to 8 horses/riders per group.

Comment: Two members of the Southern Trailriders Association stated that there is no functional loop road to ride in the Panacea Unit. It suggests making road 336 a horseback riding trail.

Response: Horseback riding is not a priority public use under current Service policy. The refuge is allowing historical use at present usage rates. The refuge is not looking to expand horseback riding or to open more areas of the refuge to horseback riding.

Comment: Two members of the Southern Trailriders association noted that there are sparse and inconsistent markings throughout the refuge. It asked for more and better marking and offered its group for assistance with this task.

Response: The refuge will try to better identify horse trails as the CCP is implemented and as the Sign and Visitor Services step-down plans are revised and implemented.

Boating

Comment: Four individuals and a representative of the American Watercraft Association asked that current refuge policy be changed to allow for personal watercraft (PWC) launches at Wakulla Beach and the Lighthouse Boat ramp.

Response: The plan limits personal watercraft launches at the Lighthouse boat ramp and Wakulla Beach Road to current use levels in order to protect seagrasses and to avoid increasing disturbance to wildlife in shallow water habitats.

Lighthouse Road Boat Ramp

Comment: One speaker supports plan's proposal to maintain, but not expand, the Lighthouse boat ramp or channel.

Response: Comment noted.

Comment: The entrance to the canal/channel is heavily shoaled and is shallow. Larger boats frequently create turbidity when launching at the ramp. Since deeper water ramps are readily available at the Fort, Shell Point Marina, and Shields Marina, the plan should include a determination that launching larger vessels is incompatible. I would propose that a 100-HP limitation and a 20-foot vessel length restriction be imposed in order to reduce turbidity associated with launching at the Lighthouse Road ramp. In addition, the speed limit in the canal/channel should be posted properly as "SLOW SPEED" or as "IDLE SPEED - NO WAKE," using signs that conform to the uniform waterway marking system.

Comment: One comment favors the use of airboats along Wakulla County's coast.

Response: Airboats are incompatible with the refuge purposes because they disturb birds and our mission is to provide a refuge for wildlife.

Response: The shallow conditions of the Lighthouse saltwater boat ramp cited in the comment generally self-regulate boat and motor size and the plan does not include language to deepen the basin or canal. There are currently "Slow - No Wake Zone" signs at either end of the saltwater boat canal.

DEP – canoe trail campsite

Comment: The Department of the Interior recently designated Florida's Big Bend Saltwater Paddling Trail as a national recreation trail. The DEP Office of Greenways and Trails is planning for a Florida Circumnavigational Saltwater Paddling Trail around the whole state. They would like to provide campsites reserved for paddlers sited every 10-15 miles along this trail and asked for 2 sites for primitive camping on refuge. The sites would accommodate a maximum of 8 people and/or 4 2-person tents.

Response: Refuge staff met with representatives of the DEP on this proposal in June 2006.

Comment: One person commented that he wants to see improved parking at the trail heads, construction of a fishing pier on Otter Lake, and traffic calming devices between the Otter Lake gate and the picnic area.

Response: Improvements to trailheads are proposed in the CCP for the Panacea Units. The CCP also provides for consideration of a fishing pier or access platform on one of the four lakes on that unit if it is warranted. Traffic calming devices are not proposed in the plan.

Comment: The refuge owns a tiny, but important, piece of land on Surf Road across the bridge from what used to be Bayside Marina. This parcel could be developed as a rest stop for the soon-coming bike trail and as a canoe/kayak launch site. Limited car/truck parking should be provided to enhance the safety of users.

Response: The bike trail is proposed to be sited across the highway from this parcel. It is not of sufficient size to develop for parking. Encouraging persons to cross a busy highway is not considered as being in the best interest of the safety of visitors.

Comment: Defenders of Wildlife – hydrilla impoundment closure - “We are particularly pleased that the Service is making the potentially unpopular decision to close boat trailer access to the impoundments on the St. Marks Unit to prevent the introduction of exotic species.”

Response: Comment noted.

Refuge Administration

Comment: One speaker stated that he would like to see us address what we will do with the refuge if the budget continues to decrease. He asked how we will we address our management priorities in view of decreasing resources. Another person sent in this written comment: I understand the FY 05-06 budget for NWRs was cut by more than \$10 million. This week the federal government was a record \$119 billion in debt. We are continuing to fight a war in Iraq that is costing a billion dollars a month and the bill for Hurricane Katrina seems to grow exponentially. In my opinion, this implementation section needs to explore what will be done if (a) no new monies are available and /or (b) our budget is cut by 10 percent? I think without addressing these realistic possibilities, this Comp Plan and the process of developing it are merely management motions to explore what could/should be.

Response: Priorities will be set in the development of the Services’ step-down plans and annual work plans. The CCP can be divided by objective and strategy due dates to 15 separate annual work plans. Each year these will be assessed to determine how to best use staff and refuge resources.

Comment: Three individuals support the plan’s proposal for hiring of additional law enforcement. One comment stated that our current officer is “doing an outstanding job.” The other two commented that there is increasing pressure on the refuge due to misuse and illegal activities. This need is going to become much more urgent over the next few years due to the very high pace of development in Wakulla County.

Response: Comment noted. The addition of law enforcement officers has been identified as a refuge priority in the CCP.

Comment: Advertise arrests. Publicity is a great deterrent to crime.

Response: It is not the Service’s policy to advertise arrests due to the provisions of the Privacy Act.

Comment: Two individuals wrote that they support the much-needed expanded budget and that they fully support the staffing expansion called for in Alternative 2.

Response: Comment noted.

Cultural Resources

Comment: Port Leon is a significant cultural site, more so than the Goose Creek Seineyard or the St. Marks Lighthouse. One commenter would like to see interpretive media developed, as well as signage or a guide pamphlet for visitors to area.

Response: This suggestion will be considered as the step-down plans for public use and cultural resources are developed and when refuge rangers develop the themes for annual interpretive programs. The Wilderness designation could affect whether anything is put on the site.

Comment: The refuge contains a large number of very valuable cultural resources. Not enough is being done today to identify, preserve, and make those resources available to the public.

Response: Until resources are allocated for this purpose, no additional work will be undertaken. Most of the refuge's important collections are housed at universities or with the regional archaeologist. A permanent collection site for all Florida refuges is proposed in the plan.

Comment: Mike Russo, National Park Service - Objective 1 offers the plan's strategies to protect cultural resources. The first strategy offered is to complete a Request for Cultural Review Compliance form before conducting any ground-disturbing activities. The EA should explain how this will serve to protect cultural resources. What does the regional archeologist do with it?

Response: According to Regional Archaeologist, Richard Kanaski, the Service has a developed and implemented a standardized process for complying with Section 106. Mr. Kanaski is the Service's point of contact to call for more details. His number is (912)652-4415, extension 113.

Comment: Mike Russo, National Park Service - Objective 1 - Another strategy is offered stating that "the refuge will conduct road maintenance in known areas with cultural resources in a manner that will not disturb those resources." This is good. But the plan should spell out specifically how the refuge will conduct road maintenance in those areas that have not been surveyed and in which the presence of cultural resources is unknown.

Response: According to Regional Archaeologist, Richard Kanaski, routine maintenance on existing roads that occurs within the existing road prism and between the outermost shoulders of the road or parallel ditches is considered as an undertaking that does not trigger Section 106 of the National Historic Preservation. Any other work would go through the Section 106 review and compliance process.

Comment: Mike Russo, National Park Service – Objective 1 - The same goes for the strategy of "evaluate effects of fire management activities on cultural resources in the vicinity of those activities." This is fine. But what about fire management activities conducted in areas that may have cultural resources but which have not been surveyed. Under Section 106, the refuge should survey all areas before fire management activities are undertaken that have the potential to adversely affect unknown cultural resources.

As for the strategy to "evaluate effects of fire management activities on cultural resources in the vicinity of those activities," it sounds like the refuge plans to burn forest as an experiment and then see how the burning affected cultural resources. This does not come across a sound strategy to protect cultural resources.

Relative to controlled burns, the CCP states that the refuge will "agree to use strategies that will not disturb cultural resources." But it does not spell out any of the alternatives. There is a vast literature on the effects of fire on shallow archaeological resources, and a vast literature on alternative fire management strategies to protect those resources. These alternative[s] should be described in the plan, or, at least referenced.

The CCP states that a section on fire's impacts on cultural resources and an Unanticipated Site Discovery Plan will be incorporated into the Refuge's Management Plan by 2006. It states that "as the refuge prepares an annual burn plan, this cultural resource protocol will be included." This is confusing, because no "protocol" is identified. All the strategy states is that a "section on fire's impact

on cultural resources” will be included in the management plan. How is this to be interpreted as a protocol designed to protect cultural resources?

The CCP states that “heavy equipment will not be used in areas with identified cultural resources.” Will it be used in areas that have not been surveyed? This does not bode well for unidentified cultural resources. The CCP’s statement that “if new cultural resources are discovered during fire management activities, then the use of heavy equipment will be stopped in that location” seems to indicate that the refuge is going ahead with the use of heavy equipment without survey for cultural resources first. This will cause a lot of damage, and is not in compliance with Section 106.

Response: According to the Regional Archaeologist, Richard Kanaski, the potential impacts of the refuge’s prescribed burns on cultural resources will be addressed in the fire and cultural resources management step-down plans. The regional archaeologist will forward the step-down plans to the Florida Bureau of Historic Preservation and the five Native American tribes for review and comment pursuant to Section 106 of the National Historic Preservation Act. As part of the Section 106 review process, the regional archaeologist will seek input from National Park Service’s Southeast Archaeological Center in Tallahassee as the refuge develops these plans.

Comment: Mike Russo, National Park Service - Objective 2 states that “dependent upon additional staffing” the refuge will “establish and implement a regular system of patrolling and managing damaged sites.” Does this mean that if additional staffing is not found, the system will not be put in place? If so, the CCP should spell out what efforts will be undertaken to get the staffing. How realistic is this strategy?

Response: The strategy has been revised and the wording “dependent upon additional staffing” has been deleted. The refuge presently has one full-time law enforcement officer and two dual (part-time) officers who are already implementing this strategy by focusing on primary sites. Additional funding for another officer would allow for more detailed and routine enforcement. There is no additional source of funding besides the annual appropriations of Congress for refuges.

Comment: Mike Russo, National Park Service - Objective 5 - One strategy to handle museum collections is to “recruit a volunteer to catalog refuge artifacts and historic documents at the station and then assure appropriate storage.” This is oddly worded. Does it mean that the volunteer will “assure appropriate storage”? If a volunteer cannot be recruited, what is plan B? Why not hire someone? Working with volunteers may leave the job undone. If the refuge is going to use a volunteer, why are they waiting until 2011 to get him/her?

Response: This strategy has been reworded. Since the Draft CCP was issued, a volunteer was recruited to complete the task of assembling an inventory of the refuge’s artifacts, which are to be kept at the refuge.

Comment: Mike Russo, National Park Service - The CCP states that “by 2011, the Regional Archaeologist will negotiate an agreement with the Florida State Museum, or other appropriate facilities...” Be advised that the name “Florida State Museum” previously referred to the museum in Gainesville, which is now called the Florida Museum of Natural History. The major museum in Tallahassee is called the Museum of Florida History. The CCP should specify which, if either is intended to be contacted. Contacting either or any facility at the late date of 2011 seems out of sequence. First, the volunteer will catalog refuge artifacts, and then these artifacts will be sent to another permanent curation facility where they will have to be re-catalogued? Whatever facility will ultimately curate the artifacts should be contacted before a volunteer begins cataloging procedures, no?

Response: The regional archaeologist is hoping to work out a long-term agreement with the Museum of Florida History or other similar repository for the permanent curation of archaeological collections from *all* Florida refuges. This effort is distinct from the volunteer work that occurred at St. Marks Refuge. The volunteer has done a simple inventory of one refuge’s on-site collection. This collection will remain on-site.

Comment: Mike Russo, National Park Service - Objective 6 - This objective is to conduct a refuge-wide cultural resource survey by 2012. One strategy is to develop an SOW for survey of the refuge. Another is to seek a volunteer to “procure pertinent scientific reports and articles to produce an annotated bibliography to document the region’s history, geomorphology, and utility of the scientific methodology.” It seems that the first contractor hired to do survey will be obliged to do the exact same work designed for the volunteer. As part of the normal background search for any survey report, the contractor writes up that which is designated for the volunteer. So the volunteer seems redundant in this aspect.

Response: Until funding for a contract can be secured, it would be helpful to refuge staff and interpretive volunteers to have such an annotated bibliography. Procuring such reports aids the regional archaeologist in writing a cultural resource overview for the refuge and developing a more detailed and focused Scope of Work for the ensuing refuge-wide cultural resource survey.

Comment: Mike Russo, National Park Service - The Phase I/II surveys of archaeological sites are to be finished by 2009 according to one strategy. Here the objective states that 2012 is the completion date. [This] seems to be a contradiction.

Response: The date of the Phase I/II surveys (Objective 6) has been changed to 2012.

Alternatives

Comment: The Tallahassee Area Convention and Visitors Bureau and 6 individuals stated that they support Alternative 2.

Response: Comment noted.

General Refuge Support

Comment: The Defenders of Wildlife, the Florida Wildlife Federation and 8 persons expressed general support for the refuge and its staff.

Response: Comment noted.

Plan Support and Criticism

Comment: A former manager of the refuge and 5 persons commented that the plan was good overall and well-written. An example is this comment: I commend the refuge staff for the obvious hard work and attention to detail found in the draft plan. The plan format and the clarity of writing are "user friendly." The maps and figures are helpful.

Response: Comment noted.

Comment: Defenders of Wildlife - Our criticism of the plan is that many of the objectives and strategies are vague, lack details or timelines, and will be difficult to determine how the public will be able to judge the effectiveness of the Service in implementing the plan. For example, one of the strategies is: "Determine black bear distribution and population dynamics on the refuge and adjoining lands." While this sounds like a reasonable activity, it provides no indication on how or when this will be done and for what management purposes. The CCP could be strengthened by making goals, objectives, and strategies more specific in accordance with the Service's *Goal and Objectives Handbook*.

Response: The CCP team used the Service's Goals and Objectives Handbook to develop this plan along with more specific training and guidance materials than that general publication. Teams of experts worked on each set of goals and developed the 64 objectives and 193 strategies proposed in the Draft CCP. We intentionally designed the plan to include targets and dates with objectives and strategies that are priorities and that are likely to be accomplished within the 15-year timeframe of the CCP. Taken year-by-year, the CCP becomes our operational or annual work plan. Resources within refuges are diminishing and some things may not be accomplished within the timeframe of the plan. But, we have designed the plan to accomplish all we can with existing resources, strategically focused, and to expand what we are able to do as we receive additional resources or as we establish further partnerships.

In the specific example, the State of Florida (FWC) is taking the lead on black bear research and we are assisting that goal wherever possible here locally. The black bear is a listed species with the state, but not with the federal government, which considers it a trust species. We take the lead in the areas where we can and where we have authority. For example, we are able to protect and conserve bear habitat in facilitating habitat connectivity (bear corridors). With diminishing resources, state and federal land managers and wildlife officers have to determine who has the best resources to address each issue. In this specific example, it is vague because we will likely assist on the timeframe of the state wildlife program. The state has the expert biologists and funding for research.

A lot of details in how we implement the CCP and the timeframe for that will be developed in the step-down plans. Some will have environmental assessments and the public can participate in a public scoping and review process.

Compatibility Determinations

Comment: The draft Plan lacks a specific reference to the "Prohibition of Airboats, Jet Skis, and Air-cushioned Hovercraft from State of Florida Waters associated with the St. Marks National Wildlife Refuge" -- As noted in my prior letter, in 1994, the refuge prepared an Environmental Assessment and Finding of No Significant Impact, with respect to the compatibility of operation of airboats, personal watercraft, and hovercraft in "all State of Florida waters within the administrative boundaries of the refuge." In 1994, the determination of incompatibility (and associated National Environmental Policy Act documentation) was approved by the Acting Regional Director.

Response: The plan focuses on allowable public uses. All other uses, such as the one mentioned above, are incompatible. The Compatibility Determination specifies this under "Other Uses".

Comment: On this point, other references in the text should be revised to accurately state the Service's authority under the Property Clause and Supremacy Clause of the United States Constitution. For example, the sentence "The Executive Closure Area only protects migratory birds from hunting. It does not allow for restrictions of state waters due to disturbance impacts or boating impacts on seagrasses" (page 94). The refuge does have the ability to protect refuge lands and resources by restrictions on vessel operation within the administrative boundary. See Defenders of Wildlife v. Andrus, 455 F. Supp., 446 (D.D.C. 1978). See also Montero v. Babbitt, 921 F. Supp. 134 (E.D. N.Y. 1996).

Response: Our legal counsel, John Harrington, Department of the Interior Assistant Solicitor, responded to this comment on March 17, 2006, as follows:

Under the doctrine of *Kleppe v. New Mexico*, 426 U.S. 529 (1976), coincident to the management of federal lands, an agency may assert regulatory authority over state waters, when it is necessary to protect federal lands and their resources. Thus, in *United States v. Brown*, 552 F.2d 817 (8th Cir. 1977), the conviction of a person hunting on state waters within the boundary of a national park was upheld. Similarly, in *Minnesota v. Block*, 660 F.2d 1240 (8th Cir. 1981), the applicability of Park Service regulations to boating on state waters within boundary of a national park were upheld. A review of National Park Service regulations reveals that it has asserted regulatory jurisdiction over state waters in certain instances. See 36 C.F.R. _ 1.2.

The regulations of the Fish and Wildlife Service, on the other hand, limit the regulatory jurisdiction over the National Wildlife Refuge System "to areas of land and water held by the United States in fee title and to property interests in such land and water in less than fee." 50 C.F.R. § 25.11(a). The Service broadly interprets the term "property interests" to include agreements with a state which permit the Service to administer lands and waters as part of the Refuge System. Therefore, the Service may enforce its regulations only on lands and waters in which it possesses a property interest and on lands and waters it manages pursuant to agreement. The waters you have referenced in your letter are neither owned by the United States, nor are they managed pursuant to agreement. Consequently, the Service's regulations are not applicable to activities conducted on those waters.

Comment: Restrictions on personal watercraft or other types of vessel operation are currently in place in other Florida refuges: Merritt Island NWR, J.N. Ding Darling NWR, and the Florida Keys National Wildlife Refuges (Key Deer, Key West, and Great White Heron). Many other refuges across the Nation impose such restrictions. In addition, if there is any doubt about this issue, the refuge should enter into a management agreement with the State of Florida, as was done with respect to the Florida Keys National Wildlife Refuges.

Response: There is a strategy in the plan to enter an agreement with the state. See Chapter IV, the eighth strategy under Goal 3, Objective 3.

Comment: The Compatibility Determinations for "Boating in Refuge Waters," for "Fishing" and for "Other Uses" (pages 329-330, 343-344, and 348) need to be revised to be consistent with the 1994 determination referenced above, and the sources cited in the 1994 NEPA documentation. I am not sure why the reference to the 1994 action is contained in the "Other Uses" section, along with beekeeping.

Since 1994, and as recently as this year, I have observed airboats and personal watercraft being operated within the refuge administrative boundary. My most recent observations included a personal watercraft being operated at high-speed (est. 25-30 MPH) in the East River north of Pelican Point. Ironically, later that afternoon, I was stopped by a Florida Fish and Wildlife Conservation Commission officer who was on-board a personal watercraft just north and west of the Lighthouse (approximately 50 yards west of the shoreline). When I inquired about PWC operation, he informed me that only launching of PWCs (and airboats and hovercraft) was prohibited within the refuge boundary. Within the last month or so, I was fishing in the East River about 2 miles north of Pelican Point, and an airboat was present with fishers aboard. When the airboat started up and began operating, the noise was very loud and caused birds in the area to flush. The impacts to solitude and to avian wildlife discussed in the 1994 NEPA documents are still valid concerns. I frequently observe bald eagles, migratory and shorebirds, and manatees in the vicinity of the East River and Lighthouse (manatee use is seasonal).

Accordingly, the Compatibility Determinations should be revised to add a stipulation as contained in the 1994 determination, and additional language should be added to the plan to ensure that the refuge boundary is marked with appropriate regulatory signage and that the Nautical Charts for the area are updated to reflect the prohibition of such vessels. Specifically, the sentence "Airboats, personal watercraft and hovercraft are prohibited from refuge waters and may not be launched from refuge boat ramps at Wakulla Beach or Lighthouse Road" should be revised as follows: "Airboats, personal watercraft, and hovercraft are prohibited from operation within the administrative boundaries of the refuge and may not be launched from any refuge boat ramp, or shoreline, within the refuge. Emergency operation of airboats, personal watercraft, and hovercraft by sworn law enforcement officers, and by refuge personnel is authorized within the administrative boundaries of the refuge, and such craft may be launched from refuge boat ramps to facilitate emergency operations. Appropriate signage shall be posted to advise of the prohibition on public use of airboats, personal watercraft, and hovercraft."

Response: According to the previously referenced legal opinion by Assistant Solicitor Harrington dated March 17, 2006, only the launching of airboats, personal watercraft, and hovercraft are prohibited from the boat ramps and Wakulla Beach Road. Therefore, the compatibility and plan language will not be revised as suggested.

Comment: Additional Stipulations Necessary to Ensure Compatibility - Boating in Refuge Waters (page 330). The draft plan text provides in part: "No boating zones may be established and enforced around sensitive areas, such as tern platforms, bird rookeries and roosts, and other areas as necessary."

Given the comprehensive nature of a refuge plan, I recommend greater specificity in delineating boating restricted areas, which should include "pole or troll" zones (such as at Merritt Island National Wildlife Refuge), or non-motorized watercraft zones (canoe and kayak areas) in addition to boating prohibited areas.

Response: Comment noted. This will be considered when the refuge works with the state to obtain agreement for managing state submerged bottomlands that adjoin the refuge.

Comment: One specific area (previously recommended in my April 18, 2001 letter) that is recommended for a prohibition on routine vessel operation is an area adjacent to the Lighthouse, in the vicinity of Long Bar. The area is frequently used by wade fishers. The seagrass flats in the area are prop scarred. Many boaters use a "short cut" on the inside of Long Bar to travel from the mouth of the Lighthouse canal to areas to the east of the Lighthouse. Since this area is shallow, most vessels navigate this area on plane at high speed. Frequently, this area is used for launching canoes and kayaks from the parking area at the Lighthouse. Accordingly, I recommend that the draft plan be revised to include a specific "pole and troll" zone along the shoreline of the Lighthouse. The northern/western end of the zone should be at the southern/western end of the rock jetty at the end of the Lighthouse ramp canal/channel; it should extend to the southern end of Long Bar; and then parallel the shoreline to Stoney Bayou. Establishment of this zone will improve safety of wade fishers and non-motorized vessel operators, will help protect the seagrass meadows, and will reduce disturbance to migratory and shorebirds using the area (which will enhance wildlife observation by persons visiting the Lighthouse).

Response: Comment noted. This will be considered when the refuge works with the state to obtain agreement for managing state submerged bottomlands that adjoin the refuge.

Comment: No motor zones should be established around small islands in Apalachee Bay (especially Palmetto and Smith) identified as critically important waterbird and shorebird nesting habitat (page 94). This approach was taken in the Florida Keys refuges.

Response: Comment noted. This will be considered when the refuge works with the state to obtain agreement for managing state submerged bottomlands that adjoin the refuge.

Appendix XIV. Finding of No Significant Impact

St. Marks National Wildlife Refuge
Comprehensive Conservation Plan
Wakulla, Jefferson, and Taylor Counties

Introduction

The U.S. Fish and Wildlife Service proposes to protect and manage certain fish and wildlife resources in Wakulla, Jefferson, and Taylor counties, through the St. Marks National Wildlife Refuge. An Environmental Assessment has been prepared to inform the public of the possible environmental consequences of implementing the Comprehensive Conservation Plan for St. Marks National Wildlife Refuge. A description of the alternatives, the rationale for selecting the preferred alternative, the environmental effects of the preferred alternative, the potential adverse effects of the action, and a declaration concerning the factors determining the significance of effects, in compliance with the National Environmental Policy Act of 1969, are outlined below. The supporting information can be found in the Environmental Assessment, which is Section B of the Draft Comprehensive Conservation Plan for St. Marks National Wildlife Refuge.

Alternatives

In developing the Draft Comprehensive Conservation Plan and Environmental Assessment for St. Marks National Wildlife Refuge, the Fish and Wildlife Service evaluated three alternatives. The Service adopted Alternative 2, the "Preferred Alternative," as the plan for guiding the direction of the refuge for the next 15 years. The overriding concern reflected in this plan is that wildlife conservation assumes first priority in refuge management. A description of the three alternatives follows.

ALTERNATIVE 1 - MAINTAIN CURRENT MANAGEMENT (NO-ACTION ALTERNATIVE)

The current Environmental Assessment and Land Acquisition Plan (2000) would allow for the acquisition and protection of 3,368 acres of lands adjacent to the refuge. Habitat planning documents would be revised as staff resources allow. A minimal amount of exotic plant and animal species removal would occur. The management of impoundment habitats would be limited by hydrologic changes in the East River drainage basin.

Limited studies would be conducted on threatened, endangered, and imperiled species and plant and animal species. Very little refuge-sponsored research or inventorying and monitoring work would be conducted. The habitat and life requirement needs of many species are unknown and the presence or absence of rare or imperiled species has not been fully addressed. Although migratory bird conservation was the primary purpose for establishing the refuge, habitat management for priority bird species would continue to be limited.

Visitor services would be limited to existing programs, facilities, and staff. Visitors would not have the most up-to-date facilities, signage, brochures, exhibits, or programs. No improvements would be made for wildlife-dependent recreation. No monitoring of public use or its associated impacts would occur. Environmental education and interpretation programs would continue and be conducted mainly onsite, with staff participation in a few off-site outreach festivals yearly.

Cultural resources would remain vulnerable to site destruction and looting since enforcement is limited. No comprehensive inventory of sites and resources would occur. Informal cultural programs would be offered to students and groups. The St. Marks Lighthouse would remain an unimproved structure (without public access). Only limited maintenance would be performed, as required for a national historic site.

Wilderness protection would also be limited by current enforcement capabilities. Very little monitoring of resources would occur; exotic or natural species surveys have yet to be conducted. The Wilderness Area would remain a Class I airshed and monitoring of ozone would continue.

All refuge functions would be carried out in existing administrative, visitor service, fire, and maintenance facilities. The refuge would continue to house administrative and program staff in a building designed for a much smaller staff. Vehicles, equipment, and supplies would be stored outdoors or in facilities that fail to adequately protect them from weather. The existing staff would be maintained with no new positions to address increased public demands and legal mandates for biological, visitor services and safety, resource protection, administrative, and maintenance functions. Under this alternative, staff would not get the training needed to maintain professionalism or to meet changing administrative needs.

ALTERNATIVE 2 - PREFERRED ALTERNATIVE

The proposed management plan outlines the enhancement of wildlife populations and related habitats over the next 15 years. It also improves refuge safety and protection of resources and may provide visitors with more opportunities for wildlife viewing and wildlife-dependent recreation. Environmental education and outreach would be expanded under this management option.

Many objectives and strategies focus on maintaining and restoring native communities, particularly longleaf pine forest. The development of the refuge as a Land Management Research and Demonstration Area would help it to become a leader in longleaf pine research and conservation and would enable the sharing of that knowledge with others to benefit both private and publicly owned lands. Programs to control or eradicate terrestrial and aquatic non-indigenous and invasive plants are proposed, as is nuisance animal control. Hydrologic studies and land conservation are proposed to maintain the integrity of refuge resources and to manage the impoundments to benefit migratory birds.

Many ongoing and proposed programs and efforts focus on threatened, endangered, rare, and imperiled species of plants and animals. The need for extensive inventorying and monitoring for baseline data is addressed in this management plan, particularly for red-cockaded woodpeckers, bald eagles, wood storks, least terns, and flatwoods salamanders.

Since a primary purpose for refuge establishment is to provide habitat for migratory birds, the improvement of the impoundments to provide high-quality habitat for waterfowl, shorebirds, and marsh birds is proposed. So, too, are strategies to improve forested habitat, such as pine flatwoods, pine-cabbage palmetto hammocks, mesic and hydric pine hardwood, and hardwood hammocks.

A primary focus of the visitor services program is to enhance environmental education and outreach efforts substantially. This plan offers increased opportunity for wildlife-dependent recreation, such as photography, hiking, and wildlife observation. It also offers fishing improvements and angler awareness programs. The feasibility of conducting youth hunting programs and clinics would be explored. The restoration of the St. Marks Lighthouse would provide an opportunity to present the refuge's rich cultural and historic heritage.

Sensitive areas and rich resources, such as the refuge's designated Wilderness Area and cultural resources, would receive more protection through increased law enforcement. A major provision of this alternative is a comprehensive study of all refuge archaeological and historic resources.

Meeting basic refuge operation needs has been addressed. Essential new office space, staffing, and equipment needs are proposed.

ALTERNATIVE 3. OPTIONAL ALTERNATIVE

Alternative 3 includes many of the provisions of Alternative 2, but proposes other enhancements to habitat and species management, resource protection, and visitor services. Exotic plant and animal species would be controlled or eradicated. Hardwood habitat management would be improved.

The biological programs of the refuge would be greatly enhanced with the addition of three biologist and/or biological technician positions to expand the Land Management Research and Demonstration Area program, to add additional projects, and to improve outreach and coordination with other conservation agencies and the public. Monitoring and inventorying of rare and imperiled species would be enhanced, especially for reptiles, amphibians, mammals, and those bird species not considered highest priority. A herpetologist would be hired to study reptiles and amphibians, to conduct literature reviews and to share data with partners. Wood duck banding would be increased. The impoundments would be actively managed for rails and life history studies would be conducted. Point counts of priority species would be undertaken for regional and national trend analysis. With additional staff, the refuge personnel could more effectively monitor and respond to wildlife disturbance and habitat management issues.

Visitor services would be improved with the addition of a ranger position to operate the expanded Visitor Center and to assist with both on- and off-site outreach opportunities. Two additional environmental education specialists would maintain the environmental education classroom, laboratory, outdoor classrooms, and overnight facility, providing maximum opportunity to the public and groups 7 days a week. They would assist the lead environmental education specialist in program development and training of staff, volunteers, and educators. In addition to the needed facilities proposed under Alternative 2, a research center for the Land Management Research and Demonstration Area program staff would be constructed in order to provide laboratory and housing facilities for partnering researchers and educators.

Cultural and wilderness resources would be further protected through the addition of a law enforcement officer who would also serve as a community police liaison in an effort to educate the public about refuge resources and to deter and prevent crime.

Selection Rationale

Alternative 2 is selected for implementation because it directs the development of programs to best achieve the refuge purpose and goals; emphasizes the restoration of forest habitats; collects habitat and wildlife data; and ensures long-term achievement of refuge and Service objectives. At the same time, these management actions provide balanced levels of compatible public use opportunities consistent with existing laws, Service policies, and sound biological principles.

Under Alternative 2, all lands within the current refuge boundary would be protected, maintained, and enhanced and lands within the approved acquisition boundary would be prioritized for land protection. This action positively addresses priority concerns and issues expressed by the public.

Environmental Effects

Implementation of the agency's management action is expected to result in environmental, social, and economic effects as outlined in the comprehensive conservation plan. Habitat management, population management, land conservation, and visitor service management activities on St. Marks National Wildlife Refuge would result in forest restoration, increased migratory bird use, increased protection for threatened and endangered species; enhanced wildlife populations; and enhanced opportunities for wildlife-dependent recreation and environmental education. These effects are detailed as follows:

1. Wildlife populations are expected to benefit from increased integration of their habitat needs into management. The impoundments would provide improved habitat conditions for waterfowl, shorebirds, wading birds, marsh birds, and other wildlife due to improved planning, monitoring, and management of the pools. The pumping of salt water would be available as needed and the protection and restoration of the East River Watershed would permit additional management actions currently limited due to a lack of reliable water.
2. Migratory bird production would increase by enhancing forest habitat quality for neotropical migratory birds, habitat and food availability for wintering waterfowl, and through hydrological restoration. Forest management practices, such as reforestation, selective harvests, prescribed burning, and conservation of mature and old-growth stand components would benefit nesting and feeding habitat for neotropical migratory birds.
3. In the forested habitats, regular inventories and prescriptions would occur at 15-year intervals and provide for the appropriate management responses to maintain healthy pine communities. The monitoring of target species would provide important feedback to identify habitat needs and evaluate and improve management actions. The development of the Land Management Research and Demonstration Program at the refuge would provide additional research and monitoring of longleaf pine habitats and associated wildlife and further improve management both on and off the refuge. In addition, the refuge would begin evaluating the potential benefits of management actions in hardwood habitats to benefit targeted neotropical migratory birds, such as Kentucky, hooded and Swainson's warblers.
4. The protection of additional lands would provide important habitat for many species, including a corridor for the Florida black bear between the Appalachian National Forest and the Aucilla River area. Populations of many rare and listed species, such as the red-cockaded woodpecker, flatwoods salamander, swallow-tailed kite, and wiregrass gentian would benefit from the restoration and management of former important habitat outside current refuge boundaries.
5. Other effects to wildlife under this alternative include: 1) the evaluation of human disturbance on wildlife and the implementation of measures to reduce those impacts; and 2) the increased control of feral hogs and their damage to populations of flatwoods salamanders and other rare amphibians, their habitats, and rare plants.
6. Habitats of threatened, endangered, and candidate species would be conserved, restored, and enhanced. Baseline inventory and monitoring of priority species would be undertaken.
7. Habitat restoration and management, along with a focus on accessibility and facility developments, would result in improved wildlife-dependent recreational opportunities. Public use may result in some minimal, short-term adverse effects on wildlife and user conflicts may occur at certain times of year, but these effects are minimized by site and trail design, time zoning, and the enforcement of refuge regulations. The effects of public use on wildlife and habitat would be monitored and assessed.

8. Implementing the comprehensive conservation plan is not expected to have any significant adverse effects on wetlands and floodplains pursuant to Executive Orders 1190 and 11988, since actions would not result in development of buildings and/or structures within floodplain areas. They would not result in irrevocable, long-term adverse impacts. Implementing the management action would result in substantial enhancement of wetland communities, particularly forested wetlands.

9. Exotic plants on the refuge and properties would be aggressively controlled to achieve effective removal of most exotic species listed by the State of Florida within 15 years. This would result in a cumulative positive impact on native vegetation.

Potential Adverse Effects and Mitigation Measures

Wildlife Disturbance

Disturbance to wildlife at some level is an unavoidable consequence of any public use program, regardless of the activity involved. Obviously, some activities innately have the potential to be more disturbing than others. The management actions to be implemented have been carefully planned to avoid unacceptable levels of impact.

As currently proposed, the known and anticipated levels of disturbance of the management action are considered minimal and well within the tolerance level of known wildlife species and populations present in the area. Implementation of the public use program would take place through carefully controlled time and space zoning, and establishment of protection zones around key sites, such as rookeries and eagle nests. All hunting activities (season lengths, bag limits, number of hunters) would be conducted within the constraints of sound biological principles and refuge-specific regulations established to restrict illegal or non-conforming activities. Monitoring activities through wildlife inventories and assessments of public use levels and activities would be used and public use programs would be adjusted as needed to limit disturbance.

User Group Conflicts

As public use levels expand over time, some conflicts between user groups may occur. Programs would be adjusted, as needed, to eliminate or minimize these problems and provide quality, wildlife-dependent recreation opportunities. Time and space zoning are effective tools for reducing or eliminating conflicts between user groups.

Effects on Adjacent Landowners

Implementation of the management action would not adversely impact adjacent or in-holding landowners. Access to private property would be allowed through special use permits. Land acquisition would occur on a willing-seller basis only, at fair market values within the approved acquisition boundary.

Land Ownership and Site Development

Proposed acquisition efforts by the Service would result in changes in land and recreational use patterns, since all uses on national wildlife refuges must meet compatibility standards. Land ownership by the Service also precludes any future economic development by the private sector.

Potential development of visitor services and administrative facilities could lead to some minor short-term negative effects on plants, soil or wildlife species. When site development is proposed, each activity would be given the appropriate National Environmental Policy Act consideration during pre-construction planning. Attempts would be made to reduce the level of impacts to the environment and to protect fish and wildlife.

Coordination

The management action has been coordinated with all interested or affected parties including: Florida and United States Congressional representatives, the Florida State Clearinghouse, the State Historic Preservation Officer, local community and government officials, conservation organizations, and interested citizens and refuge neighbors.

Findings

It is my determination that the management action does not constitute a major federal action significantly affecting the quality of the human environment under the meaning of Section 102(2) (c) of the National Environmental Policy Act of 1969 as amended. As such, an environmental impact statement is not required. This determination is based on the following factors (40 CFR 1508.27), as addressed in the Environmental Assessment.

1. Both beneficial and adverse effects have been considered and this action will not have a significant effect on the human environment (Environmental Assessment, pages 167 to 180).
2. The actions will not have a significant effect on public health and safety (Environmental Assessment, page 178).
3. The project will not significantly affect any unique characteristics of the geographic area, such as proximity to historical or cultural resources, wild or scenic rivers, or ecologically critical areas (Environmental Assessment, pages 174-5).
4. The effects on the quality of the human environment are not likely to be highly controversial (Environmental Assessment, pages 177-8).
5. The actions do not involve highly uncertain, unique, or unknown environmental risks to the human environment (Environmental Assessment, pages 175-180).
6. The actions will not establish a precedent for future actions with significant effects nor do they represent a decision in principle about a future consideration (Environmental Assessment, pages 167-180).
7. There will be no cumulatively significant impacts on the environment. Cumulative impacts have been analyzed with consideration of other similar activities on adjacent lands, in past action, and in foreseeable future actions (Environmental Assessment, pages 178-9)
8. The actions will not significantly affect any site listed in, or eligible for listing in, the National Register of Historic Places, nor will they cause loss or destruction of significant scientific, cultural, or historic resources (Environmental Assessment, pages 175-6).
9. The actions are not likely to adversely affect threatened or endangered species or their habitats (Environmental Assessment, pages 173-4).
10. The actions will not lead to a violation of federal, state, or local laws imposed for the protection of the environment (Environmental Assessment, page 178).

Supporting References

U.S. Fish and Wildlife Service. 2006. Draft Comprehensive Conservation Plan and Environmental Assessment for St. Marks National Wildlife Refuge. U.S. Department of the Interior, Fish and Wildlife Service, Southeast Region.

Document Availability

The Environmental Assessment is Section B of the Draft Comprehensive Conservation Plan and Environmental Assessment for St. Marks National Wildlife Refuge, which was made available in January 2006. Copies may be found at local libraries, the refuge, and the following website:
<http://www.fws.gov/saintmarks>.

Signed

Date: 8/29/06

Sam Hamilton, Regional Director, Southeast Region
Southeast