DRAFT COMPREHENSIVE CONSERVATION PLAN AND ENVIRONMENTAL ASSESSMENT

ST. JOHNS NATIONAL WILDLIFE REFUGE

Brevard County, Florida

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

Southeast Region
Atlanta, Georgia

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SECTION A. DRAFT COMPREHENSIVE CONSERVATION PLAN

I. Background

INTRODUCTION

Located on the floodplain of the Upper St. Johns River Basin in Brevard County in east-central Florida in Titusville, St. Johns National Wildlife Refuge (NWR) is managed as a satellite refuge of the Merritt Island National Wildlife Refuge Complex (Figure 1). St. Johns NWR is managed by the Fish and Wildlife Service (Service) as part of the National Wildlife Refuge System, which includes more than 550 national wildlife refuges and related units and over 150 million acres. The refuge is unstaffed and is composed of two management units: the 2,016-acre Bee Line Unit (Figure 2), and the 4,241-acre State Road (SR) 50 Unit, which includes the 31-acre Fox Lake Tract. At the SR 50 Unit (Figure 3), the Service manages most of the lands and waters within the acquisition boundary. However, this is not the case at the Bee Line Unit (Figure 4), where a number of tracts are privately held. Those properties of the Bee Line Unit that are not part of the larger contiguous portion (which are generally located to the south of the main portion of this unit) are commonly referred to as the Checkerboard and total roughly 1,116 acres (Figure 5), where the Service owns and manages roughly 507 acres. St. Johns NWR's management boundary represents 6,257 acres while the its approved acquisition boundary represents 6,757 acres.

St. Johns NWR was established on August 16, 1971, to provide habitat for threatened and endangered species, specifically for the conservation of the dusky seaside sparrow (*Ammodramus maritimus nigrescens*). By 1979, surveys determined that the dusky seaside sparrow had declined to less than 20 male birds. The last known sighting of this species in the wild was in 1980. Despite the loss of the dusky seaside sparrow, at least 19 federal and state listed species, and species of management concern, are known to occur at St. Johns NWR today, including four federally listed wildlife species: wood stork (*Mycteria americana*) – endangered; Northern crested caracara (*Caracara cheriway*) – threatened; eastern indigo snake (*Drymarchon corais couperi*) – threatened; and American alligator (*Alligator mississippiensis*) – threatened, by similarity of appearance. Supporting these and other imperiled species as well as native wildlife diversity are St. Johns NWR's dominant habitat class – wetlands. Wetlands including cordgrass (*Spartina bakerii*) marsh and mixed shrub wetlands, and forested wetlands including cabbage palm (*Sabal palmetto*) hammocks combined with other wetland and forested wetland habitat types cover over 90 percent of the refuge. Only 3 percent of the refuge's native habitat is upland.

This Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) for St. Johns NWR was prepared to guide management actions and direction for the refuge. Fish and wildlife conservation will receive first priority in refuge management; wildlife-dependent recreation will be allowed and encouraged as long as it is compatible with, and does not detract from, the mission of the refuge or the purposes for which it was established.

The Service developed a range of alternatives that best met the goals and objectives of the refuge and that could be implemented within the 15-year planning period. This Draft CCP/EA describe the Service's proposed plan, as well as other alternatives considered and their effects on the environment. The Draft CCP/EA will be made available to local, state, and federal government agencies, conservation partners, and the general public for review and comment. Comments from each entity will be considered in the development of the final CCP.

Figure 1. Merritt Island NWR Complex Map - management boundaries

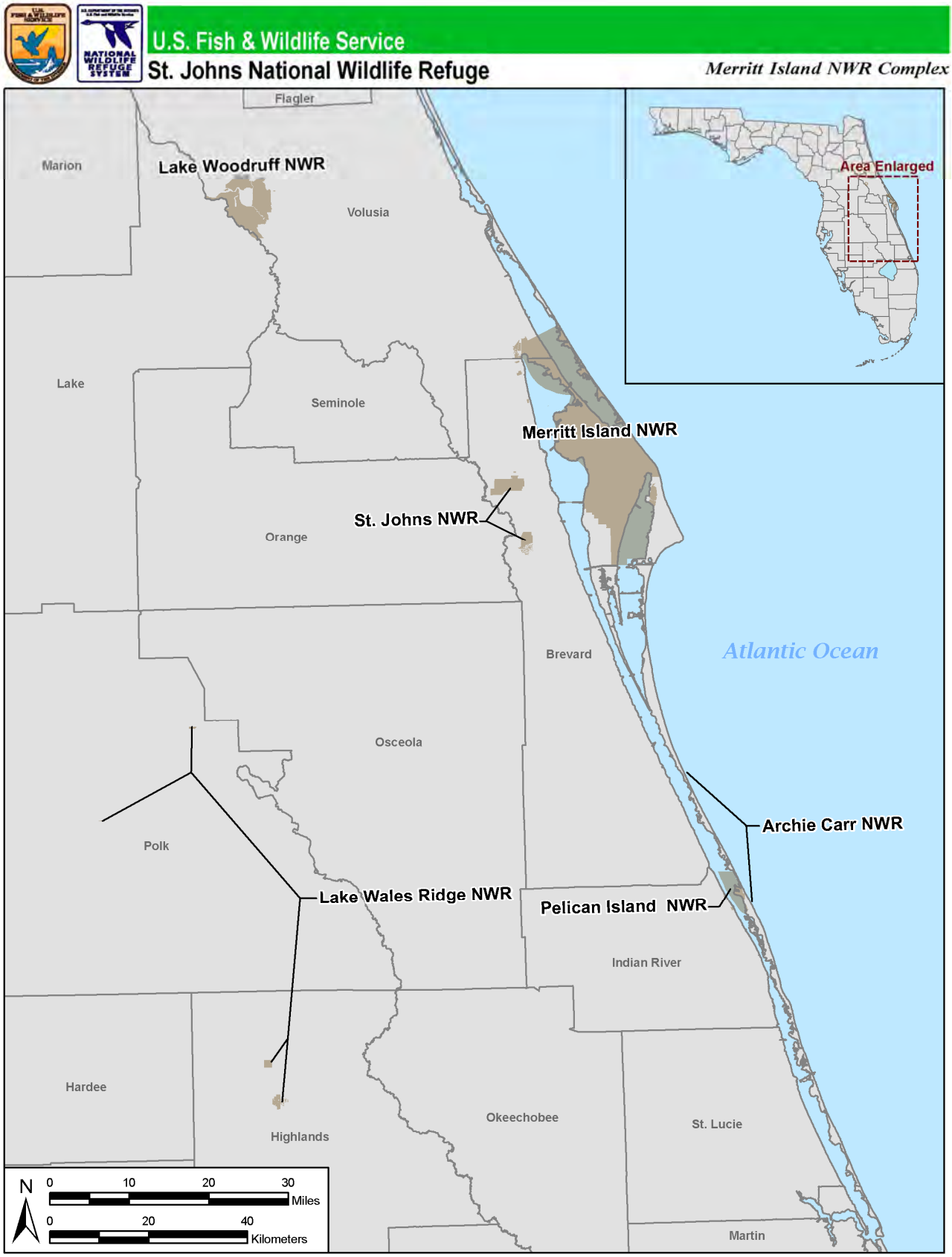


Figure 2. Location of St. Johns NWR management units

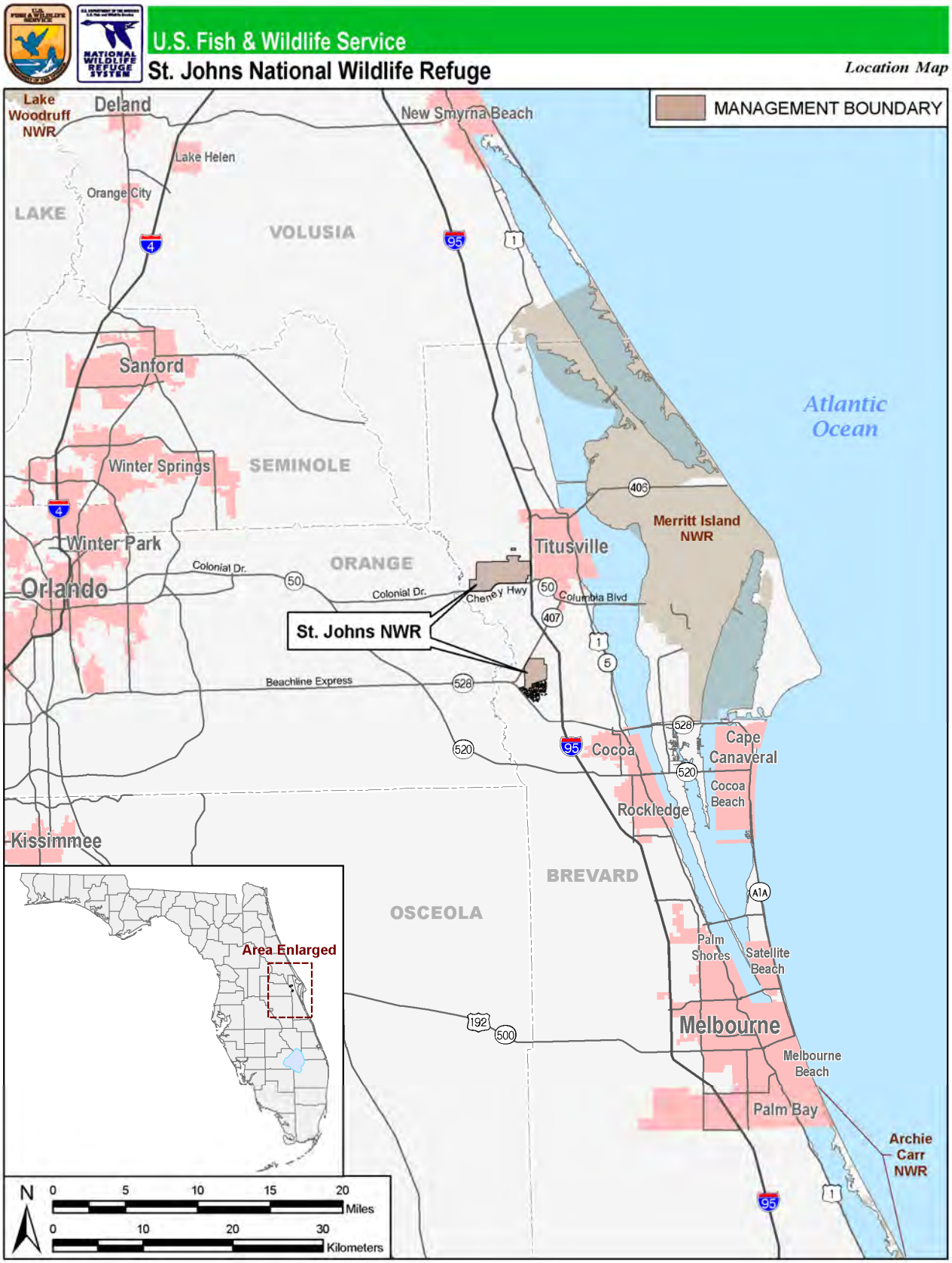


Figure 3. Land Status - State Road 50 management unit

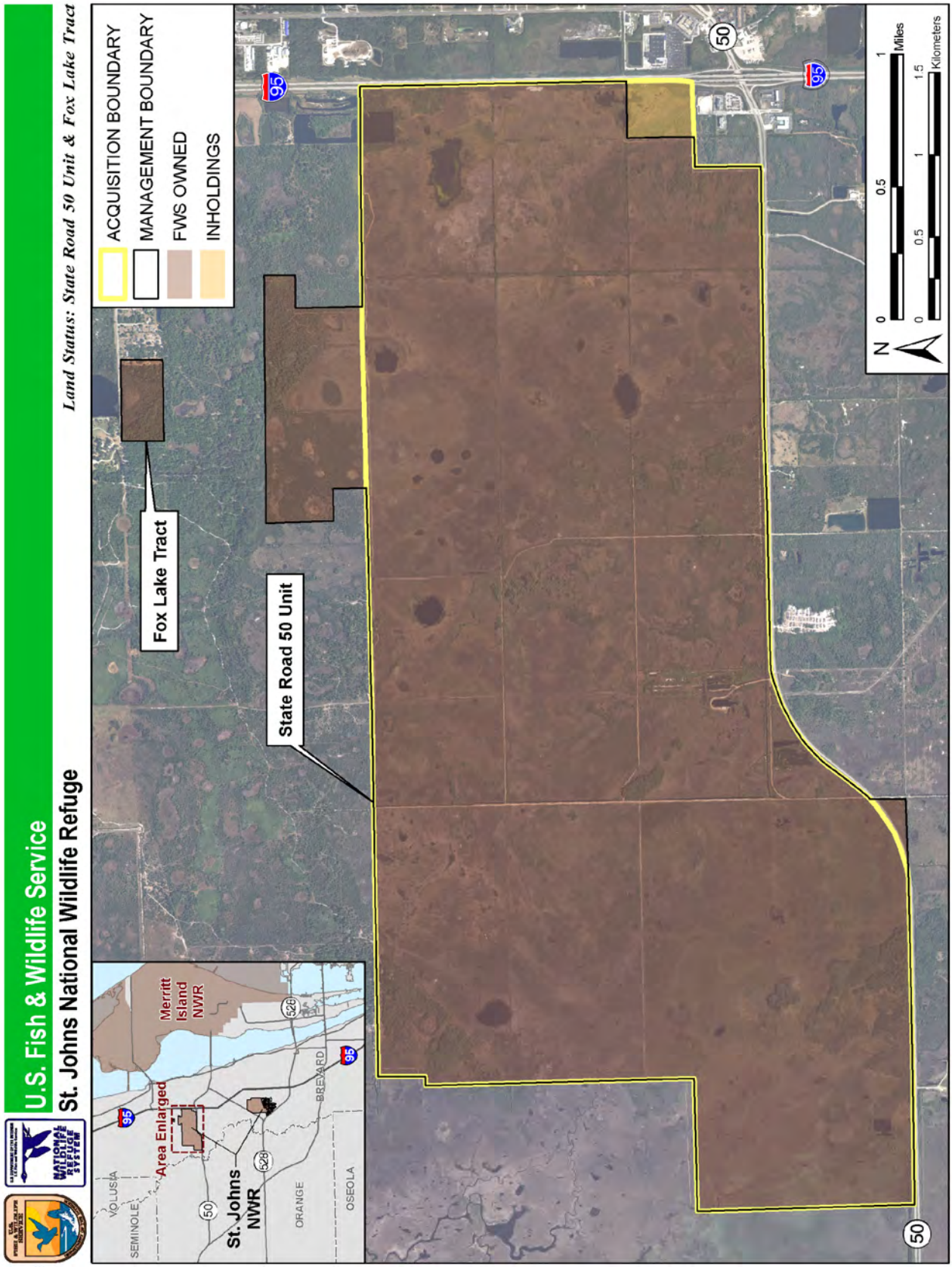


Figure 4. Land Status - Bee Line management unit

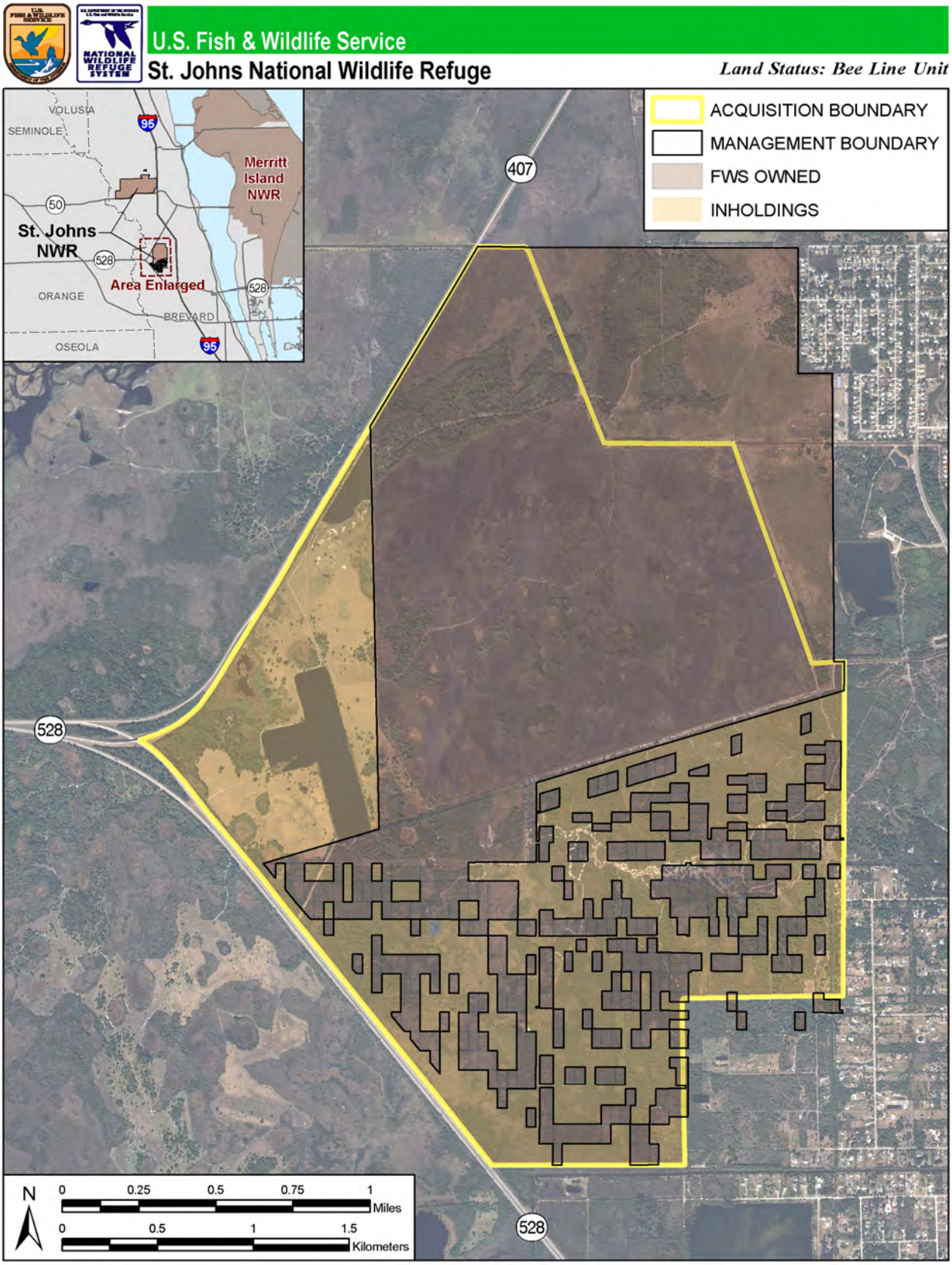
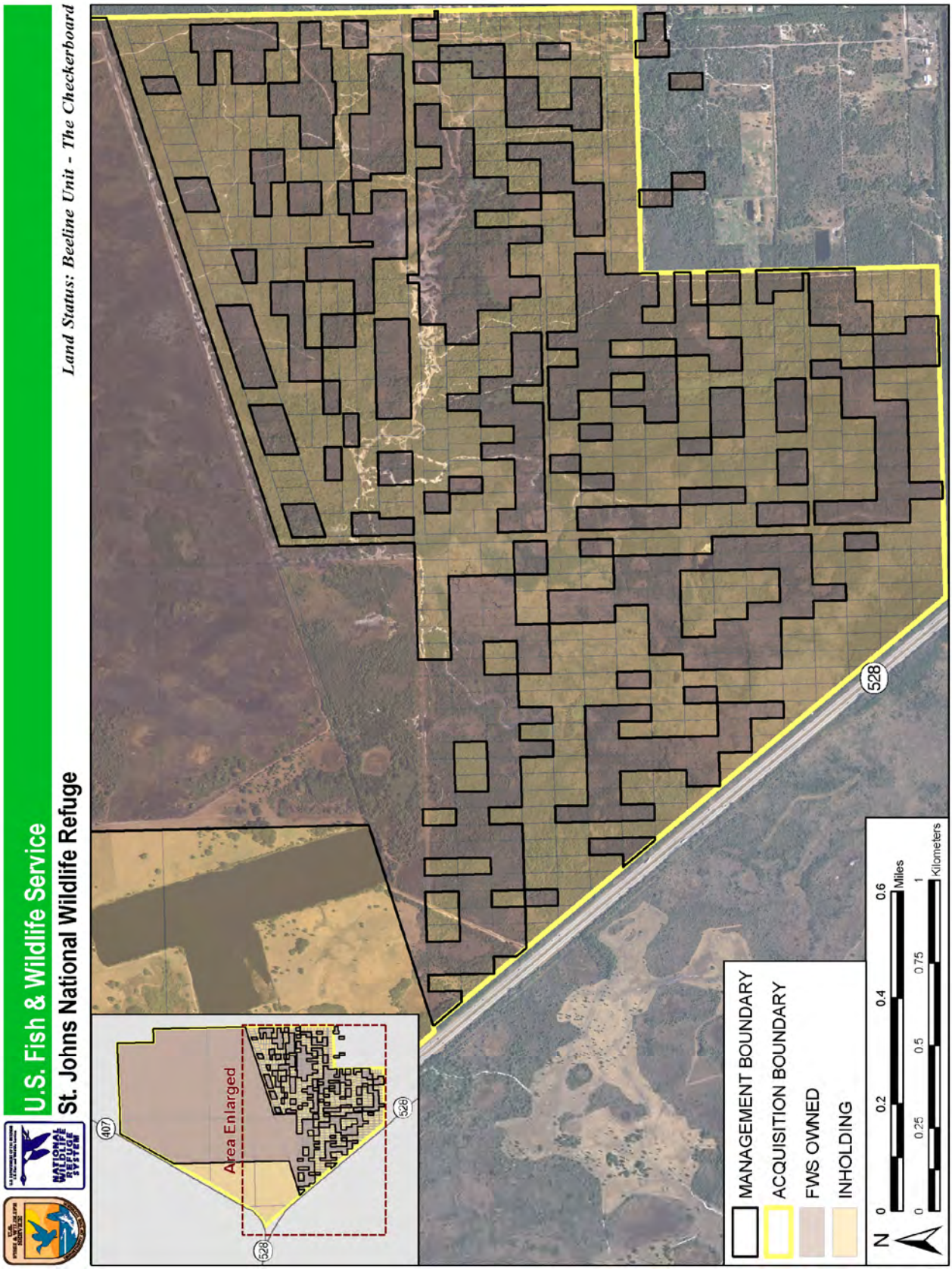


Figure 5. Land Status - Bee Line management unit checkerboard



PURPOSE AND NEED FOR THE PLAN

The purpose of the Draft CCP/EA is to develop a proposed action that best achieves the refuge's purposes; attains the vision and goals developed for the refuge; contributes to National Wildlife Refuge System mission; addresses key problems, issues, and relevant mandates; and is consistent with sound principles of fish and wildlife management.

Specifically, the plan is needed to:

- Provide a clear statement of refuge management direction;
- Provide refuge neighbors, visitors, and government officials with an understanding of Service management actions on and around the refuge;
- Ensure that Service management actions, including land protection and recreation/education programs, are consistent with the mandates of the National Wildlife Refuge System; and
- Provide a basis for the development of budget requests for operations, maintenance, and capital improvement needs.

FISH AND WILDLIFE SERVICE

The Service traces its roots to 1871 and the establishment of the Commission of Fisheries involved with research and fish culture. The once-independent commission was renamed the Bureau of Fisheries and placed under the Department of Commerce and Labor in 1903.

The Service also traces its roots to 1886 and the establishment of a Division of Economic Ornithology and Mammalogy in the Department of Agriculture. Research on the relationship of birds and animals to agriculture shifted to delineation of the range of plants and animals so the name was changed to the Division of the Biological Survey in 1896.

The Department of Commerce, Bureau of Fisheries, was combined with the Department of Agriculture, Bureau of Biological Survey, on June 30, 1940, and transferred to the Department of the Interior as the Fish and Wildlife Service. The name was changed to the Bureau of Sport Fisheries and Wildlife in 1956 and finally back to the Fish and Wildlife Service in 1974.

The Fish and Wildlife Service, working with others, is responsible for conserving, protecting, and enhancing fish and wildlife and their habitats for the continuing benefit of the American people through Federal programs relating to migratory birds, endangered species, interjurisdictional fish and marine mammals, and inland sport fisheries (142 DM 1.1).

As part of its mission, the Service manages more than 550 national wildlife refuges and other units covering over 150 million acres (60.7 million hectares [ha]). These areas comprise the National Wildlife Refuge System, the world's largest collection of lands and waters set aside specifically for fish and wildlife. The majority of these lands, 77 million acres (31 million ha), is in Alaska, while 54 million acres (21.8 million ha) are part of three marine national monuments in the Pacific Ocean. The remaining acres are spread across the other 49 states and several United States territories. In addition to refuges, the Service manages thousands of small wetlands, 37 wetland management districts, 70 national fish hatcheries, 65 fishery resource offices, and 81 ecological services field stations. The Service enforces federal wildlife laws, administers the Endangered Species Act, manages migratory bird populations, restores nationally significant fisheries, conserves and restores wildlife habitat, and helps foreign governments with their conservation efforts. It also oversees the

Federal Aid program that distributes hundreds of millions of dollars in excise taxes on fishing and hunting equipment to state fish and wildlife agencies.

NATIONAL WILDLIFE REFUGE SYSTEM

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 National Wildlife Refuge System Improvement Act of 1997 (Improvement Act) established, for the first time, a clear legislative mission of wildlife conservation for the National Wildlife Refuge System (Refuge System). Actions were initiated in 1997 to comply with the direction of this new legislation, including an effort to complete comprehensive conservation plans for all refuges. These plans, which are completed with full public involvement, help guide the future management of refuges by establishing natural resources and recreation/education programs. Consistent with this Improvement Act, approved plans will serve as the guidelines for refuge management for the next 15 years. The Improvement Act states that each refuge shall be managed to:

- Fulfill the mission of the Refuge System;
- Fulfill the individual purposes of each refuge;
- Consider the needs of wildlife first;
- Fulfill requirements of comprehensive conservation plans that are prepared for each unit of the Refuge System;
- Maintain the biological integrity, diversity, and environmental health of the Refuge System;
- Recognize that wildlife-dependent recreation activities, including hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation, are legitimate and priority public uses; and
- Allow refuge managers authority to determine compatible public uses.

The following are just a few examples of your national network of conservation lands. Pelican Island National Wildlife Refuge, the first refuge, was established in 1903 for the protection of colonial nesting birds in Florida, such as the snowy egret (*Egretta thula)* and the brown pelican (*Pelecanus occidentalis*). Western refuges were established for American bison (1906), elk (1912), prong-horned antelope (1931), and desert bighorn sheep (1936) after over-hunting, competition with cattle, and natural disasters decimated once-abundant herds. The drought conditions of the 1930s Dust Bowl severely depleted breeding populations of ducks and geese. Refuges established during the Great Depression focused on waterfowl production areas (i.e., protection of prairie wetlands in America's heartland). The emphasis on waterfowl continues today but also includes protection of wintering habitat in response to a dramatic loss of bottomland hardwoods. By 1973, the Service had begun to focus on establishing refuges for endangered species.

National wildlife refuges connect visitors to their natural resource heritage and provide them with an understanding and appreciation of fish and wildlife ecology to help them understand their role in the environment. Wildlife-dependent recreation on refuges also generates economic benefits to local communities. According to the report, *Banking on Nature 2006: The Economic Benefits to Local Communities of National Wildlife Refuge Visitation*, approximately 34.8 million people visited national

wildlife refuges in Fiscal Year 2006, generating almost $1.7 billion in total economic activity and creating almost 27,000 private sector jobs producing about $542.8 million in employment income (Carver and Caudill 2007). Additionally, recreational spending on refuges generated nearly $185.3 million in tax revenue at the local, county, state, and federal levels (Carver and Caudill 2007). As the number of visitors grows, significant economic benefits are realized by local communities. In 2006, nearly 87 million people 16 years and older fished (30 million), hunted (12.5 million), or observed wildlife (71 million), generating $120 billion (U.S. Department of Interior, Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau 2007).

In a study completed in 2002 on 15 refuges, visitation had grown 36 percent in 7 years. At the same time, the number of jobs generated in surrounding communities grew to 120 per refuge, up from 87 jobs in 1995, pouring more than $2.2 million into local economies. The 15 refuges in the study were Chincoteague (Virginia); National Elk (Wyoming); Crab Orchard (Illinois); Eufaula (Alabama); Charles M. Russell (Montana); Umatilla (Oregon); Quivira (Kansas); Mattamuskeet (North Carolina); Upper Souris (North Dakota); San Francisco Bay (California); Laguna Atacosa (Texas); Horicon (Wisconsin); Las Vegas (Nevada); Tule Lake (California); and Tensas River (Louisiana) the same refuges identified for the 1995 study. Other findings also validate the belief that communities near refuges benefit economically. Expenditures on food, lodging, and transportation grew to $6.8 million per refuge, up 31 percent from $5.2 million in 1995. For each federal dollar spent on the Refuge System, surrounding communities benefited with $4.43 in recreation expenditures and $1.42 in job-related income (Caudill and Laughland, unpublished data).

Volunteers continue to be a major contributor to the success of the Refuge System. In 2005, approximately 38,000 refuge volunteers donated more than 1.4 million hours. The value of their service was more than $25 million.

The wildlife and habitat vision for national wildlife refuges stresses that wildlife comes first; that ecosystems, biodiversity, and wilderness are vital concepts in refuge management; that refuges must be healthy and growth must be strategic; and that the Refuge System should serve as a model for habitat management with broad participation from others.

The Improvement Act stipulates that comprehensive conservation plans be prepared in consultation with adjoining federal, state, and private landowners and that the Service develop and implement a process to ensure an opportunity for active public involvement in the preparation and revision (every 15 years) of the plans.

All lands of the Refuge System will be managed in accordance with an approved comprehensive conservation plan that will guide management decisions and set forth strategies for achieving refuge unit purposes. The plan will be consistent with sound resource management principles, practices, and legal mandates, including Service compatibility standards and other Service policies, guidelines, and planning documents (602 FW 1.1).

LEGAL AND POLICY CONTEXT

LEGAL MANDATES, ADMINISTRATIVE AND POLICY GUIDELINES, AND OTHER SPECIAL CONSIDERATIONS

Administration of national wildlife refuges is guided by the mission and goals of the Refuge System, congressional legislation, presidential executive orders, and international treaties. Policies for management options of refuges are further refined by administrative guidelines established by the Secretary of the Interior and by policy guidelines established by the Director of the Fish and Wildlife

Service. Select legal summaries of treaties and laws relevant to administration of the Refuge System and management of the St. Johns NWR are provided in Appendix C.

Treaties, laws, administrative guidelines, and policy guidelines assist the refuge manager in making decisions pertaining to soil, water, air, flora, fauna, and other natural resources; historical and cultural resources; research and recreation on refuge lands; and provide a framework for cooperation between St. Johns NWR and other partners, such as the Florida Fish and Wildlife Conservation Commission (FWC), Florida Department of Environmental Protection (FDEP), Florida Division of Forestry (FDOF), St. Johns River Water Management District (SJRWMD), and private landowners, etc.

Lands within the Refuge System are closed to public use unless specifically and legally opened. No refuge use may be allowed unless it is determined to be compatible. A compatible use is one that, in the sound professional judgment of the refuge manager, will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuge. All programs and uses must be evaluated based on mandates set forth in the Improvement Act. Those mandates are to:

- Contribute to ecosystem goals, as well as refuge purposes and goals;
- Conserve, manage, and restore fish, wildlife, and plant resources and their habitats;
- Monitor the trends of fish, wildlife, and plants;
- Manage and ensure appropriate visitor uses as those uses benefit the conservation of fish and wildlife resources and contribute to the enjoyment of the public; and
- Ensure that visitor activities are compatible with refuge purposes.

The Improvement Act further identifies six priority wildlife-dependent recreational uses. These uses are: hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. As priority public uses of the Refuge System, they receive priority consideration over other public uses in planning and management.

BIOLOGICAL INTEGRITY, DIVERSITY, AND ENVIRONMENTAL HEALTH POLICY

The Improvement Act directs the Service to ensure that the biological integrity, diversity, and environmental health of the Refuge System are maintained for the benefit of present and future generations of Americans (601 FW 3). The Biological Integrity Policy is an additional directive for refuge managers to follow while achieving refuge purpose(s) and the Refuge System mission. It provides for the consideration and protection of the broad spectrum of fish, wildlife, and habitat resources found on refuges and associated ecosystems. When evaluating the appropriate management direction for refuges, refuge managers will use sound professional judgment to determine their refuges' contribution to biological integrity, diversity, and environmental health at multiple landscape scales. Sound professional judgment incorporates field experience, knowledge of refuge resources, the conservation role of the refuge within a landscape, applicable laws, and best available science, including consultation with others both inside and outside the Service.

NATIONAL AND INTERNATIONAL CONSERVATION PLANS AND INITIATIVES

Multiple partnerships have been developed among government and private entities to address the environmental problems affecting regions. There is a large amount of conservation and protection information that defines the role of the refuge at the local, national, international, and ecosystem levels. Conservation initiatives include broad-scale planning and cooperation between affected parties to address declining trends of natural, physical, social, and economic environments. The

conservation guidance described below, along with issues, problems, and trends, was reviewed and integrated where appropriate into this Draft CCP/EA.

This Draft CCP/EA supports several national and international conservation plans and initiatives, including five plans under the North American Bird Conservation Initiative and the National Wetlands Priority Conservation Plan.

NORTH AMERICAN BIRD CONSERVATION INITIATIVE

Started in 1999, the North American Bird Conservation Initiative is a coalition of government agencies, private organizations, academic institutions, and private industry leaders in the United States, Canada, and Mexico, working to ensure the long-term health of North America's native bird populations by fostering an integrated approach to bird conservation to benefit all birds in all habitats. The four international and national bird initiatives to which the refuge contributes include the North American Waterfowl Management Plan, Partners-in-Flight, Waterbird Conservation for the Americas, and the U.S. Shorebird Conservation Plan.

North American Waterfowl Management Plan

The North American Waterfowl Management Plan is an international action plan to conserve migratory birds throughout the continent. The plan's goal is to return waterfowl populations to their 1970s' levels by conserving wetland and upland habitat. Canada and the United States signed the plan in 1986 in reaction to critically low numbers of waterfowl. Mexico joined in 1994, making it a truly continental effort. The plan is a partnership of federal, provincial/state and municipal governments, non-governmental organizations, private companies, and many individuals, all working towards achieving better wetland habitat for the benefit of migratory birds, other wetland-associated species and people. Plan projects are international in scope, but implemented at regional levels. These projects contribute to the protection of habitat and wildlife species across the North American landscape. In support of the North American Waterfowl Management Plan, the Refuge provides wintering habitat for eight species of waterfowl and year-round habitat for the resident mottled duck.

Partners-in-Flight Bird Conservation Plan

Managed as part of the Partners-in-Flight Bird Conservation Plan, the peninsular Florida physiographic area represents a scientifically based land bird conservation planning effort that ensures long-term maintenance of healthy populations of native land birds, primarily non-game land birds. Non-game land birds have been vastly under-represented in conservation efforts, and many are exhibiting significant declines. This plan is voluntary and non-regulatory, and focuses on relatively common species in areas where conservation actions can be most effective, rather than the frequent local emphasis on rare and peripheral populations. In support of the Partners-in-Flight Bird Conservation Plan, the refuge's hammocks and upland forests attract and sustain neotropical migratory birds on their long journeys north and south every spring and fall.

Waterbird Conservation of the Americas – North American and Southeast Regional Waterbird Conservation Plans

The North American Waterbird Conservation Plan provides a framework for the conservation and management of 210 species of waterbirds in 29 nations. Threats to waterbird populations include destruction of inland and coastal wetlands, introduced predators and invasive species, pollutants, mortality from fisheries and industries, disturbance, and conflicts arising from abundant species. Particularly important habitats of the southeast region include pelagic areas, marshes, forested

wetlands, and barrier and sea island complexes. Fifteen species of waterbirds are federally listed, including breeding populations of wood storks, Mississippi sandhill cranes, whooping cranes, interior least terns, and gulf coast populations of brown pelicans, with wood storks occurring on the refuge. A key objective of this plan is the standardization of data collection efforts to better recommend effective conservation measures for waterbirds including wood storks.

The Southeast Regional Waterbird Conservation Plan provides regional guidance and perspectives to partners, landowners, and land managers for accomplishing waterbird conservation objectives. The plan provides a link between the national level North American Waterbird Conservation Plan and local conservation initiatives. It outlines a framework through which partners can identify and develop projects that build upon existing information to move waterbird conservation forward at both the regional and continental scale. The St. Johns NWR is located in the Peninsular Florida Bird Conservation Region (BCR) and supports this plan by providing important habitat for many species of waterbirds, including wading birds, shorebirds, rails, and bitterns.

U.S. Shorebird Conservation Plan

The U.S. Shorebird Conservation Plan is a partnership effort throughout the United States to ensure that stable and self-sustaining populations of shorebird species are restored and protected. The plan was developed by a wide range of agencies, organizations, and shorebird experts for separate regions of the country, and identifies conservation goals, critical habitat conservation needs, key research needs, and proposed education and outreach programs to increase awareness of shorebirds and the threats they face. As noted just above, the St. Johns NWR lies within the Peninsular Florida BCR, a part of the Southeastern Coastal Plain Region. The refuge's wetland systems support transient migratory shorebirds during both northbound (spring) and southbound (fall) movements.

National Wetlands Priority Conservation Plan

The objective of the National Wetlands Priority Conservation Plan (NWPCP) is to assist agencies in focusing their acquisition efforts on the more important, scarce and vulnerable wetlands in the Nation. The NWPCP may also be used to establish priorities for wetlands protection that do not involve acquisition. The NWPCP applies only to wetlands that would be acquired by federal agencies, and states using Land and Water Conservation Fund (LWCF) appropriations. In general, wetlands given priority consideration for acquisition under the NWPCP will be those that provide a high degree of public benefit, that are representative of rare or declining wetland types within an ecoregion, and that are subject to identifiable threats of loss or degradation. Threshold criteria to be considered in determining acquisition priorities include functions and values of wetlands, historic wetland losses, and threat of future wetland losses. The NWPCP could play an important role in future St. Johns NWR acquisition efforts as all federal funding used to acquire St. Johns NWR lands has come from and would be anticipated to continue through federal LWCF appropriations. Further, the refuge meets the threshold criteria for NWCPC consideration as remnant salt pan/cord grass marshes are considered highly functional rare wetland habitat types that have been reduced over time indirectly through alterations in hydrology and directly through conversion to agriculture and urban settings.

RELATIONSHIP TO STATE WILDLIFE AGENCY

A provision of the Improvement Act, and subsequent agency policy, is that the Service shall ensure timely and effective cooperation and collaboration with other state fish and game agencies and tribal governments during the course of acquiring and managing refuges. State wildlife management areas

and national wildlife refuges provide the foundation for the protection of species, and contribute to the overall health and sustainment of fish and wildlife species in the State of Florida.

State agency partners of the St. Johns NWR include the FWC, FDEP, FDOF, and SJRWMD.

Management of state fish and wildlife resources is administered by FWC and FDEP for the long-term well-being and benefit of people. FWC protects and manages more than 575 species of wildlife, more than 200 native species of freshwater fish, and more than 500 native species of saltwater fish, while balancing these species' needs with the needs of more than 18 million residents (U.S. Census Bureau 2007), and over 85 million annual visitors (Florida Department of Transportation 2008) who share the land and water with Florida's wildlife.

The FWC responsibilities include the listed items.

- Law Enforcement – to protect fish and wildlife, keep waterways safe for millions of boaters and cooperate with other law enforcement agencies providing homeland security.

- Research – to provide information for the FWC and others to make management decisions based on the best science available involving fish and wildlife populations, habitat issues, and the human-dimension aspects of conservation.

- Management – to manage the state's fish and wildlife resources based on the latest scientific data to conserve some of the most complex and delicate ecosystems in the world along with a wide diversity of species.

- Outreach – to communicate with a variety of audiences to encourage participation, responsible citizenship and stewardship of the state's natural resources.

FWC, FDEP, and FDOF manage state lands and waters. FWC manages 4.3 million acres (1.7 million ha) of public lands and 220,000 acres (89,030 ha) of private lands for recreation and conservation purposes. FDEP manages 150 state parks covering nearly 600,000 acres (242,811 ha) and 57 coastal and aquatic managed areas, totaling over five million acres (two million ha) of submerged lands and coastal uplands. FDOF manages over one million acres of State Forests in Florida for multiple public uses including timber, recreation, and wildlife habitat. Operating from 15 field units throughout the state, FDOF maintains a mission to protect and manage the forest resources of Florida, ensuring that they are available for future generations. Wildfire prevention and suppression are key components in FDOF's efforts.

Florida is divided into five water management districts to preserve and manage the state's critical freshwater resources. As an agency of the State of Florida, the SJRWMD is a government entity that is responsible for "balancing people's needs for water with nature's needs." SJRWMD manages groundwater and surface water supplies in all or part of 18 counties in northeast and east-central Florida, and issues permits that regulate water withdrawals and limits how various activities, such as construction, can impact water resources.

The SJRWMD is responsible for managing ground and surface water supplies in all or part of 18 counties in northeast and east-central Florida. It owns or manages nearly 700,000 acres (280,000 ha) of land, over 260,000 acres of which are in the Upper St. Johns River Basin, acquired for the purposes of water management, water supply, and the conservation and protection of water resources. These lands largely consist of wetlands or historically wet areas. Of less acreage, but not of less importance, are uplands areas. The SJRWMD also conducts a wide range of inventorying, monitoring, and researching on the quality and quantity of groundwater and surface water resources and conducts outreach and public education programs. As part of its efforts to protect water resources, the SJRWMD buys and manages land. As a result, vegetation and wildlife that live on these lands are also protected and the public can enjoy recreational and educational activities. Land management plans are prepared for each district conservation area, and practices such as invasive species control and prescribed fire are utilized (SJRWMD 2009).

Various state government agencies have participated in a mix of refuge projects, including the planning process to develop a 15-year management plan for the refuge. The State of Florida's participation and contribution throughout this CCP process will provide for ongoing opportunities and open dialogue to improve the ecological sustainment of fish and wildlife in the State of Florida. An essential part of comprehensive conservation planning is integrating common mission objectives where appropriate.

II. Refuge Overview

INTRODUCTION

Established on August 16, 1971, to provide habitat for threatened and endangered species, especially the now extinct dusky seaside sparrow, St. Johns NWR is in Brevard County in east-central Florida. Lying in the Upper St. Johns River Basin, the 6,257-acre refuge is managed as a satellite of the Merritt Island NWR Complex (Figure 1). While the St. Johns NWR itself is not staffed, staff from Merritt Island NWR Complex conducts management activities on this refuge. It is divided into two main management units: SR 50 Unit (4,210 acres plus 31 acres at the Fox Lake Tract) and Bee Line Unit (2,016 acres) (Figure 2).

REFUGE PURPOSES AND HISTORY

The refuge was established in August, 1971, to provide protection for threatened and endangered species and native diversity. The primary purpose of the refuge relates to threatened and endangered species and applies to all lands and waters managed as part of St. Johns NWR: "…to conserve (A) fish or wildlife, which are listed as endangered species or threatened species…or (B) plants…" (16 U.S.C. 1534, Endangered Species Act). A secondary purpose focuses more on native diversity and also applies to a few tracts: "…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), National Wildlife Refuge System Administration Act.

Establishment of the St. Johns NWR was in response to a serious decline of the dusky seaside sparrow (*Ammodramus maritimus nigrescens).* Although this species was discovered on the St. Johns River marshes in 1872 by Maynard (Trost 1968), this area was long neglected, since the birds were plentiful on Merritt Island. In the spring of 1968, Brian Sharp conducted a census of the St. Johns River's marshes and estimated 894 males were present (Sharp 1970). The salt marshes of Merritt Island once contained hundreds of dusky seaside sparrows, but the conversion of high marsh to impoundments by Brevard County Mosquito Control District caused a drastic reduction in their numbers. The species was formally listed as an Endangered Species in 1967.

A two-pronged approach of working with the Mosquito Control District to alter the management of key impoundments and purchasing marsh lands along the St. Johns River were viewed as the best approach to saving the species. On Merritt Island NWR, the key impoundments were T-10-J, T-10-K, and T-24-C. The first acquisition for the refuge was on August 16, 1971, when 9.3 acres were purchased for $2,174. Approximately $2.9 million have been expended to acquire the acreage of the refuge. For all practical purposes, the land acquisition program ended in 1980, with the most recent parcel acquired in calendar year 2000 through donation.

After establishment of the refuge, the Service began management activities. Field studies included vegetation mapping and color banding of the individual sparrows. It was determined that the territory of each nesting pair was approximately 1.3 acres and that only 400 acres of habitat within the acquisition boundary were in optimum habitat. Management actions during the ensuing years included: installing gates and barricades to keep wildfires and dumping under control, placing fill dirt back in ditches, controlling woody vegetation with herbicide, using temporary workers to cut woody vegetation, and implementing a formal fire management program. On Merritt Island NWR, the Mosquito Control District agreed to remove the dike around T-10-K. The Service paid for the work, which began in 1973 and concluded in 1979.

A formal recovery team was established in 1975, with Dr. Jim Baker as the team leader. The team submitted a draft recovery plan in 1976 and the recovery plan was approved in 1979. It was also in 1979 that a captive breeding program was started.

Even as dusky seaside sparrow surveys continued on the lands within the acquisition boundary, their population dropped precipitously. Their numbers decreased from 143 males in 1970 to 37 males in 1974. No reproduction has been documented since 1975. Many factors worked in concert to cause habitat decline within the river's high marshes. Ditching activities, road construction, and development altered water levels and hydro-period. Drier conditions accelerated brush encroachment and facilitated the extensive wildfires, which occurred during the nesting season. These wildfires were the most important factor in habitat decline and the species' final demise.

By 1983, it seemed to be too late for the dusky. Internal discussions within the Service began to focus on what to do with the refuge. One popular option was to transfer it to the St. Johns River Water Management District. This state agency had begun to acquire floodplain along the river. Congress passed the Emergency Wetlands Resource Act in 1986, which included a reference to the importance of conserving wetlands associated with the St. Johns River. This added emphasis solidified the resolve to keep the refuge as part of the Refuge System.

In 1988 a series of priority actions were formulated for the refuge. They included: complete the acquisition in the south part of the Bee Line Unit, since 60 percent of the lots were already purchased; restore drainage to natural patterns where possible; phase out cattle grazing; and remove non-essential roads and fences. These actions were in addition to a viable prescribed fire program. Also in 1988, plans were finalized to perform mitigation on the refuge for the Florida Department of Transportation. This mitigation was needed to obtain environmental permits for the widening of SR 50. The refuge agreed to fill certain ditches west of Hacienda Road, install larger and more culverts in Hacienda Road, and replant the sites to native vegetation. This began in 1990. Sadly, all of this was too late to save the dusky seaside sparrow, which was officially declared extinct in 1990.

Since that time, cattle have been determined to be incompatible (Holder et al. 1980; Hill 1994) and have been removed from the refuge. Brevard County has identified the inholdings of the Bee Line Unit as a part of its acquisition program under the Environmentally Endangered Lands Program. The prescribed fire program continues to be the priority land management activity on the refuge.

In 1997 the refuge adopted the following mission statement:

- Restore and maintain remnant salt marsh habitat adjacent to the St. Johns River to maintain biodiversity and benefit all native plant and wildlife species;

- Provide habitat and management for migratory birds; and

- Provide breeding habitat for species of special concern, including black rail (*Laterallus jamaicensis*), loggerhead shrike (*Lanius ludovicianus*), and eastern meadowlark (*Sturnella magna*).

SPECIAL DESIGNATIONS

At this time, St. Johns NWR does not include any areas under special federal designation. This includes congressionally designated or proposed wilderness areas, oil and gas activities, wild and scenic rivers, research natural areas, or demonstration areas. The refuge does maintain special State of Florida designation as an Outstanding Florida Water and is classified as a Globally Important Bird Area.

Outstanding Florida Waters

Pursuant to Section 403.061(27), Florida Statutes, FDEP is granted the authority to establish rules which provide for a special category of water bodies within the state, to be referred to as "Outstanding Florida Waters" (OFWs), which shall be worthy of special protection because of their natural attributes. For their exceptional ecological value and water quality, Florida's national wildlife refuges are included in the list of waters designated as OFWs. As an OFW, St. Johns NWR is protected by FDEP's permitting process from direct pollutant discharges that would lower ambient (existing) water quality or for indirect discharges which would significantly degrade the OFW (FDEP 2009).

Important Bird Area

The Important Bird Area (IBA) Program is part of a global effort to conserve bird populations by identifying and properly managing their habitats. IBAs are sites that provide essential habitat for one or more species of birds, including sites for breeding, wintering, and/or migrating birds. To qualify as an IBA, sites must satisfy at least one of the listed criteria. The site must support:

- Species of conservation concern (e.g., threatened and endangered species);
- Restricted-ranges species (species vulnerable because they are not widely distributed);
- Species that are vulnerable because their populations are concentrated in one general habitat type or biome; and/or
- Species, or groups of similar species (e.g., waterfowl or shorebirds), that are vulnerable because they occur at high densities due to their congregatory behavior (National Audubon Society 2010a).

St. Johns NWR is classified as a Globally Important Bird Area, especially for its support of black rails (National Audubon Society 2010b).

LANDSCAPE CONTEXT

Ecosystem management is an integrated, flexible approach to management of biological and physical environments – conducted through the use of tools such as planning, land acquisition, environmental education, regulation, and pollution prevention – designed to maintain, protect, and improve the ecosystem's natural, managed, and human communities. Strategic habitat conservation (SHC) is a science-based framework for making management decisions about where and how to deliver conservation efficiently to achieve specific biological outcomes. This framework helps resource managers to plan, implement, and evaluate conservation methods. A series of landscape conservation cooperatives (Figure 6) or conservation partnerships among the Service, USGS, other federal agencies, states, tribes, non-governmental agencies, universities, and stakeholders will provide the geographic framework to deliver SHC. Together, cooperatives will provide information to better resource management decisions and address national-scale stressors—including habitat fragmentation, genetic isolation, spread of invasive species, and water scarcity—all of which are accelerated by climate change.

Strategic Habitat Conservation

In the face of escalating challenges, such as land-use conversion, invasive species, water scarcity, and a range of other complex issues, the effects of which may be amplified by accelerated climate change, the Service embarked several years ago to develop a broader vision for conservation.

Through a cooperative effort culminating in the 2006 National Ecological Assessment Team Report, the Service and USGS outlined a unifying adaptive resource management approach for conservation at "landscape" scales—the entire range of a priority species or suite of species. Known as SHC, it is a business philosophy that requires set biological goals for priority species populations, allows strategic decision-making, and encourages constant reassessment and improvement—all critical steps in dealing with large-scale conservation challenges and the uncertainty of accelerated climate change.

SHC is a national geographic framework for implementing landscape conservation envisioned to provide an effective spatial frame of reference to build capacity and partnerships for conservation. This geographic framework provides a continental platform upon which the Service can work with partners to connect project and site-specific efforts to larger biological goals and outcomes.

The 22 geographic areas comprising the framework (Figure 6) were developed by aggregating Bird Conservation Regions (BCRs), biologically based units representing long-standing partnerships that facilitate conservation planning and design at landscape scales. BCRs can be partitioned into smaller ecological units when finer-scale planning and design are necessary. The geographic areas also incorporate Freshwater Ecoregions of the World as a standard unit for aquatic species considerations—the same framework adopted by the National Fish Habitat Action Plan—as well as existing ecological units (Omernik's Level II) to account for a variety of terrestrial species' needs. In most geographic areas, the boundaries of key partnerships are left intact to conserve existing conservation and science capacities.

The Service uses the framework as a base geography to locate the first generation of Landscape Conservation Cooperatives (LCCs). LCCs are conservation-science partnerships between the Service, federal agencies, states, tribes, non-governmental organizations, universities, and other entities. They are fundamental units of planning and science capacity to help carry out the functional elements of SHC, such as biological planning, conservation design, conservation delivery, monitoring, and research. In addition, they help to organize and direct our strategic response to accelerated climate change.

The Service's landscape conservation efforts are designed to meet 21st Century conservation challenges. These efforts parallel changes occurring across the conservation and science communities as states, tribes, non-governmental organizations, and other stakeholders recognize similar challenges and work together to conserve our nation's fish and wildlife heritage.

National network of LCCs

LCCs provide scientific and technical support for conservation at "landscape" scales—the entire range of an identified priority species or groups of species. They support biological planning, conservation design, prioritizing and coordinating research, and designing species inventorying and monitoring programs. LCCs also have a role in helping partners identify common goals and priorities to target the right science in the right places for efficient and effective conservation. By functioning as a network of interdependent units rather than independent entities, LCC partnerships can accomplish a conservation mission no single agency or organization can accomplish alone.

Collectively, LCCs will compose a seamless national network supporting landscapes capable of sustaining abundant, diverse, and healthy populations of fish, wildlife, and plants. They will provide a strong link between science and conservation delivery without duplicating existing partnerships or creating burdensome and unnecessary bureaucracy. Rather than create a new conservation infrastructure from the ground up, LCCs build upon explicit biological management priorities and objectives, and science available from existing partnerships, such as fish habitat partnerships, migratory bird joint ventures and flyway councils, as well as species- and geographic-based partnerships.

LCCs support adaptive resource management by evaluating implementation of conservation strategies, maintaining and sharing information and data, and improving products as new information becomes available. Shared data platforms serve multiple purposes, including the collaborative development of population/habitat models under alternative climate scenarios to inform spatially explicit decision support for all partners. Decision-support systems and products developed by LCCs not only help determine the most effective conservation actions to support shared priorities, but also provide tools to compare and contrast the implications of management alternatives.

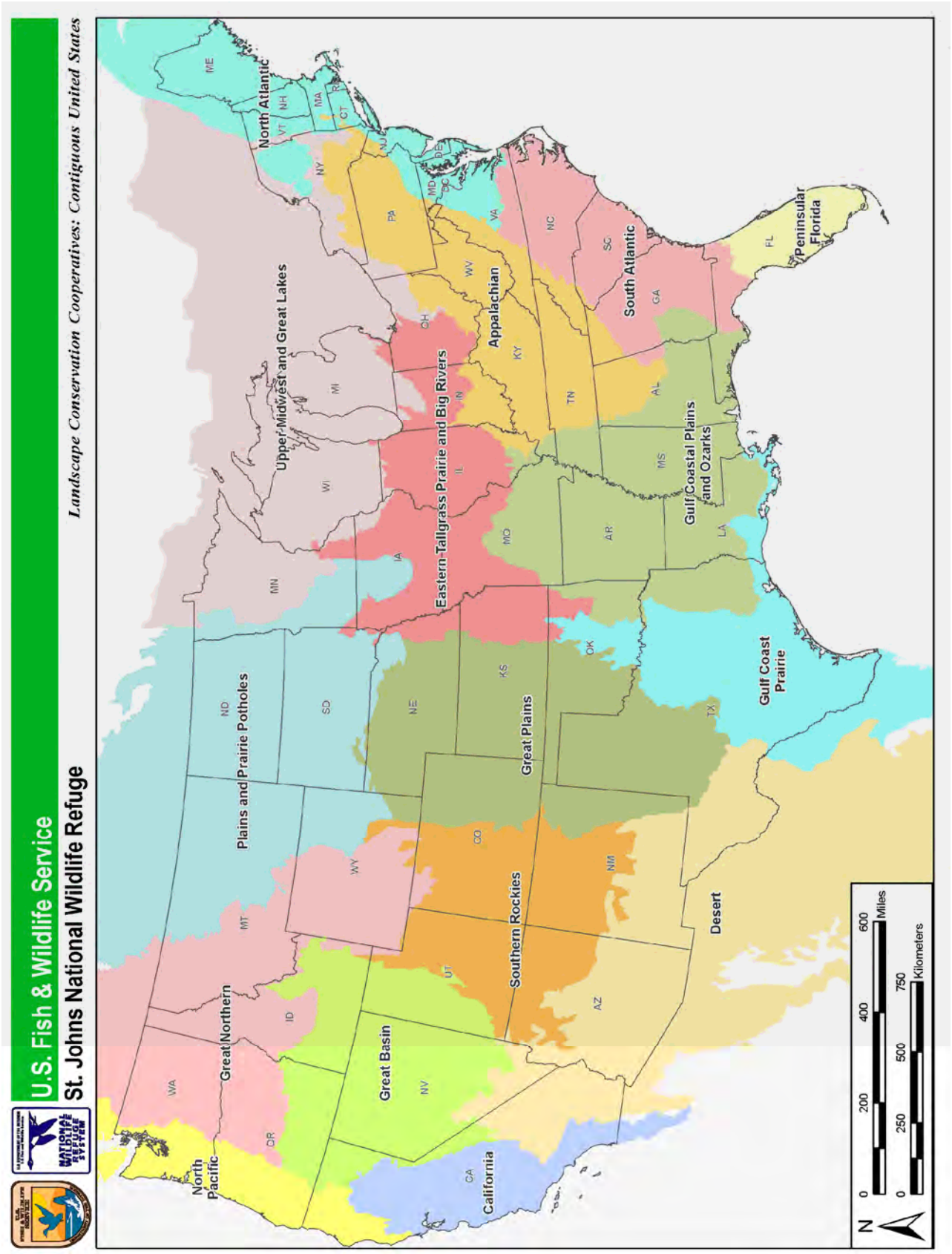
In the face of accelerated climate change and other 21st-Century conservation challenges, LCCs will regularly evaluate the effectiveness of scientific information and conservation actions and support necessary adjustments as new information becomes available. This iterative process of information sharing will help scientists and resource managers deal with uncertainties on the landscape and provide tools to compare and contrast the implications of management alternatives.

Peninsular Florida Landscape Conservation Cooperative

The refuge lies within the Peninsular Florida LCC (PFLCC), formerly called the North Florida or Peninsular Florida Ecosystem (Figure 7). Comprising one of the 16 delineated LCCs in the continental United States, the Service's Peninsular Florida LCC includes several important areas with protective designations, including Ocala National Forest, Everglades National Park, Welaka National Fish Hatchery, and numerous national wildlife refuges. Various other local, state, and federal conservation areas are also located within the Peninsular Florida LCC. The Peninsular Florida LCC spans temperate and subtropical climates, numerous physiographic districts, and a wide variety of habitats. Barrier islands, xeric scrub, pine flatwoods, freshwater marshes, lakes, streams, springs, mixed hardwood/pine forests, cypress swamps and domes, dry prairies, maritime forests, hardwood hammocks, estuarine marshes, pine rocklands, sandhill woodlands, coastal strands, sawgrass prairies, sloughs, and tree islands of the Peninsular Florida LCC serve a variety of native wildlife, including over 100 federally listed species, as well as interjurisdictional fishes, neotropical migratory birds, nongame waterbirds, and waterfowl.

The biggest problem facing the Peninsular Florida LCC is the loss of habitat through direct destruction and fragmentation, as well as through impacts from human activities. The predominant stresses for the Peninsular Florida LCC are human population growth, tourism, agriculture, silviculture, mining, water channelization, urbanization, aquifer depletion, fire suppression, exotic species, nonpoint source pollution, and point source pollution. The actions of the Peninsular Florida LCC are guided by two categories: trust resources and management issues. The trust resources include: migratory birds, anadromous fish, endangered species, and marine mammals. The management issues focus on habitat protection and management, habitat restoration, contaminants, regulatory compliance, law enforcement, and biodiversity.

Figure 6. Continental U.S. landscape conservation cooperatives



St. Johns NWR plays an important role in the Peninsular Florida LCC, especially with regard to the conservation of secretive marsh birds, rare, inland saltmarsh/cordgrass system, and the St. Johns River ecosystem. The refuge has long been managed primarily for the restoration and maintenance of habitat to serve secretive marsh birds including rails and bitterns. The refuge supports one of the last remnants of inland saltmarsh/cordgrass habitat – a non-tidal, hypersaline, poorly drained saltmarsh wetland system dominated by cordgrass. The Peninsular Florida LCC geography includes roughly 80 percent of the St. Johns River from its headwaters in southern Brevard County to northern St. Johns County. Local, state, and federal land management agencies have acquired thousands of acres of natural areas in the headwaters region where the refuge is located and throughout the St. Johns River ecosystem.

REGIONAL CONSERVATION PLANS AND INITIATIVES

A variety of regional conservation plans and initiatives were reviewed in the preparation of this Draft CCP/EA, including recovery plans for federally listed species, as well as state and local plans. Other applicable plans, initiatives, and programs include the Florida State Wildlife Action Plan, the St. Johns River Water Management District's Surface Water Improvement and Management Plan, Florida Natural Areas Inventory, Preservation 2000, Florida Forever Program, and Brevard County's Environmentally Endangered Lands Program. Several of these plans address management of conservation lands. Figure 8 shows conservation lands in the vicinity of the refuge.

RECOVERY PLANS

Under the Endangered Species Act, the Service and/or National Marine Fisheries Service (NMFS) develop a recovery plan for each federally listed threatened or endangered species. The Service has prepared recovery plans for four listed species that are known to occur at St. Johns NWR: wood stork, northern crested caracara, American alligator, and eastern indigo snake. Gopher tortoise (*Gopherus polyphemus)* is under review for federal listing throughout its range, including Florida. In addition, seven nongame birds are listed by the refuge as species of management concern (SMC), including barn owl, black rail, eastern meadowlark, least bittern (*Ixobrychus exilis*), loggerhead shrike, northern flicker (*Colaptes auratus*), and sedge wren (*Cistothorus platensis).* Without additional conservation action, these species are likely to become candidates for listing under the Endangered Species Act. The SMC designation promotes management actions for the species and is not a regulatory designation.

Each recovery plan delineates, justifies, and schedules the research and management actions necessary to support recovery of a species. If successfully undertaken, recovery actions are likely to permit reclassification or delisting of the species. As strategy documents, recovery plans do not commit manpower or funds for recovery actions, nor do they have the legal force of laws and regulations. Instead, they are used in setting regional and national federal conservation priorities for funding and implementation. The recovery plans provided a wealth of information that was used in developing this Draft CCP/EA. The refuge promotes management actions, including prescribed fire and exotics' control, to provide suitable habitat for state and federal listed species and species of management concern, providing early successional habitats for a wide array of avifauna.

Figure 7. Peninsular Florida landscape conservation cooperative

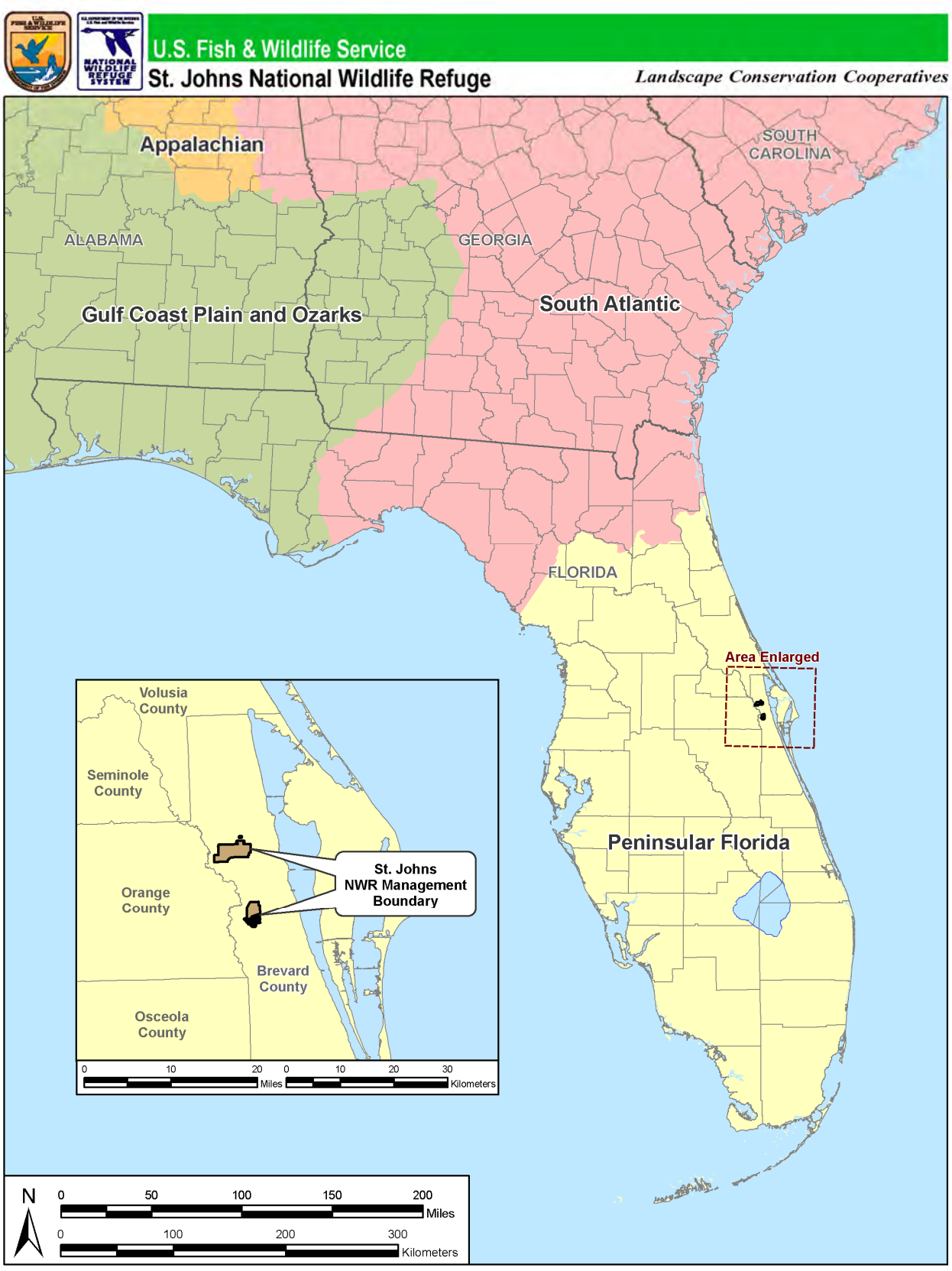
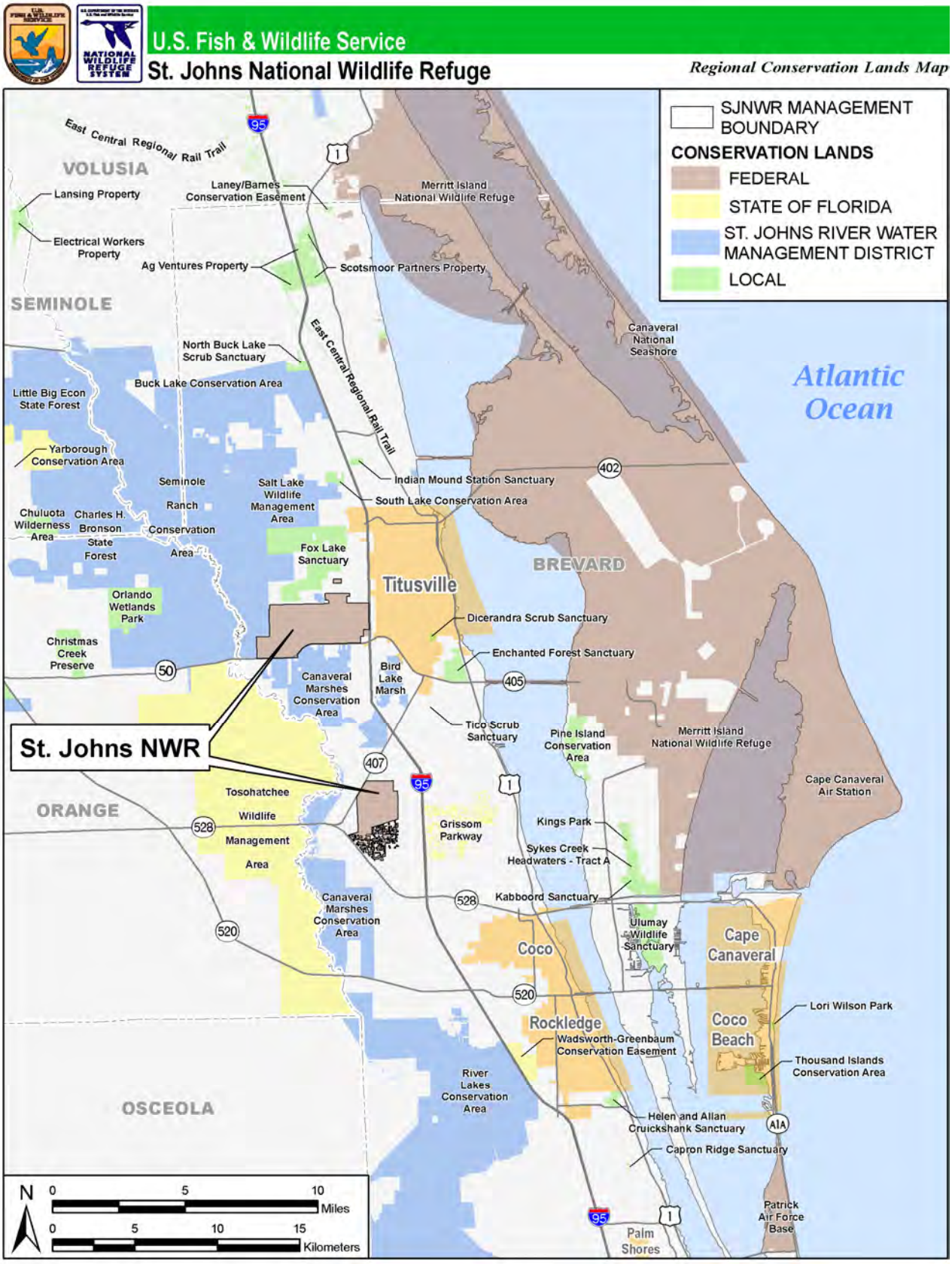


Figure 8. Conservation lands in the vicinity of St. Johns NWR



STATE WILDLIFE ACTION PLAN

As a requirement for participating in the Federal Government's State Wildlife Grants Program, each state and territory has created a Comprehensive Wildlife Conservation Strategy for conservation of a broad array of fish and wildlife. Throughout the development process, the objectives were to identify species of greatest conservation need and their habitats and to develop high-priority conservation actions to abate problems for those species and habitats. These objectives have been developed in a prudent effort to prevent declines before species become imperiled, thereby saving millions of tax dollars. In addition, the matching requirement has encouraged partnerships and cooperation among conservation partners.

To meet the intent of the Service's State Wildlife Grants Program, the FWC created Florida's Wildlife Legacy Initiative (Initiative). The goal of the Initiative was to develop a strategic vision for conserving all of Florida's wildlife. Florida's State Wildlife Action Plan (previously the Comprehensive Wildlife Conservation Strategy) was completed and approved in 2005. It outlines what native wildlife and habitats are in need, why they are in need and, most importantly, how the state plans to provide for these species and habitats. It also emphasizes the building of partnerships with other agencies and the private sector, uses a habitat-based conservation approach, incorporates a broad definition of wildlife (to include invertebrates, aquatic species, and other species), and favors non-regulatory methods in its effort to reach conservation goals and objectives, many of which provided useful guidance in developing comprehensive conservation planning benchmarks. A variety of species found on the refuge are listed in the Initiative as needing special management protection, including wood stork, northern crested caracara, round-tailed muskrat (*Neofiber alleni*) and habitats such as salt marsh (FWC 2005).

SURFACE WATER IMPROVEMENT AND MANAGEMENT PLAN

In the late 1980s, it was determined that Florida had to do more to protect and restore its surface waters. While point sources such as sewage and industrial waste discharges were being controlled, nonpoint sources – pollutants that enter water bodies in less direct ways and from multiple, dispersed sources) such as agricultural and urban runoff – were still a major concern. In 1987, the Florida Legislature created the Surface Water Improvement and Management (SWIM) program to address nonpoint pollutant sources.

The SWIM program is the only program that addresses a waterbody's needs as a system of connected resources, rather than isolated wetlands or waterbodies. To accomplish this, SWIM meshes across governmental responsibilities, forging important partnerships in water resource management. While the state's five water management districts and the FDEP are directly responsible for the SWIM program, they work in concert with federal, state, and local governments, as well as with the private sector. The St. Johns River Water Management District administers the SWIM Program within the basin. The undeveloped lands and natural habitats of the refuge contribute to the long-term water quality of the St. Johns River and are considered as part of the Upper St. Johns River Basin SWIM priority waterbody.

FLORIDA NATURAL AREAS INVENTORY

Florida Natural Areas Inventory (FNAI) is a nonprofit organization dedicated to gathering, interpreting, and disseminating information critical to the conservation of Florida's biological diversity. FNAI was founded in 1981 as a member of The Nature Conservancy's international network of natural heritage programs. The databases and expertise of FNAI facilitate environmentally sound planning and natural resource management to protect the plants, animals, and communities that represent

Florida's natural heritage. FNAI is the primary source of information on Florida's conservation lands. The inventory's databases include boundaries and statistics for more than 1,600 federal, state, local, and privately managed areas, all provided directly by the managing agencies. FNAI's databases and project evaluations provided the basis for establishing priorities and boundaries for the Florida Conservation and Recreation Lands (CARL) Program (Preservation 2000).

FLORIDA FOREVER PROGRAM

The Florida Forever Program, created by the State Legislature in 1999, follows in the footsteps of earlier successful land acquisitions programs in the State of Florida by continuing to focus land acquisition efforts in several resource categories: Natural Communities, Forest Resources, Plants, Fish and Wildlife, Fresh Water Supplies, Coastal Resources, Geologic Features, Historical Resources, and Outdoor Recreational Resources. According to 2010 Florida Forever Project boundaries (FNAI 2010), Bee Line Unit inholdings are not proposed for acquisition through the Florida Forever Program. However, the Fox Lake Unit is as are inholdings south of Fox Lake, connecting this Unit with the SR 50 Unit to the south. This acquisition polygon, the Brevard Coastal Scrub Ecosystem, also incorporates inholdings and public lands to the west of Fox Lake and forms a contiguous unit with the northwest portion of the SR 50 Unit at full acquisition.

PRESERVATION 2000

In 1990, the State of Florida took measures designed to conserve significant natural resources that might otherwise be subject to development. The State Legislature enacted Preservation 2000, a 10-year, $3 billion statewide program of public land acquisition for natural area conservation and compatible public recreation purposes. Land acquisition and management activities are funded primarily by the Conservation and Recreation Lands Trust Fund. While no lands in St. Johns NWR were acquired and conserved using this funding source, other nearby conservation lands under Service management were. The Archie Carr NWR Sea Turtle Refuge CARL project, for example, was designed principally to protect sea turtle nesting habitat. Lands acquired under this project were leased to the refuge. The Maritime Hammock Initiative CARL project was designed to protect several of the best maritime hammocks left, adding to existing conservation areas whenever possible. This project was added to the Archie Carr NWR Sea Turtle CARL project. Lands were also protected at Merritt Island NWR.

CRITICAL LANDS AND WATERS IDENTIFICATION PROJECT (CLIP) AND THE COOPERATIVE CONSERVATION BLUEPRINT (CCB)

The Critical Lands and Waters Identification Project (CLIP) is the Florida Century Commission's flagship project led by Thomas Hoctor, Ph.D., of the GeoPlan Center at the University of Florida and Jonathan Oetting of FNAI at Florida State University. Clip uses science and the best available statewide spatial data to depict Florida's critical environmental resources in a database that can be used as a decision-support tool for collaborative statewide and regional conservation and land use planning. The purpose is to envision and ensure the sustainability of Florida's green infrastructure and vital ecosystem services (Century Commission 2010).

CLIP science recommendations will be vetted with rural landowners, state agencies, regional planning councils, and other stakeholders through the Cooperative Conservation Blueprint (CCB) led by FWC in partnership with the Century Commission and the CCB steering committee. The CCB is a major multi-partner strategic planning step that Florida's Wildlife Legacy Initiative is undertaking. The CCB process creates an alternate vision of what stakeholders want the state to look like by incorporating wildlife habitat needs as well as social and economic priorities. The goal is to develop a

strategic plan for land and water conservation in Florida, using a new and broader range of conservation incentives with a shared view of the priorities (FWC 2010e).

CLIP priorities, depicting areas of opportunity for protecting biodiversity, landscapes, and water resources across the state, identified the St. Johns NWR as primarily a Priority 1 (P1) resource. A P1 designation depicts the highest level of conservation significance attributed to a landscape through CLIP (Hoctor et.al. 2008).

BREVARD COUNTY ENVIRONMENTALLY ENDANGERED LANDS PROGRAM

The Environmentally Endangered Lands (EEL) Program was established in 1990, to protect the natural habitats of Brevard County by acquiring environmentally sensitive lands for conservation, passive recreation, and environmental education. This was made possible by citizens who voted to tax themselves up to $55 million dollars for the acquisition and maintenance of Brevard County's natural areas. Residents reaffirmed the EEL Program in 2004 under a second referendum to use the same tax that is currently being collected for the Beach and Riverfront Program to protect the natural habitats within Brevard County. This would be accomplished by the acquisition of environmentally sensitive lands through a willing-seller program for the purposes of conservation, passive recreation, and environmental education.

EEL sanctuaries are managed to conserve native habitats and the plants and animals that utilize them. Each sanctuary or management area has a site-specific comprehensive management plan developed by EEL staff and the selection and management committee. The EEL program strives to maintain a regional approach to managing the EEL Sanctuary Network through the guidance provided in the Sanctuary Management Manual and through management partnerships with local, state, regional, and federal conservation agencies and private-sector conservation programs. The EEL Program adopts and implements an ecosystem approach to environmental management. Ecosystem management is defined as an integrative, flexible approach to the management of natural resources. Key themes of ecosystem management include: adaptive management, partnerships, human influences, values, and holistic approach.

The nearest EEL unit to St. Johns NWR is the Enchanted Forest Sanctuary, located in the southern limits of the city of Titusville. The EEL Program's "flagship" sanctuary, the Enchanted Forest, is the first property purchased by the Brevard County EEL Program. This 470-acre forest conserves a diversity of natural habitats, including oak scrub, mesic and hydric hammock, wet prairie, and pine flatwood. Several miles of hiking trails allow visitors to enjoy the natural beauty of the region. Wildlife observation, nature photography, and hiking are popular recreational activities. The Management and Education Center interprets the sanctuary's unique natural features for visitors of all ages and abilities. Wildlife species include the eastern indigo snake, Florida scrub lizard (*Sceloporus woodi*), gopher tortoise, white-tailed deer (*Odocoileus virginianus*), and bobcat (*Lynx rufus*) (EEL 2008).

ECOLOGICAL THREATS AND PROBLEMS

St. Johns NWR faces a variety of issues, including altered hydrological flows, inability to manage water resources, lack of understanding of basic hydrology, adjacent development, trespass and poaching activities, spread of invasive exotic species, highway impacts, and climate change.

The St. Johns NWR is part of the Upper St. Johns River Basin. Between the early 1950s and the 1970s, the Upper St. Johns River Basin was subjected to many modifications. Canals were dug to divert water for flood control and development. East-west highways were constructed, impeding sheet flow across the floodplain. Various communities were built in and around the floodplain, which increased runoff. All of

this activity greatly altered the hydrology of the St. Johns River system. These past actions in the watershed continue to affect the refuge's ecological functions today. The refuge itself has been subjected to ditching and road construction, which further modifies its hydrology.

For years much of the landscape was kept in an open grassy condition through burning and cattle grazing. As cattle ranching declined, these disturbances faded and much of the area around the Bee Line Unit and to the north of the SR 50 Unit became overgrown with wax myrtle (*Myrica cerifera*) and salt bush (*Baccharis* sp.). The surrounding landscape has suffered from increasing habitat fragmentation as the area has developed. The Bee Line Unit is now bounded by two major roads (SR 528 and SR 407) and a large residential community (Port St. John). The SR 50 Unit has Interstate 95 on the east and SR 50 on the south. Developers have expressed interest in creating large residential developments to the north of the SR 50 Unit. The Bee Line Unit abuts the growing area of Port St. John. The refuge may soon become an isolated patch of marsh surrounded by infrastructure and development. Adjacent urbanization and suburbanization are likely to lead to an increased threat from feral animals, free-roaming pets, elevated nutrient loading, noise pollution, trespass, and recreational demands.

Fire management activities on the refuge are crucial to maintaining desired habitat conditions for wildlife, but the proximity of the refuge to sensitive developed areas sharply restricts management options. Because of this urbanization/suburbanization, all unplanned ignitions at St. Johns NWR are suppressed.

The refuge exists today within a rapidly developing landscape. Florida has more than 18 million residents and nearly 77 million annual visitors (U.S. Census Bureau 2009, Florida Department of Transportation 2005a). Brevard County had an estimated 519,000 residents in 2005 (Lenze 2002), as well as a growth rate from 1990-2000 of 19.4 percent (U.S. Census Bureau 2000) and a projected growth rate from 2000 to 2015 of 25.3 percent (Lenze 2002). In 2004, near the SR 50 Unit, average daily traffic on SR 50 near Interstate 95 was 28,000 vehicles, while average daily traffic on Interstate 95 near SR 50 was 37,000 vehicles. In 2004, near the Bee Line Unit, average daily traffic on SR 528 2.3 miles east of the St. Johns River (just west of the Refuge) was 29,500 (Florida Department of Transportation 2005b).

Many of the issues of today at St. Johns NWR are the result of not taking specific actions during the acquisition phase (1971-1979). Much of the refuge's lands were platted, and easements were established under the Titusville Fruit and Farm Lands Company Plat of 1914. Brevard County was asked to vacate the easements in 1976, but refused to do so. Internal documents indicated that the Service had received approval to proceed with a condemnation of approximately 108 acres of land involved in the easements. Historical records do not disclose why the action was never taken.

This issue remained dormant until 1994, when an adjacent property owner and developer raised the issue of access and drainage rights. The property owner (petitioner) contended that mitigation work in the form of ditch filing to restore natural flow of surface water conducted in the late 1980s by the refuge for the Florida Department of Transportation (FDOT) impacted lands east of the SR 50 Unit. In 1996, the property owner had a drainage ditch excavated, which resulted in drainage of approximately 200 acres of refuge wetlands. The work was conducted without a permit from the SJRWMD, which issued an emergency order to the refuge to construct two weirs within easements on the refuge to stop the damage. Litigation was ongoing with suits and counter suits, especially between the SJRWMD and the owner, including a suit filed by the petitioner alleging the SJRWMD violated the terms of its drainage easement when the ditches were filled.

In January 2009, the judgment of the Appellate Court of the 11th District (Southeastern U.S.) was entered which ruled in favor of the refuge concerning the FDOT mitigation project—that the petitioner failed to show that the refuge had interfered with the natural flow of water and therefore had not interfered with the petitioner's common law flowage easement. Indeed the court explained, "the activities of which (petitioner) complains – principally the filing-in of drainage ditches – would restore the natural flow of surface water, not impede it" (U.S. Supreme Court 2009). The 11th Court of Appeals further noted that Florida law permits "reasonable use" of surrounding surface waters and that petitioner "has made no showing that the filing in of ditches or other activities that have allegedly led to flooding on (petitioner's) land was an unreasonable use" of the waters of the refuge (U.S. Supreme Court 2009). The case is in the final stages of the appeals process. A petition by the property owner to the U.S. Supreme Court for a writ of certiorari was filed in June 2009, and the petition is presently under review. Agencies involved include the SJRWMD, FDOT, the Service, and Brevard County.

POTENTIAL EFFECTS OF CLIMATE CHANGE

Department of the Interior Secretarial Order 3226 states that there is a consensus in the international community that global climate change is occurring and that it should be addressed in governmental decision-making. This order ensures that climate change impacts are taken into account in connection with Departmental planning and decision-making. Additionally, it calls for the incorporation of climate change considerations into long-term planning documents, such as the CCP. Projecting the impacts of climate change is hugely complex. The effects of climate change on populations and range distributions of wildlife are expected to be species-specific and highly variable, with some effects considered negative and others considered positive.

Meteorological and climatological events such as hurricanes and sea level rise pose challenges for refuge management. Further, climate change related stressors will likely enhance the negative impacts of other stressors. Climate change may exacerbate shoreline erosion due to rising seas (Doyle 1998, Natural Resources Defense Council 2001, Zhang et al. 2004, Bindoff et al. 2007, Holland and Webster 2007, Nicholls et al. 2007) and may result in an increase in the intensity and frequency of tropical cyclones (Emanuel 1987, Emanuel 2005, Webster et al. 2005, Mann and Emanuel 2006). Low-lying islands will face impacts from global climate change, particularly rising sea level and coastal storms. Such effects have already been experienced in the past; however, these events may become more frequent and severe within the 15-year time period covered by the final CCP, based on recent projections by the Intergovernmental Panel on Climate Change (IPCC) (Intergovernmental Panel on Climate Change 2007). Saline intrusion into the subsurface freshwater lens from sea level rise and saltwater inundation of surface freshwaters from storm surges can alter coastal ecosystems and freshwater marshes, resulting in more salt-tolerant aquatic plant communities. The most immediate actions that the Service can take are to gather the best scientific data possible for understanding natural processes in their current state, model possible impacts and subsequent changes from sea level rise, and develop adaptive management strategies for future conservation needs.

Although direct impacts to refuge resources are currently unknown, likely changes and stressors include alterations in wildlife populations and ranges, increased storm intensity, increased drought severity and persistence, and increased density and diversity of exotic and invasive species. And, these are likely to exacerbate other stressors, resulting in decreased water quality, altered water quantity and timing of flows, and increased pollution.

While specific impacts on the refuge's habitats and wildlife from climate change cannot be predicted with any certainty, it is certain they will occur, adding to the stresses this heavily modified landscape already faces.

PHYSICAL RESOURCES

CLIMATE

It should be noted that no consistent climatological data are available specifically for the St. Johns NWR. However, data are available for nearby Merritt Island NWR, which overlays the National Aeronautics and Space Administration's (NASA's) Kennedy Space Center. Weather data have been recorded since the early 1960s for NASA's Shuttle Landing Facility (SLF) at Kennedy Space Center. Much of the discussion below is based on SLF data.

General Climatic Conditions

The main factors influencing climate at St. Johns NWR are latitude and the proximity of large bodies of water. Generally, the climate at the refuge can be described as subtropical, with short, mild winters and hot, humid summers, with no appreciable spring or fall seasons. Summer weather patterns usually begin in April and prevail for nine months.

Temperature

Summer temperatures (measured in Fahrenheit) generally range from the low 70s at dawn to the upper 80s and low 90s during the afternoon. November may have some cool days, but winter weather typically starts in December and lasts through March. Average temperatures during the winter range from lows in the 50s to highs near 75°. Temperature extremes range from a low of 19° to a high of 100° (Patrick Air Force Base 2004).

Winds

Wind fields on the refuge can be highly variable. The refuge experiences changes throughout the day, such as sea breezes and erratic winds around thunderstorms. High winds, above 20 miles per hour at the 20-foot level, are common in the winter and spring months, with occasional days with 35 to 40 mph winds. High winds are also associated with tropical systems in the summer and fall. Periods of light and variable winds lasting several days can occur in summer months when subsiding air is entrenched over the central Florida area.

Atmospheric Moisture

As one would expect with large bodies of water in and around the refuge, the relative humidity (RH) is typically high. Mean dawn RH is between 88 and 95 percent throughout the year, while readings in the mid-afternoon are between 55 and 67 percent. Very low RH can occur with the passage of cold fronts in the winter. Readings in the 30 to 40 percent range are common and a RH as low as 26 percent has been recorded. On the other end of the spectrum, an RH of 100 percent is not uncommon with fog occurring on many mornings.

Precipitation

The average annual precipitation as recorded at the SLF is 49.0 inches (Patrick Air Force Base 2004). The average precipitation for the National Weather Service station in Melbourne, Florida, is close to that with 48.29 inches (National Weather Service 2006). Rainfall typically occurs during two time periods separated by dry seasons. Between late May and early October, weather patterns are dominated by the effects of the Bermuda High. This system causes southeast winds, which bring moist warm air onto shore, leading to the formation of thunderstorms. These rainfall events are short

duration, high intensity localized storms. The refuge averages 83 thunderstorm days per year. Sixty percent of the annual precipitation days occur during these months. From November to February, the weather patterns are influenced by cold continental air masses. Rainfall during this period comes from the effects of frontal passage. Rain events are more widespread and less intense than those in the summer. The transitional periods between these two wet seasons tend to be dry. Although uncommon, snow could occur on the refuge. The SLF has reported snow in both December and January; however, accumulations were less than 0.05 inches.

Annual precipitation amounts can vary widely. In 1998, the annual rainfall was only 34.1 inches. The total accumulation of rainfall for the months of April, May, and June 1998 was only 1.03 inches as compared to the expected amount of 10.42 inches. Conversely, in the year 2001 the refuge received a total of 61.8 inches of rain or 12.8 inches above the SLF average. These fluctuations in precipitation can significantly impact refuge management operations. In 1998, for example, the dry conditions contributed to numerous wildfires. On the other hand, the wet conditions in 2001 made travel on the refuge difficult. The frequent rains and generally wet conditions during that year resulted in decreased opportunities for prescribed burning.

Lightning

Because of its importance in fire management, a key refuge management activity, lightning deserves a special mention. Florida has the highest number of thunderstorm days in the United States (U.S. Department of Agriculture 1941). Research on Kennedy Space Center shows that within-cloud and cloud-to-ground discharges average 2.4 per minute per storm, with a rate of 30.6 discharges per minute recorded during a storm on July 14, 1980 (NASA 1984).

Tropical Cyclones

Tropical depressions, storms, and hurricanes can impact refuge activities and infrastructure. Large amounts of rainfall can accompany tropical cyclones. In addition, wind and wave action can result in major damage to important refuge habitats. In 2004, three hurricanes impacted the central Florida area. The only permanent building on the refuge suffered major damage during these storms.

GEOLOGY AND TOPOGRAPHY

Geology

The surface materials in the region of the refuge are typically undifferentiated deposits of the Pleistocene and Recent ages. These sediments are underlain by consolidated beds of Late Miocene or Pliocene which, in turn, are underlain by the Hawthorne Formation of the Early and Mid Miocene Age. The deposits of Late Miocene and Pliocene materials, along with the Hawthorne Formation, form layers of material which have low permeability. This serves to confine water in an artesian aquifer in layers of Eocene Age limestone.

Topography

The topography on most of the refuge is generally flat. The average elevation is 15 feet above mean sea level, with a very gradual slope from the east, near Interstate 95 to the St. Johns River to the west. The highest point on the refuge is found on the Bee Line Unit, where an old dune or Indian mound reaches a height of nearly 30 feet.

SOILS

Relatively minor differences in elevation and internal drainage of the land have resulted in major differences in soil types. Over twenty soil series, representing four soil orders, are found on the refuge. Detailed maps and descriptions of these can be found in the *Soil Survey of Brevard County* (Soil Survey Staff 1974). Based on soils characteristics, six general associations of soils have been identified on the refuge, as listed below.

Pompano Association

This association is made up of broad grassy flats interspersed with low flatwood knolls. Soils are poorly drained and nearly level. They are sandy to a depth of 80 inches. The dominant natural vegetation is mostly marsh cordgrass and scattered cabbage palms. Pines and palmetto are found on the low flatwoods.

Myakka-Eau Gallie-Immokalee Association

These associations are nearly level, poorly drained, acid soils. They are sandy to a depth of 40 inches and loamy below that. Water tables are usually within 30 inches of the surface and standing water may exist on these sites for short periods of time after heavy rainfall. The dominant natural vegetation is palmetto and pines.

Pineda-Wabasso Association

This association is found on the St. Johns River floodplain. It is made up of nearly level flatwoods, cabbage palm hammocks, sloughs, depressions, and intermittent small ponds. The soils are sandy to a depth of 20 to 40 inches and loamy below that level.

Copleland-Wabasso Association

This association is made up of nearly level, very poorly drained and poorly drained soils that are sandy to a depth of 40 inches and loamy below that. The dominant natural vegetation on the refuge associated with this association is cabbage palm.

Fleda-Floridana-Winder Association

These are nearly level, poorly drained, and very poorly drained soils that are sandy to a depth of 40 inches and loamy below that. The dominant natural vegetation is cordgrass and cabbage palms on the broad flats, with flags (*Iris* spp.) and lilies (*Nymphae* spp.) in the depressions.

Montverde-Micco-Tomoka Association

These nearly level, very poorly drained organic soils, are found in the St. Johns River floodplain. The dominant natural vegetation is sawgrass (*Cladium jamaicensis*), maidencane (*Panicum hemitomon*), flags, and sedges.

HYDROLOGY

The refuge's water resources include surface waters and groundwaters.

Surface Water

Some discussion of the changes in surface water over the years is important to the understanding of this resource. The St. Johns NWR is located within the Upper St. Johns River Basin. The St. Johns River, at 310 miles in length, is the longest river in Florida. It is designated as one of only 14 American Heritage Rivers due to its natural, economic, agricultural, scenic, historic, cultural, and recreational resources that make it unique. Before the coming of European settlement to this area, the St. Johns River drained an area of land from the ridge along what are now the I-95 corridor and where State Highway 441 runs today, as well as adjacent uplands to the west. This area drained is 1,331 square miles at SR 520, 1,539 square miles at SR 50, and 2,043 square miles at SR 46.

At this point in time, it is not possible to tell if the water table was higher or lower during the prehistoric era. There are indications that the water table was actually lower in the Upper St. Johns River, for example, from archaeology. There are Indian mounds in the Upper St. Johns River that are located in what are now sub-optimal conditions for habitation, that is, they are too wet. The area as a whole was probably drier greater than 500 years ago (with sea level more than 4-5 feet lower than it is today), perhaps more akin to a wet-dry prairie. There are indications in the Indian Farms area that wells were dug to reach the water table (Stewart 2010).

Drainage districts were formed in the Upper St. Johns River Basin during the early part of the 20th Century, and the construction of dikes and canals began. This continued until the 1970s. In addition, ranchers in the floodplain started a program of drainage on their lands to improve pastures. In the 1950s and 1960s, much of the area that is now the refuge was platted for development and canals were dug with the hopes of improving the area for the construction of homes. The end result of these efforts was the significant alteration of the hydrological regime of the St. Johns River Basin in general, and of the refuge in particular. In general, the present marsh has less water retention time, higher water flows, and reduced water quality as a result of agricultural and urban runoff than it did in its natural state (Cox and Auth 1971).

As development continues in the Titusville area, additional impacts on the surface waters of the refuge can be expected. On the other hand, the refuge has conducted some work to restore the natural flow of water. Ditches in the western part of the SR 50 Unit have been filled and native vegetation replanted. The long-term effects of this project and the feasibility of continuing it remain to be seen.

Surface waters on the refuge include numerous shallow natural ponds, borrow pits, and water in canals and ditches. In total, surface water accounts for about 5 percent of the refuge's area.

The SJRWMD is the state entity charged with management of the river basin's water resources, including development of nonstructural flood control, protection of water quality, enhancement of fish and wildfire habitat, and provision for public use. The SR 50 unit is located within SJRWMD's Tosahatchee planning unit, while the Bee Line Unit of the refuge falls within the Puzzle lakes planning unit. A specific task of the SJRWMD is to establish minimum flows and levels (MFLs) for important surface and ground waters. MFLs have been established by the SJRWMD for the St. Johns River at SR 50, adjacent to the SR 50 Unit near Christmas, Florida (SJRWMD 2010), and are due in 2011 for the St. Johns River at SR 520 (Lake Poinsett), which is approximately 5 miles upstream of the Bee Line Unit (SJRWMD 2010b).

The refuge receives approximately 50 inches of precipitation a year with about half of this falling in the wet season between June and September. Thirty-four percent of this total appears as runoff in lakes and streams. The peaks in surface flow off the refuge and in the St. Johns River occur during the same period. While wet season represents peak flows, the following discussion centers on the possibility that the potentiometric surface may be near, at, or above the ground surface throughout the year.

The refuge may also have value as fishery spawning and/or nursery grounds. Interjurisdictional species, including American shad (*Alosa sapidissima*), hickory shad (*Alosa mediocris*), mullet (*Mugil* spp.), and striped bass (*Morone saxatilis*) use the St. Johns River during spawning and early life stages. Apparently some individuals remain in the river year-round.

Groundwater

Three aquifer systems underlie the refuge. These are the surficial aquifer, the intermediate aquifer, and the Floridan aquifer system. Total dissolved solids within some of the aquifers are high. Chloride contents, for example, often exceed 1,000 parts per million (ppm). The quality of the groundwater, especially the surficial aquifer, varies widely with water table fluctuations (Brown et al. 1962).

At least three lines of evidence suggest that both the SR 50 and Bee Line units are areas of frequent inundation caused by the combination of groundwater discharge and precipitation. One line of evidence is hydrologic modeling efforts which show that the refuge is an area of groundwater discharge (Boniol et al. 1993). While not quantifying the volume, timing, or spatial distribution of discharge, the finding that this is a region of discharge means that any precipitation would quickly saturate the soil above the water table. Any excess precipitation would then pond and run off from the area.

The second line of evidence that the refuge is an area of groundwater discharge is water chemistry. Available nearby data show high total dissolved solids (TDS), salt-forming metals (i.e., sodium, potassium, magnesium), chloride, and fluoride, all of which are consistent with water that has passed through the mineral-rich Hawthorn Group (Osburn et al. 2002) and which are inconsistent with constituents usually found in precipitation or runoff, such as nitrates and coliform bacteria. Orthophosphates are found in the Hawthorn Group, making this a less than valuable indicator of the water's origin, but this is not the case for chlorides. Adamski et al. (2003) showed that the 250 and 5,000 mg/l isochlor (line of equal chloride concentration) becomes shallower moving westward through Orange County, with the 250 mg/l line reaching the surface of the Econlockhatchee River and remaining there at least as far east as the St. Johns River. Surface water in the Puzzle Lakes area has salinities as high as 10-11 ppt (DeMort 1991). If the 250 mg/l isochlor remains at or near ground surfaces throughout the refuge, there are likely to be two responses: runoff from the refuge should have relatively high concentrations of chlorides and other chemical constituents and these should in turn have an effect on the vegetation community.

The dominant plant species found on the refuge – *Spartina bakerii* (clumped cordgrass), *Juncus roemerianus* (black needlerush), *Muhlenbergia capillaris* (gulf muhly grass), and *Cladium jamaicense* (sawgrass) are a mix of salt marsh and wet prairies plants, all of which tend to have hydroperiods of 50 days or longer per year (Kushlan 1990). This is the third line of evidence that the water table remains near the surface throughout the year.

WATER QUALITY

The refuge does not collect water quality data on the many small water bodies within the refuge on a regular basis. However, the SJRWMD does maintain monitoring 192 stations within the St. Johns River Basin outside the refuge. These data show long-term progress in protecting and restoring

water bodies in spite of area population growth and other changes that put increasing pressure on the Water District water resources. In general, decreasing trends in the concentrations of the limiting nutrients nitrogen and phosphorus and other related constituents (turbidity and total suspended solids) have been observed (SJRWMD no date). High nutrient levels are linked with reduced levels of dissolved oxygen (important for healthy aquatic ecosystems) and ecologically adverse, aesthetically displeasing algal blooms.

There are six water quality monitoring stations in the Upper St. Johns River Basin. Here the water quality trends from 1990-2004 were more negative than in the basin as a whole. Total nitrogen increased at three stations and was stable at three. Total phosphorus decreased at one station, increased at three, and was stable at one. Turbidity (a measure of reduced water clarity) increased at two stations and was stable at four. Total Suspended Solids increased at three stations and was stable at three. Total Organic Carbon (which indicates the overall productivity in the area of the sample) increased at four stations and was stable at two (SJRWMD no date).

Waters discharged from the SR 50 Unit to the St. Johns River, designated as an Outstanding Florida Water, as well as the area immediately to the west that includes the St. Johns River is listed on the Environmental Protection Agency's Section 303(d) list for non-attainment of standards for dissolved oxygen and fish habitat quality. For the same area, the 1998 Section 303(d) list also includes that following parameters of concern: coliform bacteria, nutrients, BOD, and lead. Parameters potentially discharged from the Bee Line Unit (also designated as an Outstanding Florida Water) are not listed under Section 303(d) of the Clean Water Act. The Outstanding Florida waters designation means that the water bodies are afforded "special protection due to their natural attributes," but does not necessarily mean that the water body is unimpaired. It is likely that most, if not all, of the aforementioned pollutants are a result of nonpoint source pollution originating in nearby developments and urban areas rather than on the refuge.

AIR QUALITY

The Clean Air Act of 1970 (as amended in 1990 and 1997), required the EPA to implement air quality standards to protect public health and welfare. National Ambient Air Quality Standards (NAAQS) were established based on protecting health (primary standards) and preventing environmental and property damage (secondary) for six pollutants commonly found throughout the United States: lead, ozone, nitrogen oxides (NO_x), carbon monoxide (CO), sulfur dioxide (SO_2), and particulate matter less than 10 and 2.5 microns in diameter (PM_{10} and $PM_{2.5}$).

Criteria air pollutants in Florida include carbon monoxide, lead, nitrogen dioxide (NO_2), ozone O_3, particulate pollution (2.5 and 10 ug/m^3), and sulfur dioxide (SO_2) (FDEP 2009). These pollutants are monitored by a network of monitoring stations throughout Florida and analyzed in order to better understand general air quality trends and to locate exceedances. Primary sources of pollutants in Florida are vehicle emissions, power plants, and industrial activities. In 2009, there were 220 ambient monitors in the statewide air monitoring network and the EPA designated Florida an attainment area for all criteria pollutants, based on data collected in the previous 3 years (FDEP 2009).

The Florida Division of Air Resource Management operates National Ambient Monitoring Stations (NAMS) and State and Local Ambient Monitoring Stations (SLAMS) to measure ambient concentrations of these pollutants. In 2005, ambient air quality data were collected by 220 monitors (in 34 counties) strategically placed throughout the state (FDEP 2009). Areas that meet the NAAQS standards are designated "attainment areas," while areas not meeting the standards are termed "non-attainment" areas. While no pollutant monitoring data are being collected on St. Johns NWR, air quality is monitored on a regular basis by three monitors in Brevard County including Fay Park,

Freedom 7 Elementary School on Merritt Island, and Melbourne. Table 1 provides air quality data collected for Brevard County, nearby counties, and national level standards. Florida's 2009 monitoring results indicate that Brevard County qualifies as an attainment area for all monitored pollutants (FDEP 2009) - or an area with relatively clean air, under the Clean Air Act. The ambient air quality is influenced by land management practices, such as prescribed burning, vehicle traffic along the several major arteries that border both sections of the refuge, and off-site emission sources. The daily air quality conditions are most influenced by the considerable vehicle traffic and utilities' fuels combustion (two regional power plants are within 10 miles of the refuge). Smoke from wildland fires has the potential to impact traffic on nearby roads and the Titusville urban area.

The Air Quality Index (AQI) is a summary index developed by EPA for reporting daily air quality. It indicates how clean or polluted the air is, and what associated health effects might be of concern. The AQI focuses on health effects that may be experienced within a few hours or days after breathing polluted air. EPA calculates the AQI for five major air pollutants regulated by the Clean Air Act: ground-level ozone, particle pollution (also known as particulate matter), carbon monoxide, sulfur dioxide, and nitrogen dioxide. Lead is also considered a major air pollutant under the Clean Air Act. However, because all areas of the United States are currently attaining the NAAQS for lead, the AQI does not specifically address lead. For each of these pollutants, EPA has established national air quality standards to protect public health (AIRNow 2009).

BIOLOGICAL RESOURCES

HABITAT

Habitat types (landcover) on St. Johns NWR can be divided into four broad categories: emergent wetland (palustrine), forested wetland, upland, and other (Figures 9 and 10). Table 2 identifies approximate acreages of each habitat type found on the refuge.

Emergent Wetland (Palustrine) Landcover Types

Palustrine habitat refers to inland, nontidal wetlands typified by the presence of trees, shrubs, and emergent vegetation (plants rooted below surface water but growing above the water surface). Palustrine wetlands include permanently saturated or flooded land, such as marshes, swamps, and lake shores, and land that is wet only seasonally. Palustrine areas make up about 83 percent of the refuge. Typically, these lands have natural fluctuations of wet and dry conditions. Because of this variation, the biota found in these areas is unique. Of all of the species listed by the Service as threatened or endangered, 70 percent depend heavily on wetlands (Fernald and Patton 1984). The wetlands on the refuge are primarily cordgrass and cattail marshes. Small areas of salt pans also exist.

Cordgrass Marsh (M): These marshes are predominately marshy or sand cordgrass (*Spartina bakerii*). Associated with the cordgrass is sawgrass (*Cladium jamaicensis*), fringe rush (*Fimbristylis castanea*), and black needle rush (*Juncus roemerianus*). The altered water regime has allowed brush and other vegetation to invade the cordgrass marshes. Succession to groundsel (*Baccharis angustifolia* and *B. halimifolia*) and wax myrtle (*Myrica cerifera*) overstory occurs in the absence of fire.

Cattail Marsh (CT): These areas are dominated by cattail (*Typha latifolia*). Some stands of cattail are found around the edges of the natural ponds associated with the cordgrass marshes. They are also found in abundance in the borrow pits, along canals, and in other disturbed wetland areas.

Table 1. 2007 Air quality statistics by county

County	CO 8-hr (ppm)	Pb Qmax (µg/m3)	NO_2 (ppb) (avg)	O_3 1-hr (ppb)	O_3 8-hr (ppb)	PM_{10} 24-hr (µg/m3) (high)	PM_{10} 24-hr (µg/m3 (avg)	$PM_{2.5}$ 24-hr (µg/m3) (high)	$PM_{2.5}$ 24-hr (µg/m3) (avg)	SO_2 24-hr (ppb) (high)	SO_2 24-hr (ppb) (avg)
Refuge Home County											
Brevard County	ND	ND	ND	76	70	35	14	22	6.5	6	1
Nearby Counties											
Osceola County	ND	ND	ND	75	68	ND	ND	ND	ND	ND	ND
Volusia	ND	ND	ND	69	62	92	15	22	7.1	ND	ND
Seminole	ND	ND	ND	79	65	38	16	22	7.3	ND	ND
Orange	2	ND	0.06	83	75	30	16	22	7.0	2	1
United States											
National Ambient Air Quality Standards	9	0.15	0.05	120	75	150	50	35	15	100	2

CO - Highest second maximum non-overlapping 8-hour concentration (applicable NAAQS is 9 ppm)
Pb - Highest three month maximum concentration (applicable NAAQS is 0.15 µg/m^3)
NO_2 - Annual Average concentration (applicable NAAQS is 0.05 ppb)
O_3 (1-hour) - Highest One-Hour Ozone Concentrations (ppb), SLAMS Network, AQS# 009-0007 - Melbourne Beach (applicable NAAQS is 120 ppb)
O_3 (8-hour) - Highest Eight-Hour Ozone Concentrations (ppb), SLAMS Network, AQS# 009-0007 Melbourne Beach (applicable NAAQS is 0.075 ppm)
PM_{10} - Highest 24-hour concentration – taken at Port St. John monitoring site (SLAMS Network AQS# 009-0011) (applicable NAAQS is150 µg/m^3) - Average annual concentration (applicable NAAQS is 50 µg/m^3)
$PM_{2.5}$ - Highest 24-hour concentration – taken at Port St. John monitoring site (SLAMS Network AQS# 009-0011) (applicable NAAQS is 35 µg/m^3) - Average annual concentration (applicable NAAQS is 15 µg/m^3)
SO_2 - Highest 24-hour concentration taken at Port St. John monitoring site (SLAMS Network AQS# 009-0011) (applicable NAAQS is 100ppb - Average annual concentration (applicable NAAQS is 2.0 ppb)
ND - Indicates data not available IN – indicates insufficient data to calculate summary statistic
AM - Annual mean
µg/m^3 - units are micrograms per cubic meter
Qmax - Quarterly maximum
Ppm - units are parts per million
Notes: Data from exceptional events are not included. The monitoring data represent the quality of air in the vicinity of the monitoring site and, for some pollutants, may not necessarily represent urban-wide or parish/county-wide air quality.
Source: FDEP 2009

Salt Pans: These are areas of extremely high salinity. They are populated by such species as glasswort (*Salicornia virginica*) and salt grass (*Distichlis spicata*). There are roughly 100 acres of salt pan habitat present on the refuge. Salt pan units are part of the emergent wetland system mostly occurring as elements of the cordgrass marsh setting. They are small in area, individually limited to less than an acre, and therefore unmapped as an exclusive habitat type.

Mixed Shrub Wetlands (MS): These wetlands are dominated by an overstory of woody species like wax myrtle, groundsel tree (*Baccharis halimifolia*), and false willow (*Baccharis angustifolia*). The understory is typically dominated by marsh grass species including cordgrass, sawgrass, and black needle rush. Mixed shrub wetlands currently comprise nearly 2,000 acres of habitat on the refuge.

Forested Wetland Landcover Types

Forested areas make up about eight percent of the refuge's area. Into this broad category fall the cabbage palm hammocks, and hydric and mesic hardwood hammocks.

Hardwood (mesic and hydric) Hammock (MH): The mixed hammocks have not only cabbage palms *(Sabal palmetto)* and live and laurel oaks *(Quercus virginiana* and *Q. laurifolia)*, but also elms *(Ulmus* spp.*)*, ashes (*Fraxinus* spp.), red mulberry (*Morus rubra*), sugarberry (*Celtis laevigata*), and other species.

Cabbage Palm Hammock (CP): This forest vegetation type is found in small stands scattered throughout the cordgrass marsh areas. These hammocks are almost pure stands of cabbage palms (*Sabal palmetto*). Cabbage palms also occur on disturbed sites such as ditch banks and old cleared areas. The understories are usually open with a scattering of palmetto and other vegetation.

Upland Landcover Types

Upland vegetation types include scrub areas and pine/palmetto flatwoods and are located on spodic and xeric sites, that is, sites with mostly dry soils with overstories of woody oak, pine or combinations of these. These vegetation types occupy on about 3 percent of the refuge area.

Oak Scrub (OS): Can be described as having an overstory of 15- to 25-foot tall scrub oaks (*Quercus sp.*), with a scattered understory of saw palmetto (*Serenoa repens*) and a few other shrub species on well-drained sandy soils.

Flatwoods Pine and Palmetto (FW): These are found on flatwoods soils. The flatwoods soils are in the Myakka-Eau Gallie-Immokalee Association and are poorly drained spodosols. Pine stands vary by age and density. In addition, small flatwoods areas exist that are devoid of pines. Although the acreage of the pine communities is limited, they do provide diversity. The pine lands are of special interest because they provide nesting habitat for the southern bald eagle. Two pine species are found naturally on the refuge. Slash pine (*Pinus elliottii*) makes up about 85 percent of the pine population. The remainder consists of pond pine (*P. serotina*). The most common understory species are saw palmetto, gallberry *(Ilex glabra),* and *Lyonia* spp.

Other Landcover Types

Bare Soil (BS): These are areas devoid of vegetation including earthen roads, dikes, and rights-of-way. These areas are not graveled or paved.

Borrow Pond (BP): These are man-made ponds resulting from removal of fill dirt for road/levee construction.

Pasture (P): These are mowed lands with herbaceous communities primarily controlled by cattle-grazing practices.

Palm Strand (PS): Areas within marsh habitat that are dominated by cabbage palms.

Pond (W): Land covered by freshwater from runoff and precipitation.

Disturbed Land/Spoil (SP): This is land covered with spoil dirt from canal dredge.

Woody Exotics (EX): Areas dominated by exotic/nuisance species.

Fire Ecology

Few of the vegetation communities found on the refuge are not in some way related to fire (Adrian 2001). Most are fire-maintained, while others are fire-influenced. The natural communities found on the refuge that are not fire types include the obvious ones, such as the open waters of the borrow ponds. In order to use fire wisely to manage the habitats of the refuge, it is important to first understand how fire functions in the natural system. Figures 11 and 12 identify locations of fire management units for both the SR 50 and Bee Line units.

Fire-Influenced Communities

Many of the wetland and mesic communities are influenced by fire on occasion. For instance, mixed mesic hammocks do not burn during normal times. However, during periods of extreme drought, fires do move through these areas as evidenced by fire scars found on some of the older trees. Fire also plays a role in determining the edges of these hammocks. Fires that occur in the normal dry season will burn the edges of hammocks, keeping them in check. Conversely, during very wet cycles, the hammock species will gradually move out into other communities. This oscillation has most likely occurred for thousands of years. The wetter mixed hardwood and willow swamps are more resistant to fire's incursion, but can still be affected.

Fire-Maintained Communities

The vast majority of habitat types found on the refuge are fire-maintained. These can be grouped into three categories: grassy marshes, flatwoods, and scrub. This grouping is based on both the role fire plays in these ecosystems and the fire management practices used to manipulate them. The fire regimes and the effects fire has on each of these categories are discussed in detail.

Table 2. Approximate Service managed and inholding acreage of major habitat types of the St. Johns NWR

Habitat Type	SR 50 Unit (management acres)	Bee Line Unit (management acres)	Refuge Management (total acres)	Bee Line Unit Inholdings (acres)	SR 50 Unit Inholdings acres)	Inholdings (total acres)
Emergent (Palustrine) Wetlands						
Cordgrass Marsh	2,449	660	3,109	127	19	146
Cattail Marsh	65		65			
Salt Pans*	100		100			
Mixed Shrub Wetlands	1,091	853	1,944	485		485
Forested Wetlands						
Mesic and Hardwood Hammock		113	113	17		17
Cabbage Palm Hammock	235	149	384	61	6	67
Uplands						
Oak Scrub		12	12			
Flatwoods Pine and Palmetto	66	97	163	17		17

Habitat Type	SR 50 Unit (management acres)	Bee Line Unit (management acres)	Refuge Management (total acres)	Bee Line Unit Inholdings (acres)	SR 50 Unit Inholdings acres)	Inholdings (total acres)
Other						
Pond	66	2	68	16		16
Palm Strand	43	5	48	4		4
Pasture		53	53	162		162
Borrow pond	32	1	33	68	9	77
Bare soil	47	54	101	10		10
Disturbed Land/Spoil	23	8	31	9		9
Woody Exotics	6		6			
Ditch	18	9	27			
Total Acres	**4,241**	**2,016**	**6,257**	**976**	**34**	**1,010**

**an estimated 100 acres of salt pan habitat is mapped collectively with the mixed shrub wetland cover type.*

Figure 9. Land cover - State Road 50 Unit

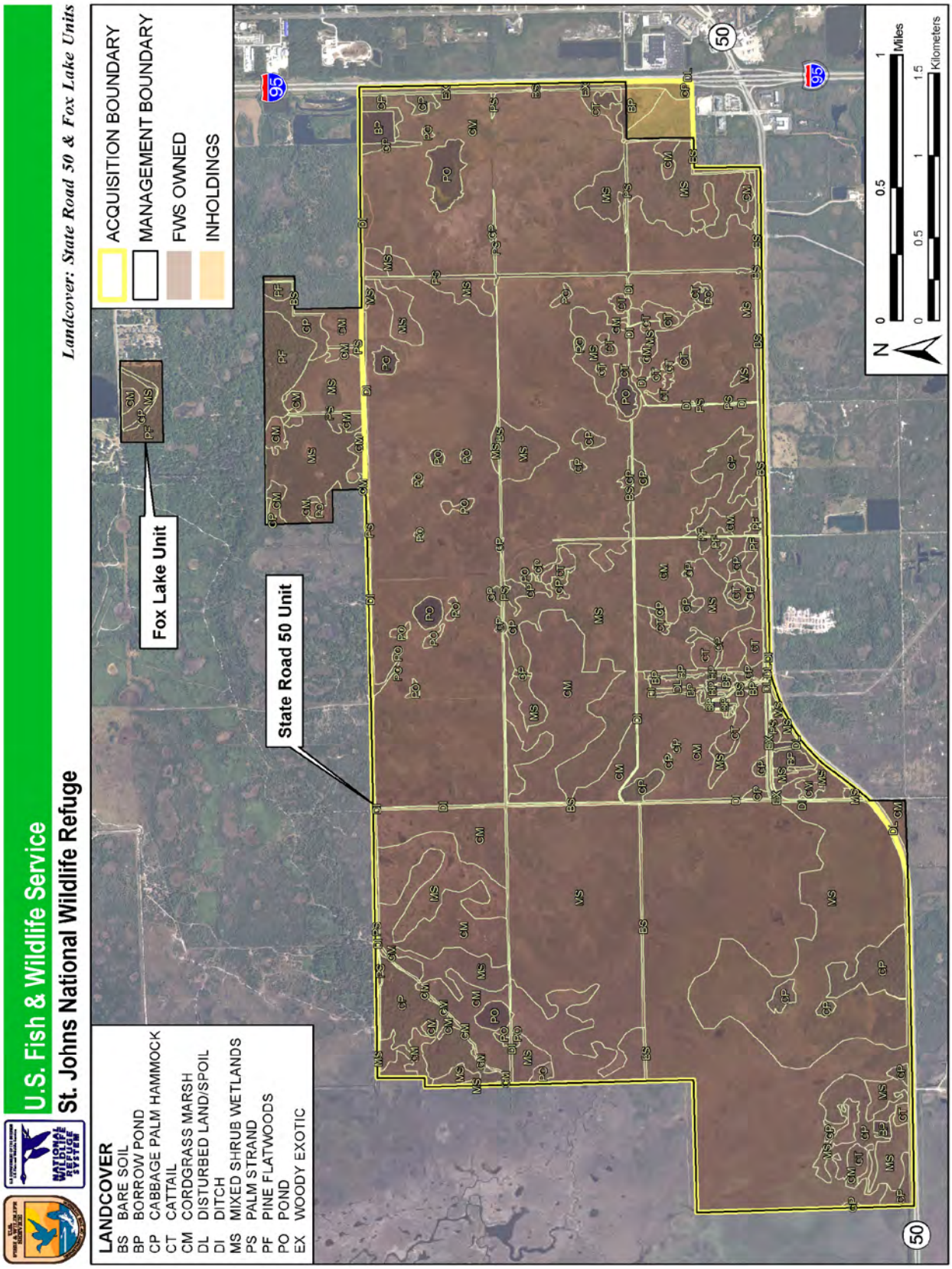


Figure 10. Land cover - Bee Line Unit

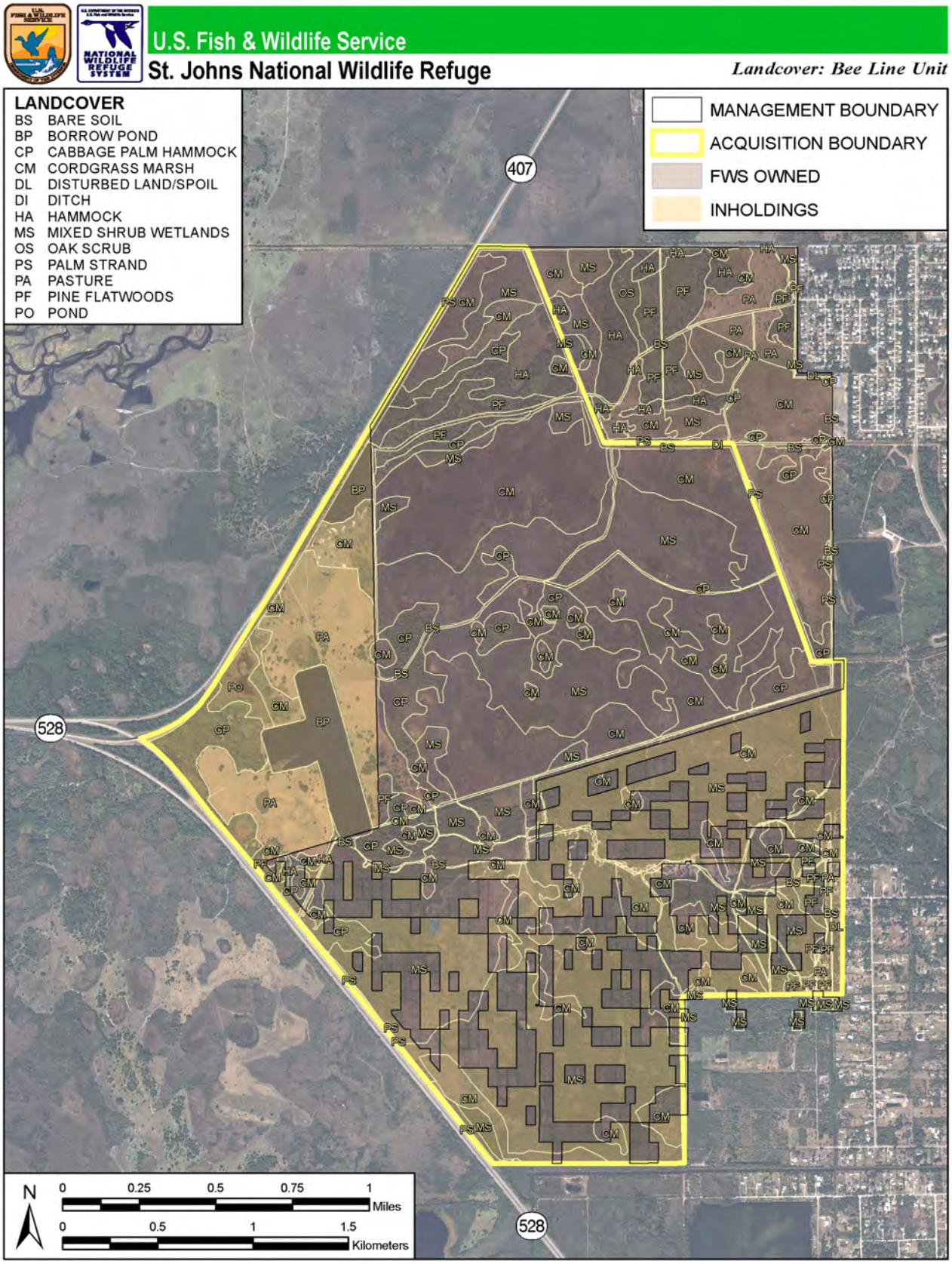


Figure 11. Fire management units - State Road 50 Unit

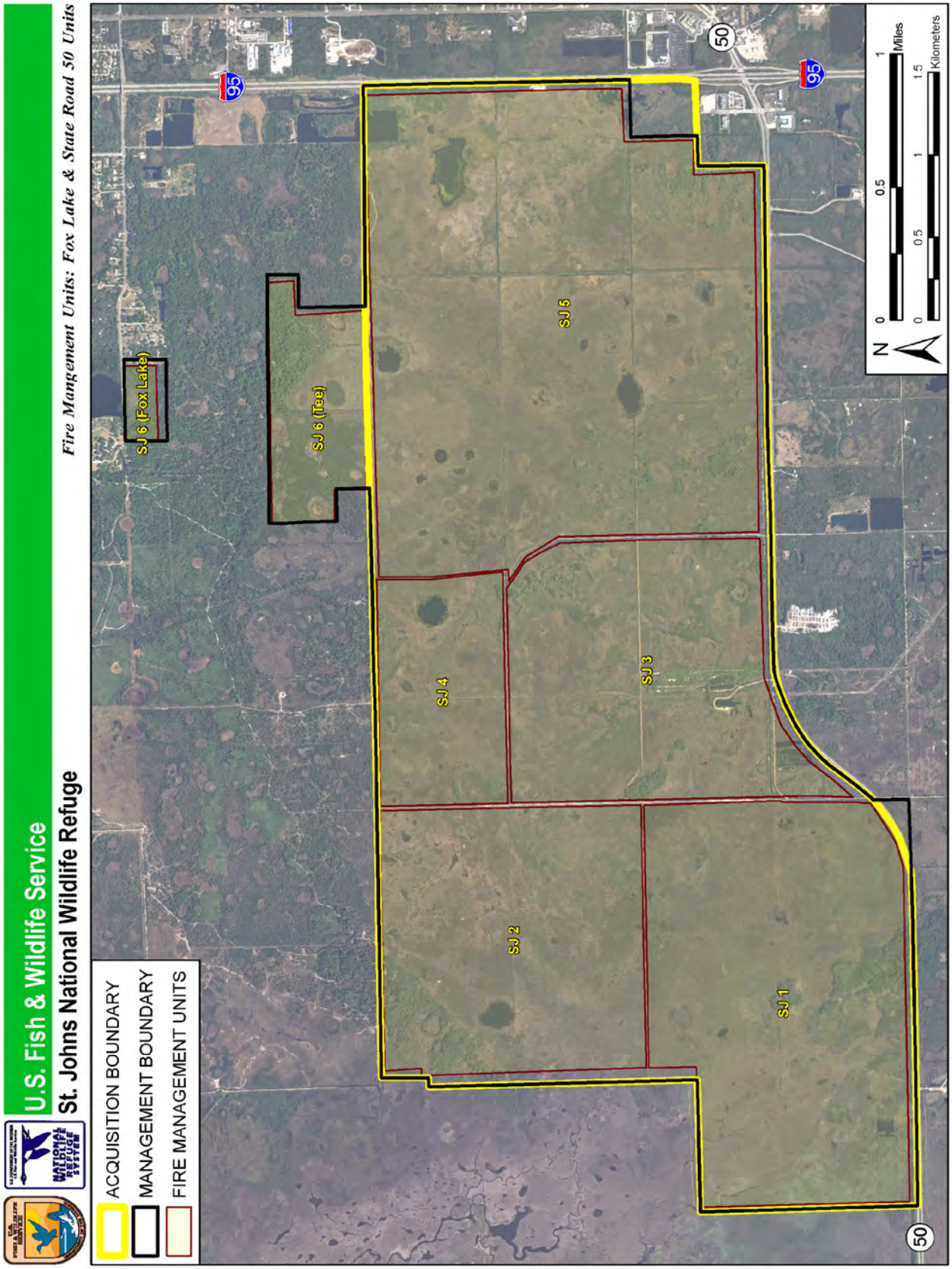
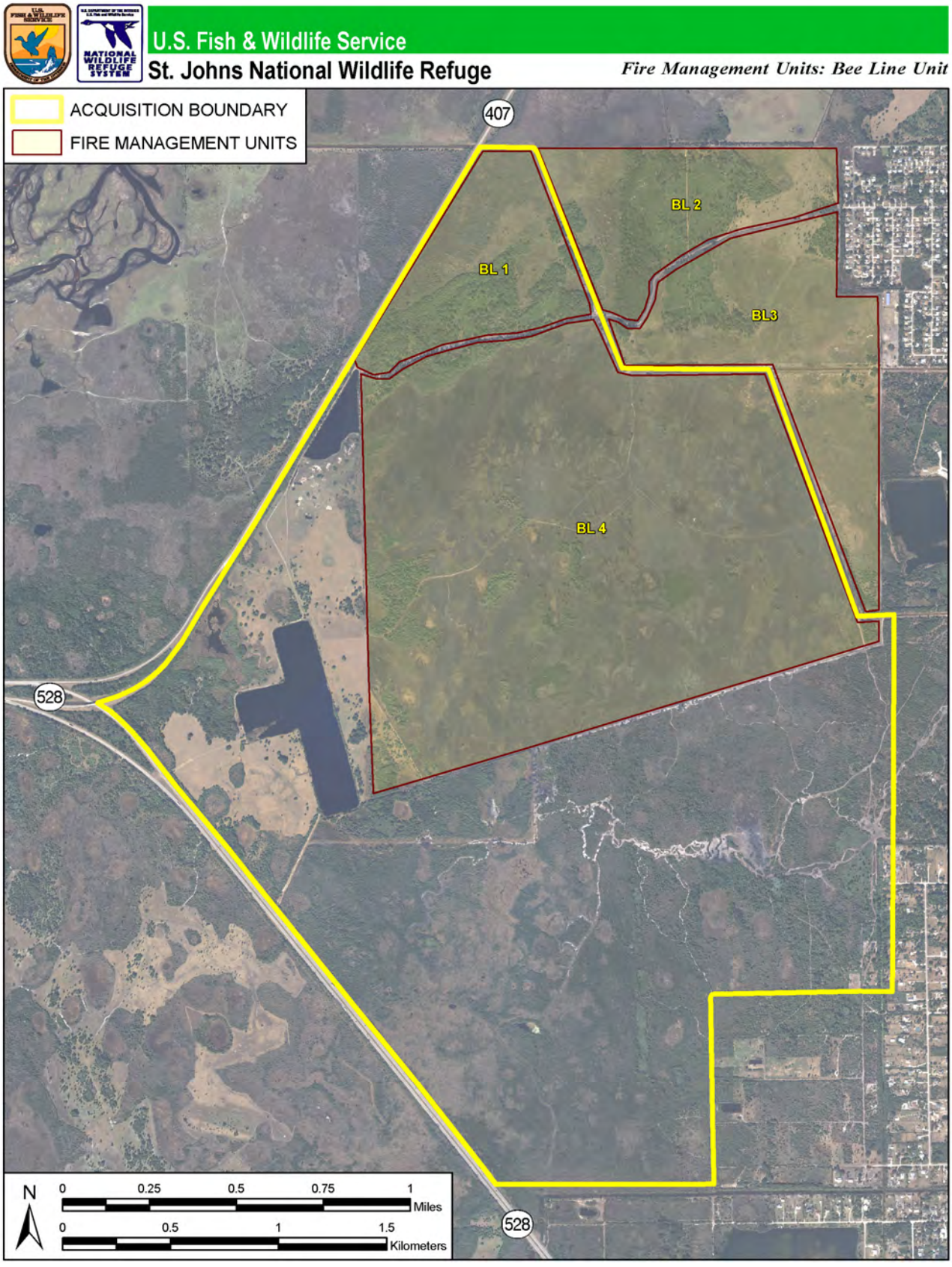


Figure 12. Fire management units - Bee Line Unit



Fire Regime

The fire regime can be defined, in simple terms, as the frequency and season of fire occurrence, along with the behavior of the fire that takes place. The fire regimes that occurred naturally in these types varied considerably and are a matter of debate in some cases. One significant question facing refuge managers is what constitutes the fire season. It could be defined as only the natural or lightning-caused fire season or it may include any of the human regimes that have occurred over time. In the case of the refuge, the Service is managing for ecological diversity. This would define a fire season starting as early as April and continuing through September. However, for fuels management, the refuge may burn during other months.

The regimes described below are derived from the literature and the knowledge of those who are familiar with fire ecology in the coastal areas of Florida (Myers and Ewel 1990).

Marshes

Marshes make up the majority of the refuge. The vegetation is sand cordgrass, along with small areas of other species. The fire regime can best be characterized by intense, rapidly moving fires that occur frequently. Estimates of the fire interval vary, but would typically be between 2 and 4 years. Experience has shown that it takes about 2 years after a prescribed fire for enough fuels to accumulate to allow another fire to burn. Before the advent of human-made barriers, fires in the marshes burned large areas. One ignition source would therefore influence considerable acreage.

Pine and Palmetto Flatwoods

The flatwoods group includes both the usual pine flatwoods and the "treeless" or palmetto prairie. The pine flatwoods are characterized by an overstory predominately of south Florida slash pine with some pond pine and a brush understory consisting of palmetto, gallberry, and other species. The fire regime in the flatwoods consists of moderately intense fires that occur every 3 to 5 years. Experience has shown that it takes from 2 to 3 years for the vegetation to recover enough to sustain any sort of successful prescribed burn. By the time 5 years have passed, however, there is sufficient fuel on the site to support fires capable of killing the overstory if there is a moderate drought.

The flatwoods burn completely and vigorously. Much of the understory vegetation is highly flammable. Species such as saw palmetto contain resins and oils that ease ignition and increase rates of spread. It is assumed, as in the marshes, that without barriers, lightning-caused wildfires once burned extensive areas.

Oak Scrub

The scrub areas on the refuge are on xeric sites. The vegetation can be characterized as an overstory of 15- to 25-foot tall scrub oaks, with a scattered understory of palmetto and a few other shrub species. The natural fire interval in this type is probably between 8 and 12 years. In the natural system, fires often started in other, more flammable ecosystems and burned into the sand ridge scrub area. Therefore, scrub that was located in a matrix of vegetation that was more easily ignited burned more often than stands were surrounded by nonflammable vegetation (Myers and Ewel 1990).

Fire intensity in the sand ridge scrub is high. Natural fires occurred under severe burning conditions, dry fuel conditions, and high winds. Successful prescribed burns have been conducted on the refuge with the Keech-Byram Drought Index above 500 and mid-flame wind speeds of 15 to 20 miles per hour. This results in a fire with 20- to 40-foot flames and rates of spread of above 40 chains per hour (about one-half mile per hour).

NATIVE WILDLIFE

Originally created to conserve and manage habitat for the now extinct and de-listed dusky seaside sparrow, the St. Johns NWR provides important habitat for a wide variety of wildlife species. Currently, the refuge provides habitat for four wildlife species federally listed as endangered or threatened (i.e., wood stork, northern crested caracara, eastern indigo snake, and American alligator). Additionally, the refuge supports six bird species federally designated as birds of conservation concern and nine species (eight birds and one reptile) listed by the State of Florida as either endangered, threatened, or a species of special concern. Limited wildlife data are available for the refuge, since the Service conducts no regular surveys. Additional information on species of plants and wildlife identified on the refuge can be found in Appendix I.

Birds

St. Johns NWR provides nesting, roosting, or foraging habitat to at least 90 species of birds. Since few formal inventories of bird species have been performed on the refuge, it is quite possible that the diversity of bird species utilizing the refuge is even higher. Currently, two bird species federally listed as threatened or endangered (wood stork and northern crested caracara) have been known to utilize the refuge, although for northern crested caracara, use is infrequent. The bald eagle also occurs on the refuge, but this species was delisted in 2008.

Six bird species federally designated as birds of conservation concern (i.e., black rail, eastern meadowlark, least bittern, loggerhead shrike, northern flicker, and sedge wren) are also supported by refuge habitats. An additional eight bird species listed by the State of Florida as endangered (peregrine falcon), threatened (American kestrel and Florida sandhill crane), or a species of special concern (little blue heron (*Egretta caerulea*), osprey (*Pandion haliaetus*), snowy egret, tri-colored heron (*Egretta tricolor*), and white ibis (*Eudocimus albus*)) have been recorded on the refuge. In addition to providing habitat to federally and state listed species, the refuge also supports a wide variety of other resident and migratory bird species, including waterfowl, wading birds, and neotropical migratory birds.

Waterfowl
Due to the lack of extensive, open water habitat, waterfowl use on the St. Johns NWR is somewhat limited. Despite this, small flocks of eight species of waterfowl can commonly be found wintering on the refuge: blue-winged teal (*Anas discors*), ring-necked duck (*Aythya americana*), green-winged teal (*Anas crecca*), mottled duck (*Anas fulvigula*), gadwall (*Anas strepera*), northern pintail (*Anas acuta*), wood duck (*Aix sponsa*), and hooded merganser (*Lophodytes cucullatus*). In addition, small numbers of mottled ducks are year-round residents, and it is quite possible that mottled duck nesting occurs on the refuge.

Wading Birds
Ten species of wading birds have been recorded on the refuge: cattle egret, great blue heron, great egret, white ibis, glossy Ibis (*Plegadis falcinellus*), wood stork, little blue heron, little green heron, tri-colored heron, and snowy egret. Of these, one is federally listed as endangered (wood stork, previously mentioned) and four are listed by the state as species of special concern (i.e., little blue heron, snowy egret, tri-colored heron and white ibis). The refuge provides habitat for foraging and

roosting, and in the spring of 2003, a small rookery formed on an island in a borrow pit on the south side of the SR 50 Unit. While primarily containing the nests of non-native cattle egrets (*Bubulcus ibis*), this rookery also includes nests of little blue and tri-colored herons.

Shorebirds
Common snipe are abundant on the refuge in the winter months, and take advantage of the open mud conditions created by fireline activities, winter prescribed burning, and the readily available matrix of sparse vegetation and moist soil. American woodcock (*Scolopax minor*) use similar habitats during the winter, but their numbers are smaller.

Rails and Bitterns
The St. Johns NWR provides important habitat for a number of resident and migratory secretive marshbirds (i.e., purple gallinule (*Porphyrio martinica*), common moorhen (*Gallinula chloropus*), American coot (*Fulica Americana*), king rail (*Rallus elegans*), Virginia rail (*Rallus longirostris*), sora rail (*Porzana carolina*), black rail, and both bittern species [i.e. American bittern (*Botaurus lentiginosus*) and least bittern].

TherRefuge provides what is considered the most important wintering and breeding habitat for black rails (*Laterallus jamaicensis*) in the eastern United States (Eddleman et al. 1994, Legare 1996b). Between 1993 and 1996, black rails were intensively studied on the refuge. Research was primarily concerned with black rail response to playback of recorded vocalizations, but the research did reveal that black rails were relatively abundant (0.25 birds/hectare within the study area) and that responses could frequently be elicited (Legare 1996a). However, recent monitoring, using Standardized North American Marsh Bird Monitoring Protocols, developed by the U.S. Geological Survey (USGS), Arizona Cooperative Fish and Wildlife Research Unit, failed to detect black rails. (This protocol was also unsuccessful at detecting least bitterns, a species which has been previously identified on the Refuge, as well as a bird of conservation concern.) It is unknown whether this is an indication of a decline in black rail numbers or rather a reflection of the inability to successfully detect rails using this methodology.

Passerines
Currently, 26 species of passerines have been identified on the refuge. Undoubtedly, this is only a fraction of the passerine species which utilize the refuge during the year. Additional surveys conducted during the fall and spring migrations would likely show that the relatively small refuge areas of hammock and upland forest are magnets for neotropical migratory birds, and may actually provide important resting areas for some species. The number of passerine species which nest on the refuge is unknown, although it is likely that at least 11 of the 26 passerines identified thus far regularly nest on the refuge. See Appendix I for the list of these species.

Fishes

Knowledge of the ichthyofauna or fishes of the refuge is currently limited, and no formal surveys have been conducted. The expectation would be that it is similar to the fishes of the adjacent St. Johns River marshes. Fishes known to occur include the Florida largemouth bass (*Micropterus salmoides floridanus*), Florida gar (*Lepisosteus platyrhincus*), bowfin (*Amia calva*), bluegill (*Lepomis macrochirus*), black crappie (*Pomoxis nigromaculatus*), and the exotic armored catfish (*Callichthys callichthys*) (Appendix I).

Amphibians and Reptiles

To date, 15 species of reptiles and amphibians have been identified on the refuge. Two species (American alligator and eastern indigo snake) are federally listed as threatened, and one species (gopher tortoise) is designated by the state as a species of special concern. No specific research has been conducted on the herpetofauna of the refuge, and what little is known is primarily the result of incidental observations made by refuge complex staff or the observations of researchers studying other fauna. Most of the species identified thus far are relatively large or vocal species, and no effort has been made to identify species which are cryptic or fossorial in habit. The presence (or absence) of exotic herpetofauna (e.g., brown anoles (*Anolis sageri*) and Cuban tree frogs (*Osteopilus septentrionalis*) has also not been documented.

Mammals

Sixteen species of mammal have been identified on the refuge through a combination of incidental sightings, from by-catch in bird trapping studies, and from preliminary small mammal studies (Davis 1978; see Appendix I). No federal or state listed mammalian species are known to occur on the refuge. However, in September 2005, a road killed female black bear (a state species of special concern) was discovered along SR 50, on the southern boundary of the SR 50 Unit of the refuge. In addition to the native mammal fauna, the refuge also supports a population of feral hog (*Sus scrofa*), a nuisance exotic.

Invertebrates

Knowledge of the invertebrates – including insects, arachnids, arthropods, and mollusks – of the refuge is currently limited and no formal surveys have ever been undertaken.

Table 3. Listed species that may occur on the St. Johns NWR

Scientific Name	Common Name	Agency Status (FWS)	Agency Status (FWC, FDACS)
Mycteria americana	**Wood Stork**	Endangered	Endangered
Caracara cheriway	**Northern Crested Caracara**	Threatened	Threatened
Drymarchon corais couperi	**Eastern Indigo Snake**	Threatened	Threatened
Alligator mississippiensis	**American Alligator**	Threatened*	SSC
Laterallus jamaicensis	**Black Rail**	Species of Management Concern	
Tyto alba	**Barn Owl**	Species of Management Concern	
Sturnella magna	**Eastern Meadowlark**	Species of Management Concern	
Ixobrychus exilis	**Least Bittern**	Species of Management Concern	

Scientific Name	Common Name	Agency Status (FWS)	Agency Status (FWC, FDACS)
Lanius ludovicianus	**Loggerhead Shrike**	Species of Management Concern	
Colaptes auratus	**Northern Flicker**	Species of Management Concern	
Cistothorus platensis	**Sedge Wren**	Species of Management Concern	
Falco sparverius paulus	**Southeastern American Kestrel**		Threatened
Grus canadensis pratensis	**Florida Sandhill Crane**		Threatened
Gopherus polyphemus	**Gopher Tortoise**	Under Review	Threatened
Egretta caerulea	**Little Blue Heron**		Species of Special Concern
Egretta thula	**Snowy Egret**		Species of Special Concern
Egretta tricolor	**Tricolored Heron**		Species of Special Concern
Ajaja ajaja	**Roseate Spoonbill**		Species of Special Concern
Eudocimus albus	**White Ibis**		Species of Special Concern

**Similarity of Appearance to a Threatened Taxon in the Entire Range (American crocodile)*

Wood Stork (*Mycteria americana*)
Wood storks are large, long-legged wading birds. About 50 inches tall, their wingspan of is 60-65 inches from wing tip to tip. Their plumage is white except for black primaries and secondaries and a short black tail. The wood stork's head and neck are largely bare of feathers and dark gray in color. Its bill is black, thick at the base, and curved slightly downward towards the tip. Immature birds are dingy gray and have a yellowish bill (USFWS 2010a).

The southeastern U.S. breeding population fell from an estimated 20,000 pairs in the 1930s to about 10,000 pairs by 1960 and to a low of approximately 5,000 pairs in the late 1970s. Nesting primarily occurred in the Everglades. The generally accepted explanation for this decline is the reduction in food base (primarily small fish) necessary to support breeding colonies. This reduction is believed to be due to loss of wetland habitat as well as to changes in hydroperiods (when and how much water is present) from draining wetlands and changing water regimes by constructing levees, canals, and floodgates to alter water flow in south Florida.

Wood storks have a unique feeding technique and require higher prey concentrations than other wading birds. Optimal water regimes for the wood stork involve periods of flooding, during which populations of prey (small fish) increase, alternating with drier periods, during which receding water levels concentrate fish at higher densities coinciding with the stork's nesting season. Wood storks use thermals to soar as far as 80 miles from nesting to feeding areas. Since thermals do not form in early morning, wood storks may arrive at feeding areas later than other wading bird species such as herons. Energy requirements for a pair of nesting wood storks and their young are estimated at 443 pounds of fish for the breeding season, based on an average production of 2.25 fledglings per nest (USFWS 2010a).

The stork's primary diet consists of small fish from 1 to 6 inches long, especially topminnows and sunfish. Wood storks capture their prey by a specialized technique known as grope-feeding or tacto-location. Feeding often occurs in water 6 to 10 inches deep, where a stork probes with the bill partly open. When a fish touches the bill it quickly snaps shut. The average response time of this reflex is 25 milliseconds (thousandths of a second), making it one of the fastest reflexes known in vertebrates.

Loss of nesting habitat, primarily cypress swamps, may also be affecting wood storks in central Florida, where nesting in non-native trees and in artificial impoundments has been occurring recently. Less significant factors known to affect nesting success include prolonged drought and flooding, raccoon predation on nests, and human disturbance of rookeries (USFWS 2010a).

The wood stork is a highly colonial species. It usually nests in large rookeries and feeds in flocks. They may be breeding at 3 years of age but typically do so at 4. Nesting periods vary geographically. In south Florida, wood storks lay eggs as early as October and fledge in February or March. However, in north and central Florida, Georgia, and South Carolina, storks lay eggs from March to late May, with fledging occurring in July and August. Nests are frequently located in the upper branches of large cypress trees or in mangroves on islands. Storks lay two to five eggs, and average two young fledged per successful nest under good conditions. Several nests are usually located in each tree. Wood storks have also nested in man-made structures.

The current population of adult birds is difficult to estimate, since not all storks nest each year. Presently, the wood stork breeding population is believed to be greater than 8,000 nesting pairs (16,000 breeding adults). Nesting has been restricted to Florida, Georgia, and South Carolina; however, they may have formerly bred in most of the southeastern United States and Texas. A second distinct, non-endangered population of wood storks breeds from Mexico to northern Argentina. Storks from both populations move northward after breeding, with birds from the southeastern United States population moving as far north as North Carolina on the Atlantic coast and into Alabama and eastern Mississippi along the Gulf coast, and storks from Mexico moving up into Texas and Louisiana and as far north as Arkansas and Tennessee along the Mississippi River Valley. There have been occasional sightings in all states along and east of the Mississippi River, and sporadic sightings in some states west of the Mississippi as well as Ontario, Canada (USFWS 2010a).

The wood stork is of special interest to the Service. Federally listed as endangered in 1984, as noted above, wood stork numbers have declined dramatically since the 1930s, when Florida alone had an estimated 15,000 to 25,000 nesting pairs (Rodgers et al. 1996). Recent censuses have indicated that just over 5,200 pairs currently nest in Florida (Meyer and Frederick 2004). Wood storks are regular visitors to the St. Johns NWR, where they take advantage of foraging opportunities provided by natural open water areas, drainage ditches, and borrow pits. No known records exist of wood storks nesting on the refuge, and it is unlikely that any nesting will occur in the future due to the lack of appropriate nesting substrate (i.e., cypress or mangroves, surrounded by relatively large areas of standing water). The number of wood storks currently utilizing the St. Johns NWR is unknown, since this may vary from year-to-year and few formal surveys of the refuge have been performed.

Northern Crested Caracara (*Caracara cheriway*)
A member of the falcon family, the northern crested caracara's long neck, long yellow legs, and massive gray-blue bill give it a unique appearance among the raptors. With a length of 23 inches and a wingspan of 47 inches, the crested caracara is about the size of an osprey. It has a white head and throat, white wing tips, and white tail contrasting with a dark body, red face, and a signature black crest (USFWS 2010b). The bare skin on the face of this bird is another distinctive feature. When the caracara is at rest, preening or being preened, or engaged in other non-aggressive behaviors, its facial skin is bright orange-red. A caracara's feet are also noteworthy – while clearly those of a raptor, its talons are flatter, enabling it to run and walk more easily than other raptors (USFWS 1999).

While listed as Audubon's crested caracara (*Polyborus plancus audubonii*), taxonomic research has revealed that the Florida population should be recognized as the northern crested caracara (Dove and Banks 1999; Integrated Taxonomic Information System 2008 in USFWS 2009b). Minor variations between populations do not warrant recognition of subspecies within C. cheriway (Dove and Banks 1999 in USFWS 2009b). This taxonomic change has been accepted by the scientific community (USFWS 2009b)

The caracara's peculiarity was captured nearly a century ago in a classic treatise on America's birds (*Birds of America*): "…Audubon's Caracara strikes the observer with singular grotesqueness. An odd performance in which it indulges is to throw the head so far backward as to touch the shoulder feathers, emitting while in this position, its hoarse raucous call." Indeed, the bird's name is an attempt to reproduce its cry in syllables (Pearson 1917).

Northern crested caracara is a resident, diurnal, and non-migratory subspecies that occurs in Florida as well as the southwestern United States and Central America. In Florida, this species is found in the prairie area of the south-central region of the state (FWC 2010a). Historically, this bird was a common resident in Florida from northern Brevard County, south to Fort Pierce, Lake Okeechobee, and Hendry County. It has been reported as far north as Nassau County, and as far south as Collier County and the lower Florida Keys in Monroe County. Available evidence indicates that the range of this subspecies in Florida has experienced a continuing long-term contraction, with caracaras now rarely found as far north as Orlando in Orange County or on the east side of the St. Johns River (USFWS 1999).

The Florida population typically occurs in dry or wet prairie areas with scattered cabbage palms (*Sabal palmetto*). It may also be found in lightly wooded areas. Scattered saw palmetto (*Serenoa repens*), scrub oaks (*Quercus geminata*, *Q*. *minima*, *Q*. *pumila*), and cypress (*Taxodium* spp.) may also be present. Widespread changes in land use may have forced a change in the type of habitat this subspecies will use. The caracara now frequents improved or semi-improved pasture. The presence of seasonal wetlands in these pastures may also be an important factor in their attractiveness to caracaras.

Caracaras prefer to nest in cabbage palms surrounded by open habitats with low ground cover and low density of tall or shrubby vegetation. They construct new nests each nesting season, often in the same tree as the previous year. Their nests are well-concealed and most often found in the tops of cabbage palms. Both males and females participate in nest construction (USFWS 1999).

Caracaras are highly opportunistic in their feeding habits and foraging patterns, both eating carrion and capturing live prey. Their diet consists of insects and other invertebrates, fish, birds, reptiles including snakes, turtles, lizards and small alligators, small mammals such as rabbits, skunks, prairie dogs, opossums, rats, mice, and squirrels, frogs, crabs, crayfish, fish, maggots, and worms, among other prey items. These raptors hunt on the wing, from perches, and on the ground. Caracaras regularly patrol roads and highways searching for carrion. They may be seen on fence posts or utility

poles from which they scan the road surface for road-killed raccoons, opossums, or armadillos (FWC 2010a). They feed on road kill alongside vultures, although they are dominant over vultures and may occasionally chase them away from the food. Caracaras are also known to attack or harass other birds to steal their food, including bald eagles, pelicans, gulls, and other large birds. They jump on the victim's back or strike from above with their talons; the attacked bird usually drops its prey or regurgitates its food, which the caracara snatches before it hits the ground (USFWS 1999).

While the caracara is a strong flier it spends a lot of time on the ground, scratching and digging for insects, or hunting near shallow ponds and marshes for turtles, snakes, frogs and fish. Caracaras occasionally eat larger animals such as rabbits and cattle egrets, and a pair will sometimes work together to subdue these larger prey.

At one time, caracaras were common in the prairies of central Florida, but their population dwindled as their preferred habitat was converted to housing subdivisions, strip malls, golf courses, citrus groves and improved pastures. The Fish and Wildlife Service listed northern crested caracara as threatened in 1987 and the Florida Fish and Wildlife Conservation Commission also designates it as threatened. This subspecies is most abundant in a six-county area north and west of Lake Okeechobee (DeSoto, Glades, Hendry, Highlands, Okeechobee, and Osceola Counties). Their remaining range is mostly on privately held ranch land, and biologists are working with landowners to better understand the needs of caracaras and the many wild animals dependent on these upland prairies (FWC 2010a).

With an estimated Florida population of 400, the caracara is assumed to be an infrequent visitor to the St. Johns NWR because very few actual observations have been recorded. Observations of caracara on the adjacent Blue Heron Water Treatment Facility south of State Route 50 (SR50) are considered uncommon. However, sightings of the caracara in other areas adjacent to the refuge are not uncommon, and relatively recently (October 2005) a road-killed caracara (attended by its mate) was discovered on SR50, approximately ½ mile east of the refuge's Hacienda Road entrance. No record exists of nesting by caracara on the refuge, although appropriate habitat (open *Spartina* marshes, scattered cabbage palms, and palm hammocks) exists, and it is quite possible that nesting territories could be established in the future. Also, a pair was recently observed on the Bee Line Unit (Ehrhardt and Earsom 2006).

Eastern Indigo Snake (*Drymarchon corais couperi*)
The adult eastern indigo snake is large and thick-bodied reptile. It is the longest snake in the United States (FWC 2010b), reaching 6 to 8 or more feet in length. The average adult size is 60-74 inches (152-188 cm) long, while the record exceeds 100 inches in length. The snake's body is glossy black and in sunlight has iridescent blue highlights. The chin and throat is reddish or white, and the color may extend down the body. The belly is cloudy orange and blue-gray. The scales on its back are smooth, but certain individuals may possess some scales that are partially keeled. The pupil is round. Juveniles are black-bodied with narrow whitish blue bands (USFWS 2010c).

This subspecies is found in a variety of habitats, especially those that border marshes and swamps, where it searches for prey such as birds, young turtles, frogs, and other snakes, including rattlesnakes (FWS 2010b).

The eastern indigo snake is sometimes confused with the black racer, which has a white chin, and is a slender, fast-moving snake. The eastern indigo snake is more docile and much slower-moving than the black racer, features that have made it popular with snake collectors. Pressure from collectors, along with disappearing habitat, have reduced the wild population of this subspecies and earned it federal and state protection as a threatened species (FWC 2010b).

The eastern indigo snake was listed as threatened by USFWS in 1978. Historically, it occurred from southern Georgia to the Florida Keys and west to Alabama, but today, it is mostly restricted to Florida and southern Georgia, where it is often found in association with gopher tortoise burrows in well-drained scrub and sandhill habitats (FWC 2010b). As human populations increase throughout the declining range of this subspecies, natural communities continue to be modified for agricultural, residential, and commercial purposes, most of which are incompatible with the habitat needs of eastern indigo snakes. Also, the probability of snake mortality increases due to a number of factors, including direct killing by property owners and domestic animals, highway mortality, bioaccumulated pesticides or rodenticides, loss of gopher tortoise populations and their burrows, and increased use of all-terrain vehicles. Prescribed fire has been inadequate to maintain appropriate habitat in many areas. Extensive tracts of unfragmented wild land are the most important sanctuary for eastern indigo snake populations. Because of its relatively large size and home range, the eastern indigo snake is especially vulnerable to habitat loss, degradation, and fragmentation (USFWS 2009a).

Occasional sightings of the eastern indigo snake have been reported over the years since the creation of the refuge in 1971. Two individuals were radio-tagged on the refuge as part of a larger study in Brevard County from 1998-2001 (Breininger et al 2004). These two individuals used both the wetlands and uplands of the refuge. Both individuals were observed foraging in the *Spartina* wetlands and used the dike roads, and tree hammocks for refugia. However, beyond this limited anecdotal information, little is known about the status of this species on the refuge.

American Alligator (*Alligator mississippiensis*)
The American alligator is a large, semi-aquatic, armored reptile that is related to crocodiles. Their body alone ranges from 6-14 feet long. Almost black in color, the alligator has prominent eyes and nostrils, with coarse scales over the entire body. It has a large, long head with visible upper teeth along the edge of the jaws. Its front feet have five toes, while its rear feet have four toes that are webbed (USFWS 2010d).

The American alligator is a living fossil from the Age of Reptiles, having survived on earth for 200 million years. In spite of the species' success and longevity in the struggle for survival, the U.S. population reached an all-time low in the 1950s, primarily due to market-hunting and habitat loss. However, in 1987, the alligator was pronounced fully recovered, making it one of the first endangered species success stories. At present, alligators are distributed widely throughout the southeast, from the Carolinas to Texas and north to Arkansas (USFWS 2008).

The American alligator is federally listed as threatened only as a result of its similarity in appearance to the federally endangered American crocodile. The alligator can be distinguished from the crocodile by its head shape and color. The crocodile has a narrower snout, and unlike the alligator, it has lower jaw teeth that are visible even when its mouth is shut. Furthermore, adult alligators are black, while crocodiles are brownish in color.

The American alligator is no longer regulated under Section 7 of the Endangered Species Act and is not in danger of becoming extinct. Indeed, alligator numbers have grown substantially in recent decades. American alligators are relatively common on the refuge, and nesting is known to occur. No estimate of alligator abundance has been developed for the refuge.

Black Rail (*Laterallus jamaicensis*)
The black rail is a secretive marsh bird and the smallest rail in the state. It inhabits densely vegetated marshes where it would pass largely unnoticed if not for its distinctive vocalizations (FWC 2003). It breeds very locally in coastal California and Kansas, on the Atlantic and Gulf coasts from New York through Florida to east Texas, and in Belize, Peru, Chile, and Argentina.

Black rails are usually found with one or more species of cordgrass (*Spartina*). In central Florida large areas are dominated by cordgrass, producing extensive savannas with scattered cabbage palm islands. At these sites the wetter marshes are characterized by sawgrass, which frequently grows taller than 2 m (6 ft). An exception to the association of black rails and tufted cordgrass occurs at Merritt Island NWR, also in Brevard County, where the birds are most frequently seen in areas dominated by spike grass (FWC 2003).

The black rail builds its nest of green or dead grasses on moist ground or just above the ground or water, attached to weed or grass stalks. They are permanent residents in upper tidal marshes along the Gulf coast from Texas to Florida, and are also found in inland marshes of the Florida peninsula. Within Florida the species is found in the higher zones of tidal marshes, which are rarely inundated. The inland population is centered in the St. Johns River Valley from Lake Woodruff in Volusia County southward to Brevard County. It is also known from Paynes Prairie in Alachua County and in portions of the Everglades. The black rail certainly occurs elsewhere in the state, but its secretive nature has precluded its discovery and documentation.

Black rails are listed as a Species of Management Concern by the Service. As noted above, St. Johns NWR furnishes what may be the most important wintering and breeding habitat for black rails in the eastern United States. In the 1990s, black rails were relatively abundant on the refuge. However, monitoring in the 2000s using a different methodology failed to detect black rails. It is not known whether this is due to the different methodology or an actual decline in black rail numbers.

Barn Owl (*Tyto alba*)
The barn owl is actually one of the most widely distributed birds in the world, found on every continent but Antarctica, and even on many islands scattered across the world's oceans. It is a medium-sized owl with a white or mostly white underside, heart-shaped, white face, and a tawny back marked with black and white spots. It has long legs, dark eyes, and a round head without ear tufts (Cornell Lab of Ornithology 2009a).

Listed as a Species of Management Concern by the Service, the barn owl is found throughout the State of Florida. It inhabits hardwood and tropical hammocks, urban areas with abundant palms and large hardwoods, and may nest in manmade structures such as silos, barns, and deserted buildings. Barn owls forage voraciously for rodents in open areas such as prairies, pastures, fields, and sparsely wooded areas (FWC 2009a).

In Florida, barn owls breed from March through July and nest in secluded places like caves, barns, tree cavities, and large bird houses. They build no actual nest and lay from 3-11 (most commonly 5-7) white or buff-white eggs.

Barn owls have been observed on the refuge.

Eastern Meadowlark (*Sturnella magna*)
The eastern meadowlark is resident throughout most of mainland Florida. Overall, its breeding range extends from Maine west through southern Canada to eastern Minnesota and central Arizona and south through Central America to northeast Brazil. During winter, individuals retreat from the northern portion of the range and migrate southward (FWC 2003).

Eastern meadowlarks have a bright yellow breast with a black "V," which flashes from fence posts, snags, and power lines, as the birds sing their sweet whistling song. They frequent grassy fields, pastures, cultivated areas, groves, open pine woods, prairies, and open areas generally. In towns, the meadowlark is more secretive but can often be found if any moderately sized area of suitable

habitat remains. Food consists mostly of insects, which comprise more than 75 percent of the diet; grains, and the seeds of weeds making up the remainder.

The eastern meadowlark nests on the ground in thick grass. The nest has an arched "roof" and is constructed mostly of very fine grasses. Three to five white eggs are laid per clutch. The eggs are smooth with a moderate gloss and are spotted and splotched over their entire surface with brown and lavender. The female incubates the eggs for 13 to 15 days, and the young fledge at 11 or 12 days of age (FWC 2003). Like other animals, if disturbed on the nest, the female will pretend to be wounded to lure the intruder, human or otherwise, away from the vulnerable nest, eggs, or hatchlings.

Listed as a Species of Management Concern by the Service, the eastern meadowlark is found on the refuge and throughout the southeastern United States.

Least Bittern (*Ixobrychus exilis*)
The least bittern is the smallest of the North American herons. In the United States, the least bittern occurs primarily in the eastern half of the country, with a disjunct (geographically isolated) population breeding locally from southern Oregon south through California and into Mexico. Birds from the U.S. winter from Florida, Texas, and California south to northern South America (FWC 2003).

Least bitterns breed from March to August and may raise two broods per year. They usually nest in fresh and salt marshes and on rare occasions in mangroves, often close to areas of human habitation. Almost any lake with a dense stand of cattails or shrubby emergent marsh vegetation is potential breeding habitat. They generally build their nests in a dense stand of cattails or rushes, approximately one foot above the water level. The nest is placed on a base of dried plants bent downward or, rarely, in an old nest of another species. Least bitterns usually nest individually, although in prime habitat, they may nest in loose colonies. Both green and dry plants are used to construct the nest, which is built by both partners of the breeding pair. A clutch typically consists of 4-5 eggs, which are pale bluish or greenish, like the eggs of many herons. The female lays one egg per day, and both sexes incubate them for 17-18 days.

Young bitterns can leave the nest when about 5 days old, though if undisturbed, they may remain in the nest up to two weeks. Nestlings fledge at about 25 days of age. The least bittern is an occasional to fair common breeding summer resident but is quite rare in winter in north Florida. Locally, it is considered a fairly common breeder in south Florida. The species is migratory, although some individuals are found throughout the winter in south Florida (FWC 2003).

Listed as a Species of Management Concern by the Service, the least bittern is found year-round in most of Florida. Prospects for the least bittern are uncertain because of wetland habitat loss and the encroachment of invasive plant species into marshes.

Loggerhead Shrike (*Lanius ludovicianus*)
The loggerhead shrike is small gray, black, and white perching bird of pastures, fields, and open brush land. A sit-and-wait hunter, the shrike does not look like a predator and it lacks the strong feet and talons of a raptor. However, it does have a strongly hooked bill for gripping flesh, and a strong notch or "tooth" near the bill tip that helps sever the spinal cord of its prey. It uses this hooked beak to kill insects, lizards, mice, and birds, impaling them on thorns to hold them while it tears them apart (Cornell Lab of Ornithology 2009b). This habit has earned it the nickname of “butcherbird” (FWC 2003).

The loggerhead shrike breeds from Canada's Prairie Provinces to Mexico, the northern Gulf coast, and south Florida. It winters in the southern portion of its breeding range. While 11 subspecies of the loggerhead shrike have been identified in North America, only *L. l. ludovicianus* breeds in Florida.

As noted above, shrike habitat consists of open grasslands with scattered trees and shrubs for nest, roost, and perch sites. The shrike often uses power lines and fence posts as hunting perches. An opportunistic feeder, it preys mainly upon invertebrates, but also takes small terrestrial vertebrates, such as mice or birds, usually impaling them on thorns or barbed-wire fences (FWC 2003).

Nests are usually constructed between 1 and 3 m (3 and 30 feet) above the ground, in a crotch in dense foliage. The nests are bulky and made of sticks and twigs. Branches of the nest tree or bush are often incorporated into the nest, possibly to anchor the nests against damage from high winds. The nests are lined with herbaceous vegetation and animal hair. A typical clutch has 5-6 grayish-buff eggs, which are marked with gray, brown, and black. Incubation lasts 15-17 days. Nestlings remain in the nest some 16-20 days after hatching and continue to be fed by their parents for 4-6 weeks after fledging. Two or 3 broods may be raised per season (Miller 1931, Lohrer 1974).

Listed as a Species of Management Concern by the Service, the loggerhead shrike is a year-round resident of the southern United States. Once abundant, it declined drastically through the latter half of the 20th century. It is essentially gone from the northeastern part of its range and continues to decline throughout (Cornell Lab of Ornithology 2009b). Although scientists have tried to explain the population declines, no adequate cause or causes have yet been found. Land-use changes appear to be the most important factors affecting shrike populations, but the effects of other factors such as pesticides, predation, competition, diseases, and parasites are unclear or unstudied (FWC 2003).

Northern Flicker (*Colaptes auratus*)
The northern flicker is a large woodpecker 10.5-11 inches long. It has a brown back and wings barred with black, a black crescent on upper breast, a beige breast and belly spotted heavily with black, and a white rump (obvious in flight). There are two color forms (yellow-shafted in the east and red-shafted in the west), formerly considered separate species, now lumped as one. The yellow-shafted flicker in Florida has a tail and underwings are entirely yellow below; its retricies and primaries have yellow shafts. There is a red crescent on the nape, a gray cap and nape, tan face, chin, and throat. The adult male has black whiskers (USGS 2000).

This bird is common in Florida's urban habitats, where it sometimes irritates homeowners by drumming on the eaves of houses and other buildings, especially on metal surfaces. Its flashy white rump patch and vibrant call make it relatively easy to identify. The northern flicker's breeding range extends from the northern tree line between the taiga and arctic regions of Alaska and Canada through the entire United States (FWC 2003).

In Florida, northern flickers are found in open pine and mixed woodlands, hammocks, and residential areas (Kale et al. 1992). The bird's diet consists of mainly animal foods in the spring and summer (75 to 90 percent) and primarily vegetable foods in the fall and winter (50 to 60 percent). Approximately one-half of their diet consists of ants and beetles. Ants are a preferred food, and the northern flicker is often seen preying on ant hills in lawns, pastures, parks, other open areas. The species tends to be scarce and local in areas with extensive unbroken groundcover such in pine plantations and unburned woodlands (FWC 2003). Northern flickers spend much time on the ground, more than other woodpeckers do, and when in trees they're often perched upright on horizontal branches instead of leaning against their tails on a trunk. They fly in an up-and-down path using heavy flaps interspersed with glides (Cornell Lab of Ornithology 2009c).

Like other woodpeckers, the northern flicker is a cavity nester. Its nest is usually located in a dead snag, between 1 to 18 m (2 to 60 feet) above the ground. Occasionally the flicker will nest in a bank, sawdust pile, haystack, or even on the ground and it readily accepts nest boxes. Cavity excavation

takes about 12 days. Usually 5-8 white eggs are laid between late March and June; they are incubated 11 to 12 days, and the young fledge in 25 to 28 days (FWC 2003).

In Florida, northern flickers are considered resident species. Yet many nonresident flickers also migrate into Florida in the fall, where they are often quite noticeable along the Gulf coast. Spring migration occurs from February through April.

The northern flicker is listed as a Species of Management Concern by the Service.

Sedge Wren (*Cistothorus platensis*)
The sedge wren is a small, secretive wren that breeds in short grass and sedge marshes. Because of the ephemeral nature of its nesting habitats, this wren tends to move around from one year to the next, not remaining in one place for long. It is one of the most nomadic territorial birds in North America. On any given site, it may be abundant one year and completely absent the following. Many unconnected sedge wren populations occur throughout the Americas, from Canada to Tierra del Fuego (Cornell Lab of Ornithology 2009d). The sedge wren winters in grassy marshes and dry grass fields of coastal areas of the southeastern United States.

This wren's diet consists of insects and spiders. It is known to run on the ground to escape predators and it usually flies only a short distance before diving back into the grass (Cornell Lab of Ornithology 2009d). The sedge wren nests in dense tall sedges and grasses of wet meadows, hayfields, and marshes; it avoids cattails however. Its nest is a round ball of grasses and sedges, with an entrance on the side.

The sedge wren is listed as a Species of Management Concern by the Service because of its dependence on vulnerable and restricted habitats.

Southeastern American Kestrel (*Falco sparverius paulus*)
Two subspecies of American kestrel (*Falco sparverius*) are found in Florida: a northern subspecies (*Falco sparverius sparverius*) that winters here from September-April, and a resident, non-migratory subspecies, the southeastern American kestrel (*Falco sparverius paulus*). Kestrels found in Florida during May-June are resident southeastern American kestrels (FWC 2009b).

The back and tail of the kestrel are russet and the wings blue-gray. Two lines of onyx tears mark the sides of its white face. American kestrels often perch on wires at the edge of an open area, from which they hunt for insects (mostly grasshoppers and dragonflies), lizards and small mammals. They are famous for their ability to hover like helicopters or dragonflies above their prey (FWC 2009b).

American kestrels nest in cavities or holes excavated by other birds like woodpeckers or other natural processes. Kestrels nest predominantly in dead but standing longleaf pine tree snags, usually in the abandoned cavities of pileated woodpeckers. Kestrels nest between mid-March and early June, typically raising about four chicks per season. Kestrels are short-lived birds – even for those surviving their first winter, life span averages less than 3 years.

The American kestrel has experienced a marked population decline and range contraction in recent decades. It is currently listed as threatened in Florida. Once widely distributed throughout seven southeastern states, the southeastern American kestrel occurs today primarily in Florida, the coastal plain of South Carolina, and the Mississippi Gulf coast. It is patchily distributed elsewhere in small, fragmented populations. Loss of nesting snags, especially longleaf pine, appears to be the main reason for the decline. Moreover, since kestrels avoid pine plantations and hardwood stands, the loss of open foraging habitat appears to have been a contributing factor (FWC 2009b).

Florida Sandhill Crane (*Grus canadensis pratensis*)
The sandhill crane is a long-legged, long-necked, gray, heron-like bird with a patch of bald red skin on top of its head. They fly with necks outstretched like geese whereas herons fly with their necks tucked in on their backs. Two subspecies of sandhill crane occur in Florida. The Florida sandhill crane (*G. c. pratensis*), numbering 4,000 to 5,000, is a non-migratory, year-round breeding resident. Every winter, 25,000 migratory greater sandhill cranes (*G. c. tabida*) join the Florida sandhill crane. The migratory sandhill crane is the larger of the two subspecies. Greater sandhill cranes winter in Florida but nest in the Great Lakes region (FWC 2009c).

The sandhill crane is closely related to the once nearly extinct (now slowly recovering) whooping crane, which is being reintroduced into Florida. Young sandhills weigh about twelve pounds, males are larger than females, but external markings are identical. Cranes outlive most birds, sometimes reaching 20 years of age.

Cranes are monogamous breeders. Sandhill cranes nest during late winter and spring on mats of vegetation about two feet in diameter and in shallow water. The female normally lays two eggs. Within 24 hours of hatching, the young are able to follow their parents away from the nest, foraging for seeds and roots, crop plants such as corn and peanuts, insects, snakes, frogs, and occasionally young birds or small mammals. Cranes are quite omnivorous; they feed on a variety of seeds, grain, berries, insects, earthworms, mice, small birds, snakes, lizards, frogs, and crayfish, but do not "fish" like herons (FWC 2009c).

Resident sandhill cranes usually forage in very small groups or pairs. In November and December, however, large flocks of greater sandhill cranes arrive, more than doubling Florida's population. In March and April, the migratory cranes depart northward once more.

The Florida sandhill crane is listed as threatened by the state (FWC 2009c).

Gopher Tortoise (*Gopherus polyphemus*)

The gopher tortoise is under review for listing in Florida by the Service under the Endangered Species Act and is listed by the State of Florida as a threatened species (Florida Fish and Wildlife Conservation Commission 2009d). The state listed the gopher tortoise in 1975 as threatened; however, in 1979, due to changes in the state's listing criteria, the species was down-listed to a species of special concern. Between 2002 and 2006, the state recognized the need to uplist the gopher tortoise to a threatened species. This occurred in 2008.

The gopher tortoise is ancient. Its reptilian ancestors originated in western portion of the continent about 60 million years ago. At least 23 species of tortoise are known to have existed in North America since those origins, but only four of these species remain today. Three of the living species, the desert tortoise, Texas tortoise, and Bolson tortoise, occur in the southwestern United States and northern Mexico. The gopher tortoise is the only one that occurs east of the Mississippi River. The ancestors of today's gopher tortoises, along with those of scrub jays, burrowing owls, and short-tailed snakes, were part of a savanna fauna that migrated into the southeastern United States millions of years ago (Gopher Tortoise Council 2009).

Gopher tortoises can live up to 40-60 years in the wild and they reach reproductive maturity at 9-21 years of age. They average 9-11 inches in length. Their breeding season is generally March-December, although males may attempt to mate throughout the activity season (April-December). The incubation period for gopher tortoise eggs is 80-110 days, depending on the latitude (FWC 2010c).

Tortoises are much less active during the winter, although on warm afternoons some individuals trudge to the earth's surface to bask in the sun on the sandy aprons of their burrows. An excellent digger, the gopher tortoise lives in long burrows that offer reprieve from cold, heat, drought, forest fires, and predators. The burrows average 15 feet long and 6.5 feet deep and maintain a fairly constant temperature and humidity throughout the year. The gopher tortoise is known to share its burrow with more than 350 other wildlife species, including burrowing owls, Florida mice, indigo snakes, opossums, rabbits, gopher frogs, Florida mice, eastern diamondback rattlesnakes, and gopher crickets.

The gopher tortoise feeds on low-growing plants like wiregrass, broadleaf grasses, and legumes (bean family plants). They also eat prickly pear cactus, blackberries, paw-paws, and other seasonal fruits. In addition to needing open areas with abundant food, gopher tortoises require relatively deep, sandy soils for burrowing and sunny spots for laying eggs.

Gopher tortoises live where there are well-drained sandy soils with a sparse tree canopy and abundant low-growing vegetation. They typically occur in habitats such as sandhill, pine flatwoods, scrub, scrubby flatwoods, dry prairies, xeric hammock, pine-mixed hardwoods, and coastal dunes, which have historically been maintained by periodic wild fires. When fire is suppressed in these habitats, small trees, shrubs, and brambles begin to grow, making it difficult for the gopher tortoise to move around and eventually shade out the low-growing plants and herbs that gopher tortoises eat. (FWC 2010c).

The gopher tortoise has been regulated in Florida since 1972, and has been fully protected since 1988 (FWC 2010d). Listed as threatened by the State of Florida, it is known only from incidental sightings on the refuge. It is likely that the population of gopher tortoises on the refuge is relatively small due to the lack of appropriate upland habitat. (Upland habitat accounts for only 10 percent of refuge landscape cover.) Despite this, tortoise burrows have been identified on both the SR 50 and Bee Line units of the refuge.

Despite the protection afforded by the State of Florida, gopher tortoise populations throughout the state continue to decrease. In response to this continuing decline, a new management plan was drafted and approved in 2007 as a precursor to reclassifying the gopher tortoise from a "species of special concern" to a "threatened species." The threatened status was approved and went into effect on November 8, 2007 (FWC 2010d).

The State of Florida has developed a gopher tortoise management plan, the goal of which is to progressively decrease the rate of decline of the gopher tortoise to allow for the species to be relisted as a "species of special concern" and eventually an unlisted, managed species. To achieve this goal, the management plan outlines measurable conservation objectives to restore and maintain secure viable populations of gopher tortoises throughout the species current range in Florida (FWC 2010d).

Objectives of the state’s gopher tortoise management plan are to:

- Optimize gopher tortoise carrying capacity by appropriate habitat management on protected lands;
- Increase protected gopher tortoise habitat;
- Restock gopher tortoises to protected, managed, suitable habitats where they no longer occur or where densities are low;
- Decrease gopher tortoise mortality on lands proposed for development;

To achieve these objectives, a cooperative program with state, local, and private partners has been established across the state. Current efforts include restocking Florida's public and private lands.

Little Blue Heron (*Egretta caerulea*)
Although the little blue heron is closely related to the snowy egret, it is missing most of the highly ornamental aigrettes (head plumes or feathers of egrets and herons) that were the cause of the other wading birds being coveted by millinery hunters a century ago. The little blue heron breeds from southern California across to the southeastern states and as far north as coastal Maine. It also nests south to Peru, Brazil, and Uruguay. Birds that breed in the United States winter in the southern states and the Caribbean Basin (FWC 2003).

While the little blue heron definitely prefers freshwater habitat, it is not rare in coastal areas. Its diet is more varied than that of other herons and includes insects, shrimp, amphibians, and fish. Little blue herons often feed alone, walking along the edges of canals, streams, rivers, and lakes, or on the top of floating vegetation.

Breeding occurs from April through September in Florida, and little blue herons appear to breed somewhat later than tricolored herons or snowy egrets. The little blue heron nests in colonies, often with other species of long-legged wading birds. They build nests of sticks in trees and shrubs on islands, in thickets near water, or in emergent vegetation over water. From 3 to 5 blue-green eggs hatch in 20-24 days, and the white-plumaged young fledge in about 28 days (FWC 2003).

In the Florida Panhandle, it is not unusual to see migrating flocks of little blue herons in the spring, generally in February and March. There is little documentation of fall migration for this species, but like other herons, adults and young of the year disperse widely in a northerly direction following breeding.

The little blue heron is more widely distributed throughout the state than the tri-colored heron or the snowy egret. Colonies have been reported from the Keys to Duval and Escambia Counties. However, like the snowy egret, the little blue heron breeds in greater abundance in the central and southern peninsula, with colonies more widely scattered throughout north Florida and the Panhandle (FWC 2003).

The little blue heron is listed as a species of special concern by the state because of its dependence on wetlands. Comparing statewide surveys from 1976-78 and 1986-89, little blue herons apparently decreased from more than 20,000 pairs to fewer than 17,000 pairs. Stevenson and Anderson (1994) cite evidence of dramatic declines in breeding numbers on Florida's Gulf coast from 90,000 birds in the mid-1930s to 7,500 birds in the mid-1960s.

Snowy Egret (*Egretta thula*)
The snowy egret is a medium-sized, slender all-white heron with black legs and yellow feet (golden slippers). It has a long thin neck, bill, and legs. Its bill is dark (Cornell Lab of Ornithology 2009e).

This egret is abundantly adorned with aigrettes when it breeds. At the beginning of the 20th century, these feathers were much in demand by the millinery trade to adorn fashionable women's hats and hair. Hunters slaughtered the adult birds by the thousands for these feathers, leaving unhatched eggs to spoil and young snowy egrets in the nest to starve, which decimated the species' population (FWC 2003).

Snowy egrets breed from northern California east to South Dakota and south to Florida, Chile, Argentina, and the Greater Antilles. They winter in southern California and Arizona, the southeastern United States, and south to the limits of their breeding range. It forages in both freshwater and saltwater habitats, where it actively pursues its prey, usually in flocks with other waders. Its diet is predominantly small fish, but it will also consume shrimp and small vertebrates.

The snowy egret typically nests in colonies on islands with other species of wading birds in swamps and mangroves or in emergent vegetation over water. The nest is a platform of sticks in trees or bushes, usually less than 9 m (30 feet) above the ground or water. Three to five blue-green eggs hatch in about 18 days, and the young fledge when they are about 25 days old (FWC 2003).

Breeding season for the snowy egret in Florida runs from January through August. Florida hosts wintering birds from more northerly states, and large numbers of migratory birds swell the winter ranks of residents in the Everglades and other southerly locations.

The Florida Fish and Wildlife Conservation Commission has designated the snowy egret a species of special concern. Snowy egrets appear to be declining dramatically as a breeding bird. Between statewide surveys in 1976-78 and 1986-89, there was reduction from more than 51,000 breeding birds to less than 14,000, a 73 percent decline. The probable leading cause of this decline is the loss and degradation of wetlands statewide, particularly in the coastal zone and the southern half of the state (FWC 2003).

Tricolored Heron (*Egretta tricolor*)
The tricolored heron is a medium-sized, slim heron of the southeastern United States. It was formerly known as the Louisiana heron. It has a long, slender neck and bill, a dark back and neck, purplish chest, and a white belly (Cornell Lab of Ornithology 2009f, FWC 2003).

This species nests north along the Atlantic coast to Massachusetts and westward in coastal lowlands around the Gulf of Mexico and Caribbean, including the West Indies, to northern Brazil. It also nests between central Baja California and Ecuador on the Pacific coast. The tricolored heron is most numerous in saltwater and brackish-water habitats. It often forages alone in both freshwater and saltwater habitats, using a variety of capture techniques to glean small fish (FWC 2003).
Its breeding habitat includes marshes, ponds, and rivers, where it nests in shrubs and flooded woody plants or vegetation on islands, often in colonies with other species. Its diet consists of fish, small vertebrates, aquatic invertebrates, and insects. Breeding for this species occurs from February through August. Tricolored herons usually nest in colonies with other species of herons and ibises. They construct platform nests of sticks in trees or bushes on islands or over standing water, or nests of flattened vegetation on the ground on salt marsh islands. Three or four blue-green eggs hatch in about 22 days, and the hatchlings fledge at approximately 16-21 days of age.

Once described as the most abundant heron in Florida, the tricolored heron's long-term population trend is uncertain, but it appears to be in decline (FWC 2001). Tricolored heron numbers decreased from approximately 35,000 breeding birds in 1976-78 statewide surveys to less than 16,000 in 1986-89 surveys. The probable main causes of the decline are human-induced loss and degradation of wetlands and development in the coastal zone.

White Ibis (*Eudocimus albus*)
The white ibis is a wading bird of the Deep South. At maturity, it has a long, down-curved, bright red bill, long red legs, an all-white body and black wingtips. This striking bird is frequently seen on lawns looking for large insects as well as probing for prey along shorelines (Cornell Lab of Ornithology 2009g).

The white ibis is a symbol of Florida for many people, and its habit of nesting and flocking in large numbers dramatically conveys an abundance of wildlife. This species resides and breeds from Baja California and Sinaloa, through south Texas, Louisiana, Alabama, Georgia, and coastal North Carolina, and then south to Peru, the Greater Antilles, and French Guiana. Because the white ibis and the scarlet ibis (*Eudocimus ruber*) interbreed in the wild, they may actually be color races of the same species (FWC 2003).

White ibises feed mainly on aquatic prey, including crayfish, crabs, insects, snakes, anurans, and fish. White ibis nesting typically occurs from March to August. Ibises usually breed in mixed-species colonies located over standing water, within freshwater marshes or ponds, or on coastal islands. They nest in trees, shrubs, cactus, and grass clumps, from ground level to a height of 15 m (50 ft). The nests are round and constructed of sticks, bent rushes, leaves, and roots. Clutches are 1-4 (usually 2 or 3) cream-to-greenish colored eggs, speckled with brown, black, and reddish spots. Incubation requires 21-22 days, and the young are able to leave the nest at 9-16 days of age.

Spring and fall migration flights of the white ibis, generally in February and September-October, can be spectacular. This species wanders widely and is nearly nomadic in breeding habits. After the breeding season, adults and juveniles may travel northward well outside of the breeding range.

Although now greatly outnumbered by the non-native cattle egret, the white ibis remains an abundant wading bird in Florida. Nevertheless, aerial surveys have revealed 90 percent declines in south Florida breeding pairs since the l940s and 20-50 percent declines statewide during the past decade. Because of this, the white Ibis has been designated a species of special concern by the FWC. The causes for its decline are likely to be similar as those for other wading birds, including the loss and degradation of wetland habitat and human development in coastal areas and freshwater foraging areas. In addition, large numbers of this nomadic species appear to have been attracted to the intensive crayfish aquaculture industry of south central and southwest Louisiana (FWC 2003).

Cape Sable Seaside Sparrow (*Ammodramus maritimus mirabilis*)
The Cape Sable seaside sparrow (CSSS) is a sedentary subspecies of seaside sparrow, which, like the now extinct dusky seaside sparrow (*A. maritimus nigrescens*), makes extensive use of short-hydroperiod freshwater wetlands composed of a mix of grassy species almost devoid of trees and shrubs. The CSSS does not presently occur at St. Johns NWR, nor is this subspecies' historic range known to have extended to the area which is now the refuge. Rather, the CSSS is currently relegated to six distinct geographic areas well to the south of the refuge in marl prairie habitat flanking Shark and Taylor sloughs in the Everglades. The sparrows in these areas are recognized as distinct subpopulations and it has been determined by the Sustainable Ecosystems Institute's Final Report for the Everglades Multi-Species Avian Ecology Review sponsored by the Service, that three major subpopulations of CSSS are necessary to ensure the survival of the subspecies (SEI 2007).

There is a high degree of uncertainty whether the previously major subpopulation, located west of Shark River Slough (subpopulation A), will be able to persist in its current location given the much wetter conditions that are expected to result under the Comprehensive Everglades Restoration Plan (CERP). In fact, this subpopulation is in jeopardy of extirpation even under a specially designed water management strategy (Interim Operational Plan) designed to provide more favorable habitat conditions for the CSSS at this location.

Furthermore, no additional locations have been identified in the Everglades or Big Cypress Swamp, where suitable CSSS marl prairie habitat exist or could be improved to meet the CSSS life history requirements. Based on radio-telemetry data collected since 2003, the Avian Ecology Review Panel concluded that the six separate CSSS populations could be more accurately described as a connected set of subpopulations. The panel furthermore concluded that:

1) The CSSS has considerable capacity to colonize unoccupied suitable habitat.

2) The CSSS may be inherently more resilient than was previous suspected. Resilience will continue to decline, however, as population size and range size decline.

3) Maintenance and creation of suitable habitat is more important than was previously recognized.

4) Maintaining conditions that allow for population growth remains essential, but an emphasis on birds only in areas where they currently occur is not the only option available and other options should be considered.

5) The historic management approach of ensuring the maintenance of three distinct populations is invalid. From a conservation biology standpoint, while data on movement indicate that the subpopulations are connected, there are increased risks to the species from having one interconnected set of subpopulations, and thus additional populations, locations, and habitats are recommended.

This led the expert Avian Ecology Review Panel to include in their conclusions and recommendations the possibility of translocating wild CSSS outside their native range. However, the panel recommended that translocation be attempted first at suitable habitat in the Everglades to re-establish extirpated subpopulations. The translocation protocol for sparrows outside their native range specifically addressed the introduction of the CSSS into the former habitat of the now extinct Dusky Seaside Sparrow (i.e., Merritt Island and St. Johns NWRs). The protocol identifies the original cause of the Dusky Seaside Sparrow's decline (Baker 1978; Sykes 1980; Post and Greenlaw 1994), pre-requisite investigations (i.e., absence of other Seaside Sparrows, amelioration of the causes of extinction, and an assessment of current suitability of the destination sites), and introduction and monitoring procedures similar to those described by Jenkins and Pimm (1999).

Listed Flora

No federally listed plant species are known to occur on the refuge. Listed plants may and more than likely do occur on the refuge; however baseline data to verify listed plant species presence and abundance is lacking.

NON-NATIVE AND INVASIVE SPECIES

The spread and encroachment of exotic, non-native, and invasive plants and animals in ecosystems generates great concern around the world, because these alien and aggressive species are detrimental to the biological integrity of native systems. Exotic, invasive, and nuisance plant and animal species have been recognized as serious threats to native species and habitats on the refuge. Nuisance native animal species are also known to have negative impacts on threatened and endangered species and on human safety. Plant and animal species such as melaleuca (*Melaleuca quinquenervia*), cogongrass (*Imperata cylindrica*), Brazilian pepper (*Schinus terebinthifolius*), feral hogs, and feral cats (*Felis domesticus*) among others are known to occur on the St. Johns NWR (Table 4).

Plants

In Florida, almost one-third of the plants occurring in the wild are exotic (non-native), and of the estimated 1,200 exotic species in Florida approximately 11 percent are invasive in natural areas, that is, tending to spread and displace native species and communities (Schmalzer et al. 2002). Over 50 invasive exotic plants are found in and around nearby Merritt Island NWR. No comprehensive survey of exotic plants exists for the St. Johns NWR, but some of these species have been observed by Complex staff on the refuge.

Melaleuca
Melaleuca (*Melaleuca* spp.) was originally introduced to Florida a century ago as an ornamental plant and to help drain low-lying swampy areas. Highly flammable and spreading aggressively, it has since become a serious invasive weed. Many of the infestation sites on St. Johns NWR are difficult to access due to limited access to the vast wetland habitats. Melaleuca has been treated by Complex staff as tree locations have been identified. Due to manpower and funding shortages, no efforts have been made to conduct re-treatments of previously treated sites.

Brazilian Pepper
Brazilian pepper (*Schinus terebinthifolius*) has invaded almost all habitat types throughout the entire refuge. Infestations are most severe on disturbed sites, along roads and dikes, on marsh and wetland fringes, and on the edges of elevated sites in the marsh. Brazilian pepper has been treated by Complex staff periodically and not on a standard schedule. Aerial applications were conducted on dense pepper stands on the eastern boundary line adjacent to Interstate 95. However, Complex staff efforts have concentrated on roads and fire breaks. Until recently, these control efforts were uncoordinated with no record of treatment dates and locations.

Cogongrass
Cogongrass (*Imperata cylindrica*) has been documented on the Refuge on the interior roads. All cogongrass infestation sites are one acre or less in size. All recent control of cogongrass has been by Complex staff, and all efforts have occurred periodically and not on a standard schedule. In 2003 and 2004, all documented cogongrass sites were treated with glyphosate.

Other Invasive Plants
Other exotic plants that have been treated on nearby public lands along the St. Johns River drainage and may be an issue for the refuge in the future, including: camphor tree (*Cinnamomum camphora*), guava (*Psidium guajava),* Chinese tallow (*Sapium sebiferum*), air potato (Dioscorea bulbifera), para grass (*Urochloa mutica)* and several others listed as Category I invasive exotics (FLEPPC 2009). There has been a recent increase in para grass along SR 46 invading into the cordgrass marshes along the St. Johns River.

The Florida Exotic Pest Plant Council defines Category I invasive exotics as those which are altering native plant communities by displacing native species, changing community structures or ecological functions, or hybridizing with natives. This definition relies not on the economic severity or geographic range of the problem, but rather on the documented ecological damage caused (FLEPPC 2009).

There have been no staff efforts to control these other invasive plants at St. Johns NWR, but these and other exotic species may present an issue in the future.

Animals

Two invasive animal species that may pose a threat to the refuge are feral hogs and feral cats. Hogs are an invasive species which are present in large numbers in all upland and marsh habitats of the refuge. Hogs cause extensive habitat damage and it is suspected that they also negatively impact wildlife through direct mortality (predation) and competition for food. Hogs also pose a safety hazard due to impacts with vehicles. Hogs cause economic damage through vehicle collisions and through destruction of landscaped areas and road shoulders by rooting. No current estimates exist for the hog population on the refuge, although observations of hog tracks on the roads are not uncommon.

The number of feral cats occurring on the refuge is probably small, but is unknown at this time. If present, they may be a consequence to secretive bird groups such as rails. It is assumed that all feral cats occurring on the refuge are released by the public or wander in from adjacent urban communities (e.g., from Port St. John onto Bee Line Unit).

Table 4. Non-native species (potentially) occurring on the St. Johns NWR

Scientific Name	Common Name	FLEPPC Category
Plants		
Melaleuca spp.	**Melaleuca**	I
Schinus terebinthifolius	**Brazilian pepper**	I
Imperata cylindrical	**Cogongrass**	I
Cinnamomum camphora	**Camphor tree**	I
Psidium guajava	**Guava**	I
Sapium sebiferum	**Chinese tallow**	I
Dioscorea bulbifera	**Air-potato**	I
Urochloa mutica	**Para grass**	I
Animals		
Sus scrofa	**Feral hog**	N/A
Felis domesticus	**Feral cat**	N/A

CULTURAL RESOURCES

Archaeological evidence suggests that the St. Johns River basin, which includes the refuge, has been inhabited for over 12,000 years (Milanich 1998). Paleoindians were nomadic hunters who made use of riparian habitats during the much drier glacial period which ended approximately 9,500 years before present (BP). This period was followed by the Archaic Period (9,500 – 4,000 BP) characterized by a significant warming of the global climate during where sea levels rose and estuaries and rivers expanded. The mega-fauna of the glacial periods disappeared from Florida. In response, native inhabitants switched to utilizing aquatic resources and established more permanent settlements. It was during this period that shell middens, large aggregations of shellfish refuse, were created.

The earliest inhabitants of the Indian River region now called Brevard County were Native Americans who ventured into the area perhaps as long as 12,000 years ago (Brevard County 2010). The descendents of these people became more settled, and began societies based on living off the resources of the Indian River Lagoon, the St. Johns River, and the surrounding coastal highlands and high points within the river basins (Brevard County 2010). Known collectively as the archaic people, these are the humans who inhabited the Windover Archaeological site located in north Brevard County (Brevard County 2010). Still later, their descendents became diversified into distinct tribes, the Ais, and the Timucuans, who lived along the shores of the Indian River lagoon and left behind huge mounds of discarded shellfish, animal bones, and fractured pottery (Brevard County 2010). These were the native peoples who were encountered by the first Europeans (Brevard County 2010). At the time Europeans arrived in the sixteenth century, the Timucua occupied the region, fishing, hunting, and farming (FWC, 2010f).

Windover Site

The Windover site, one of the most important cultural discoveries in the New World, is located approximately 1.2 miles from the southeast corner of the SR 50 Unit. The Windover Pond site is considered one of the world's greatest archeological finds (Brevard Museum of History and Natural Science 2010). Accidently discovered in 1982 during road construction for a subdivision, the developer EKS, Inc., made possible archaeological excavations from 1984-1986 (Doran 2002). The significance of the Windover site cannot be understated. The shallow bog pond was the burial ground for more than 200 Native Americans who lived in the area about 7,000 years ago (Brevard Museum of History and Natural Science, 2010). The site has produced the largest skeletal sample of 7,400 year BP in the New World; the oldest bottle gourd north of Mexico; the largest most complex textiles from this time in the New World; a pollen record dating from the end of the Pleistocene to recent; DNA from brain tissue and bone; a dietary reconstruction from gut contents and isotopic analysis; and an excellent inventory of organic artifacts (Doran 2002). "With a sample size of minimally 168 individuals all ages are well represented. Many other samples in North America, earlier and later in time are missing many subadults. At Windover approximately half the sample is less than 20 years of age making it paleodemographically more useful for many kinds of analysis" (Doran 2002). Bone, antler, and wooden tools and woven fabrics are often well preserved in wet sites like Windover (Doran 2002). Lithics were rare at Windover and most artifacts were made of bone, antler, wooden and dental tools (Doran 2002). In most traditional populations around the world lithics are a small part of the material culture inventory. Most organic (bone, wood, etc.) parts of the technology inventory do not survive (Doran 2002), but have at Windover. One thing that makes the Windover site unique is the complex set of hand woven fabrics all dating to the Early Archaic Period (approximately 7,410 years BP). Made from plant fibers, these materials form one of the New World's largest textile inventories from this early period (Doran 2002)

The Archaic Period marks the beginning of the agriculture age by Florida's Native people and the arrival of European conquerors with a resulting decline of Native American cultures. Brevard County would remain largely unsettled through the mid 1830s, with Seminole Indians as the only known inhabitants of the present-day Brevard County (Brevard County 2010). Fort Ann – an important supply depot located on the east shore of the Indian River on a narrow strip of Merritt Island – was established in 1837 (Brevard County 2010). Armed conflicts with the Seminoles dwindled to stalemates and gradually pioneers trickled into Brevard County and by the 1850s a small community was emerging in the vicinity of Sand Point or present day Titusville (Brevard County 2010). The region remained very sparsely settled throughout the Civil War but the region opened up to settlement in the years that followed. In the 1880s, railroad transportation had arrived in Titusville and soon the Flagler line extended the rail line southward through the entire county, which improved transportation from steamboat provided options along the Indian River bringing more settlers and winter tourists (Brevard County 2010).

"Commercial fishing, citrus, agriculture, and resort tourism, and a variety of smaller industries continued to fuel the area's economy and growth until World War II. Afterwards, Cape Canaveral and the Kennedy Space Center produced a boom in the population growth and development that continues to influence the region today" (Brevard County 2010).

A culture resource survey of the St. Johns NWR was done in 1979 (Swindell et al., 1979). This survey was not extensive, but found no archaeological or historic sites of significance. The investigators did speculate that the high dune ridge on the Bee Line Unit might, at one time, have been adjacent to the channel of the St. Johns River. They hypothesized that this site may have had prehistoric habitation. They also surmised that there may be buried sites with no "surface signature" within the boundaries of the refuge. No further cultural resources studies have been done.

Without dedicated staff and funding resources, the Service has done little to manage cultural resources on the refuge. No comprehensive survey has been conducted on the refuge.

SOCIOECONOMIC ENVIRONMENT

Population Trends

The refuge is in Brevard County, Florida. During the 1800s, the region was agriculturally based and included such operations as growing citrus, harvesting palmetto berries, and growing pineapple. With repeated freezes devastating agricultural crops, cattle grazing increased in the region. Various military facilities were developed in the region during World War II. By the 1960s, the National Aeronautics and Space Administration's (NASA) space program instigated considerable growth in the area. The modern economy of the Titusville/Merritt Island area is based on tourism and agriculture, as well as fishing in the Indian River Lagoon and St. Johns River, manufacturing, real estate, services, and government.

By 2008, Florida's population reached 18.3 million, an increase of over 2.3 million since 2000 or 14.3 percent over the 8-year period (U.S. Census 2010a). Seventy-seven percent of Florida's residents live in one of Florida's 35 coastal counties (U.S. Census Bureau 2010a). Florida's population is expected to continue to grow over the next 50 years, anticipated to reach 21 million by 2015 (Zwick and Carr 2006), over 28 million by 2030 (US Census Bureau 2005-2007), and over 35 million by 2060 (Zwick and Carr 2006). With over 536,000 people, Brevard County is the 10th most populated County in Florida and grew by 12.6 percent from 2000. Brevard County municipalities in close proximity to the refuge include the cities of Titusville, Cocoa, and Christmas, while Port St. John is an unincorporated residential area adjacent to the Bee Line Unit (Table 5). Tables 5 and 6 identify population trends for nearby municipal areas, and refuge resident and neighboring counties according to data from the U.S. Census Bureau and Citi-Data.com.

Table 5. Population trends of cities and residential areas near the St. Johns NWR

City/residential area	2000 Population	Population – 2007 or 2009	Percent Population Change	Location in Relation to Refuge
Titusville	40,994	44,510	8.6	Adjacent to the eastern boundary of the SR 50 Unit
Port St. John	12,112+	13,548*	11.8	Adjacent to the eastern boundary of the Bee Line Unit
Christmas	1,192+	1,372*	15.1	Approximately 5 miles west of SR 50 Unit
Cocoa	17,087	16,538	-3.2	Within 10 miles southeast of the Bee Line Unit

U.S. Census Bureau 2010a
+ U.S. Census Bureau, 2010b (http://factfinder.census.gov/home/saff/main.html?_lang=en
**July 2007 population from Citi-Data.com (http://www.city-data.com/city)*

Table 6. Projected population growth of resident and area counties

County	2000 Population*	2009 Population*	2060 Population+	Annual change (2000-2060)+
Brevard	476,230	536,357	1,009,108	8,881
Volusia	443,343	495,890	943,513	8,336
Indian River	112,943	135,167	284,447	2,858
Seminole	365,202	413,204	855,854	8,178
Orange	896,354	1,086,480	2,469,540	26,220
Osceola	172,493	270,618	779,319	10,114

** U.S. Census Bureau 2010a*
+Zwick and Carr 2006

In 2004, average daily traffic on State Road 50 near Interstate 95 was 28,000 vehicles, while average daily traffic on Interstate 95 near State Road 50 was 37,000 vehicles (Florida Department of Transportation 2005b). Near the Bee Line Unit, average daily traffic on State Road 528, 2.3 miles east of the St. Johns River (just west of the refuge), was 29,500 (Florida Department of Transportation 2005b). Further, the refuge's SR 50 Unit has developments pending along its northern border, potentially representing thousands of new homes. Also, the Bee Line Unit abuts the growing area of Port St. John.

Table 7 shows the relationship of demographic, race, education, and economic census indicators between Brevard County, the State of Florida and the United States. According to the U.S. Census Bureau 2006-2008 American Community Survey, 2008 household income in Brevard County rose to $50,080 from $40,099 in 2000 (based on 1999 dollars). Per capita income is all but equal to Florida's value ($27,152 vs. $27,151), but below the national level of $27,466. Brevard County is below the national and state poverty level averages and ranks higher than the state when comparing percent of population over 25 with high school and college degrees. In terms of race, Brevard County has a predominantly white (84.2 percent) population, higher than both national and state averages. Black/African American percent population values (9.7) are lower compared to national (12.3) and state (15.3) percentages of total population. The percent of Hispanic/Latino population in the county is also lower (6.9) compared to state (20.5) and national (15.1) percentages while, Brevard County Asian percent population (2.0) is just below the state value of 2.2 percent.

Table 7. 2006-2008 demographics of Brevard County in comparison to Florida and the United States

Characteristic	Brevard County	State of Florida	United States
Demographic			
Population 2008	534,165	18,182,321	301,237,703
Population Increase (%) since 2000	12.6	14.3	7.0
Median Age (years)	43.6	40.1	36.7
18 years and over (%)	79.8	77.9	75.5
65 years and over (%)	20.2	17.1	12.6
Race/Ethnicity (%) of Population			
White	84.2	76.7	74.3
Black/African American	9.7	15.3	12.3
Hispanic/Latino (of any race)	6.9	20.5	15.1
Asian	2.0	2.2	4.4
Education (% of population over 25)			
High School degree	90.2	84.9	84.5
College degree	26.0	25.7	27.4
Economic			
Median household income	50,080	48,637	52,175
Per capita income	27,152	27,151	27,466
Families below poverty level (%)	6.7	9.0	9.6
Individuals below poverty level (%)	9.6	12.6	13.2

U.S. Census Bureau, 2006-2008 American Community Survey

Economy, Recreation and Tourism

Not only does Florida have a high number of residents and high growth rates, it also experiences high levels of tourism. Nearly 84 million people visited Florida in 2006 (Florida Department of Transportation and University of South Florida 2008). Florida is the top travel destination in the world (Visit Florida 2008). An estimated 84.5 million people visited Florida in 2007, up from 72.8 million in 2000 (Visit Florida 2008). Tourism spending increased over the same period to $65.5 billion from $50.9 billion, providing state sales tax revenue of over $3.9 billion and employing over 990,000 people in 2007.

Florida's economy relies heavily on tourism, but other sectors play important roles in Florida's economy. Nearly 40 percent of all U.S. exports to Latin America and South America move through Florida. The space industry represents $4.5 billion of Florida's economy with average annual wage of aerospace workers at approximately $52,000. The number employed at the Kennedy Space Center alone is 15,000, and Florida ranks 4th among all the states in overall aerospace employment with 23,000 jobs. In terms of agriculture, Florida leads the southeastern United States in farm income, producing about 75 percent of the U.S. oranges and roughly 40

percent of the worlds orange juice supply. Growth in high tech, finance, and back office operations is also strong with many small entrepreneurial software companies recently established. Additionally, more than $500 million per year in sponsored research at Florida universities provide another major economic factor (Visit Florida 2008).

REFUGE ADMINISTRATION AND MANAGEMENT

Without dedicated staff stationed on-site, the Service is limited in the level of land protection and conservation it can provide. The Merritt Island NWR's biologist is responsible for providing habitat and wildlife management services at St. Johns NWR, but this is a collateral duty only.

LAND PROTECTION AND CONSERVATION

St. Johns NWR was established in August 1971 to provide protection for threatened and endangered species and to promote native diversity. Establishment of the refuge was in response to a serious decline of the dusky seaside sparrow (*Ammodramus maritimus nigrescens*). The salt marshes of Merritt Island once contained hundreds of dusky seaside sparrows, but the conversion of high marsh to impoundments caused a drastic reduction in their numbers and the species was formally listed as endangered in 1967.

A two-pronged approach was developed to save the species which included purchasing marsh lands along the St. Johns River. To this end, the first acquisition for the refuge occurred on August 16, 1971, when 9.6 acres were purchased for $2,174. It was this acquisition that formally established the refuge and to date approximately $2.9 million has been expended to acquire the existing 6,257-acre compliment of refuge lands. After establishment, the Service began management activities including field studies, backfilling ditches to restore hydrology, installing gates and barricades to control dumping, controlling woody vegetation, and implementing a formal fire management program. Despite the collective efforts of the Service and partners, the population of dusky seaside sparrows continued to drop precipitously and sadly, the dusky seaside sparrow was officially declared extinct in 1990.

As mentioned just above, 6,257 acres have been acquired since the first parcel was purchased: 4,241 acres of the SR 50 Unit (Figure 3) and 2,016 acres of the Bee Line Unit (Figures 4 and 5). The refuge's management boundary represents 6,257 acres while 6,757 acres occur within the approved acquisition boundary. Roughly 1,010 acres within the acquisition boundary privately held. Efforts to acquire lands greatly reduced as the fate of the dusky seaside sparrow became more and more evident and for all practical purposes, the land acquisition program ended in 1980, with the most recent parcel acquired in calendar year 2000 through donation. The refuge shifted its management focus to providing and maintaining habitat opportunities for a suite of migratory and resident birds, some of which are federal or state listed species and/or considered species of management concern.

At the SR 50 Unit, the Service manages most of the lands and waters within the acquisition boundary. Interestingly, the refuge owns and manages two areas outside of its official acquisition boundary – the Fox Lake tract and an area of the SR 50 Unit colloquially referred to as the 'T' (Figure 3). These areas have been owned and managed as part of the refuge since the mid-1970s, and a few of the parcels that constitute each area include some of the first lands acquired. A number of tracts are privately held throughout the southern portion of the Bee Line Unit (Figure 4) in an area the refuge refers to as the Checkerboard (Figure 5), where a random and mixed ownership pattern occurs.

The Bee Line Unit Checkerboard is an approximately 1,116-acre area of platted and subdivided tracts of mostly 1- to 2-acre parcels and a series of rights-of-way. The refuge owns roughly 507 acres of the Checkerboard with roughly 609 acres privately held or occurring as easements/rights-of-way.

This mix of multiple owners and the chaotic ownership pattern constitute one of the principle management conundrums for the refuge. All Checkerboard area management options are influenced by and greatly restricted as a result. From the inability to perform basic management functions, such as prescribed fire and habitat maintenance to the inability to protect the refuge boundary from unpermitted uses, the Checkerboard has become an undisciplined area where many forms of unpermitted activities now occur, including mud bogging and many other forms of ATV and ORV use. Partner agencies including Brevard County have identified Checkerboard inholdings as part of their EEL land acquisition programs and the refuge has discussed management options with partners in an attempt to consolidate ownership, further law enforcement strategies, and protect the refuge from unpermitted uses, but no formal agreements have been developed.

A summary of our approach to create updated coverage for the maps developed in this Draft CCP/EA can be found as metadata accompanying the GIS digital files (Service 2010e).

VISITOR SERVICES

St. Johns NWR is closed for public recreation or access because of a lack of appropriated funds, staff, and visitor facilities (e.g., trails, signs, and roads). However, staff and volunteers occasionally conduct special guided educational tours on the refuge. And, annually about 10 special use permits are issued to allow research and other access, including for special tours during the annual Space Coast Birding and Wildlife Festival.

Overall though, no services are provided for visitors other than the occasional tours just mentioned. Due in large part to its closed status, there is a general lack of public awareness about the refuge, its mission, purposes, resources, and values. Information including basic signs and brochures about the refuge are insufficient.

PERSONNEL, OPERATIONS, AND MAINTENANCE

Past and current management actions on St. Johns NWR have included prescribed burning, fire suppression, herbicide treatments, and hydrologic restoration. These habitat management activities are in addition to law enforcement and routine operations, such as boundary posting and road maintenance.

The refuge does not have dedicated personnel, nor staff stationed on-site. Merritt Island NWR staff (Figure 13) administer all actions necessary to manage the St. Johns NWR through collateral duties, including wildlife and habitat management, resource protection, limited visitor services, and refuge administration.

In terms of facilities, the refuge has one small storage building on the SR 50 Unit in which fire suppression and management tools and equipment are stored. Several miles of unpaved roads require maintenance periodically, as do ditches. Heavy grading and maintenance equipment from Merritt Island NWR is used for this purpose. The refuge also has several signs that require upkeep and maintenance in addition to a boundary fence system and access gates in strategic locations of the Bee Line Unit.

Fire Management

Fire management activities include both wildland fire suppression and prescribed burning.

Wildland Fire Suppression
All units of the refuge are in close proximity to sensitive areas. The SR 50 Unit is bordered on the south by State Road 50 and on the east by Interstate 95. Across I-95 are several commercial developments. The Bee Line Unit has a large subdivision to the east, and state highways 407 and 528 to the northwest and southwest. Because of this urbanization/suburbanization, all unplanned ignitions are suppressed.

Since 1975, 69 wildfires have been recorded on the refuge. At least one large fire occurred on the refuge before good records were kept. This one was important because it burned several thousand acres of dusky seaside sparrow habitat.

Most of the fires on the refuge have been suppressed by using a combination of helicopter bucket drops followed up by ground attack and mop up operations. Fires in the marsh grasses tend to be intense and fast-moving. The helicopter provides quick initial attack with minimal risk to firefighters. After the fire is slowed down, hand crews or amphibious vehicles can be used to completely extinguish it. During severe droughts, engines can drive through the marsh areas and have been used.

Prescribed Fire History
Even though the refuge was established in 1971, no prescribed burning was done during the 1970s. Land was being purchased and ownership fragmented to such an extent that prescribed fire was not feasible. However, several major wildfires did occur between 1973 and 1976 that burned 90 percent of the dusky seaside sparrow habitat on the refuge.

In 1980, a Fire Management Plan (FMP) was developed for the refuge (Leenhouts 1980). The FMP had 24 burn units on the SR 50 Unit and 11 burn units on the Bee Line Unit. No burning was planned on the Fox Lake Tract. Burning started in 1981 with three units burned totaling 360 acres. By 1983, it was decided that 35 units required more resources to manage than were available. The many small units were incorporated into two on the SR 50 Unit and one on the Bee Line Unit.

This configuration lasted until 1996. During the ensuing time period, the objectives of the refuge shifted from maintaining habitat for the dusky, which was declared extinct in 1990, to ecosystem management. Biological work on black rails (Legare 1996b) showed that St. Johns River floodplain and the refuge provided important habitat for this species. While studying these birds, it was discovered that burning large acreages using a head fire techniques was detrimental. In an effort to provide escape and recovery habitat for secretive marsh birds, the large burn units were subdivided into six burn units on the SR 50 Unit and four burn units on the Bee Line Unit. At this time the Fox Lake Tract was incorporated into a separate burn unit.

To date, 40 prescribed fires have been conducted on the refuge. Of these, 23 were on the SR 50 Unit and 17 were on the Bee Line Unit. There have been no prescribed fires on the Fox Lake Tract. Three general objectives were established for these fires. The first objective is fuels reduction. This is especially important on the Bee Line Unit with the subdivision adjacent to the eastern side. Periodic prescribed burns reduce the hazard of wildfires escaping and damaging homes. The SR 50 Unit also has structures adjacent to it, but the main concern on this unit is avoiding smoke on State Road 50 and Interstate 95, which negatively affects traffic and safety on these busy highways.

The second objective for prescribed fire is ecosystem health. As fire consumes the vegetation, it releases nutrients tied up in the dead and decadent biomass. These nutrients are quickly recycled as the marsh grasses regenerate. When the marsh grows back, it is more open, providing the wildlife easier access through the area. The final objective is to reduce the woody vegetation that has spread into the marshes. Normally, fire only top-kills the brush, which soon re-sprouts. However, setting the brushy species back every few years helps prevent them from completely taking over the site and shading out the native marsh grasses.

Invasive Species Management

In 2000, Merritt Island NWR began participation in a FDEP program where public land management agencies could submit proposals for exotic plant control project funding. To date, Merritt Island NWR has not included the St. Johns NWR in the FDEP projects, focusing efforts on protecting native plant diversity and protecting wildlife habitat on the larger Merritt Island NWR. The Complex will continue to seek invasive plant control project funding from FDEP.

Control efforts by Complex staff have historically been uncoordinated and typically focused on controlling exotic plants along selected roads and firebreaks. The refuge receives no earmarked or dedicated funding for exotic plant control. All exotic plant control efforts have been funded out of limited operations monies from the Merritt Island NWR Complex.

Limited herbicide applications on the refuge have been made to control exotic and invasive plant species. Two problematic exotic plants include Brazilian pepper and cogongrass. The former occurs both along roads and ditch banks, as well as in some of the higher marsh areas. Both aerial and ground applications of Garlon have been used to control this exotic. Cogongrass is usually treated with ground applications of Roundup.

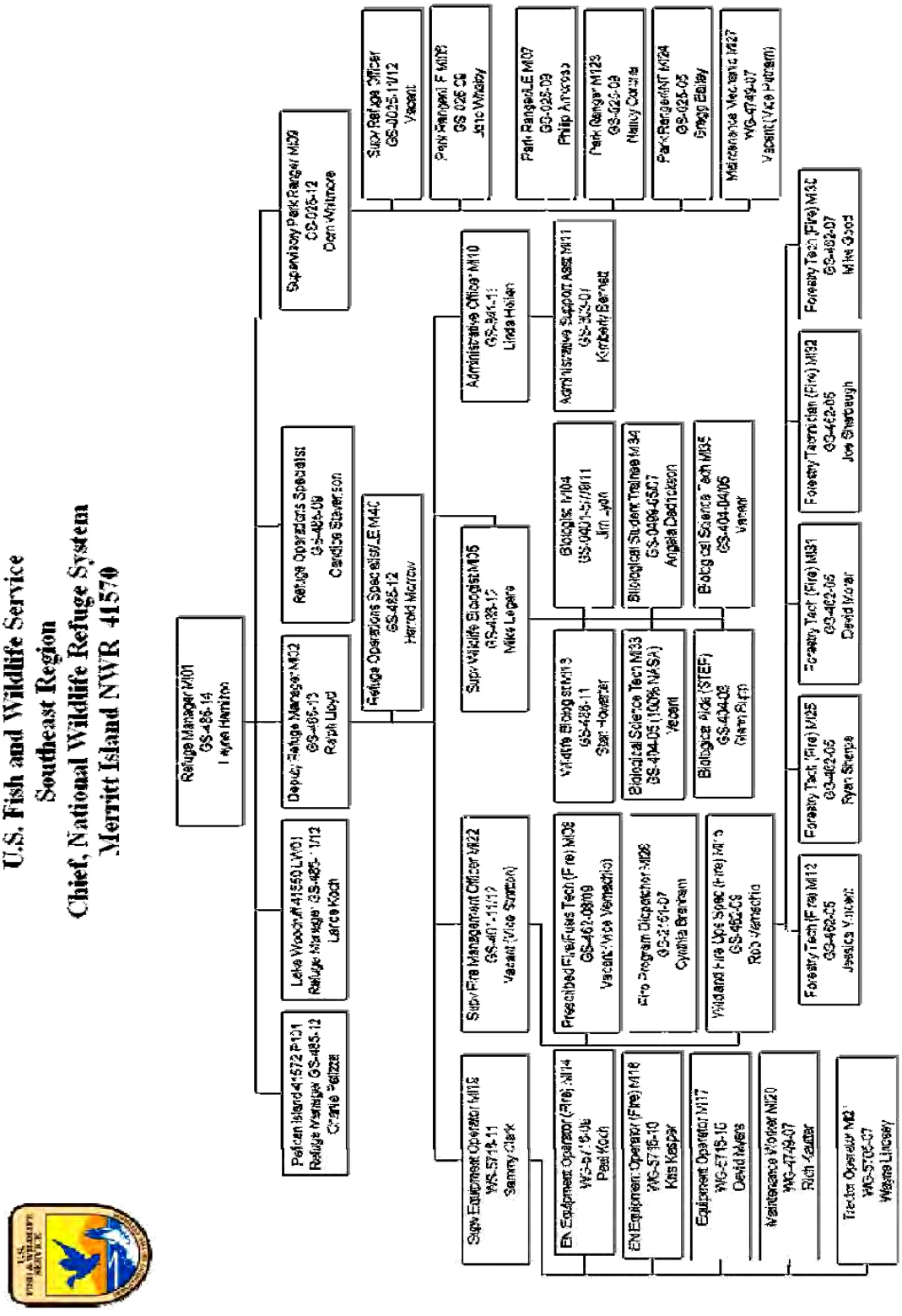
Restoration of Hydrology

The hydrology of the refuge has been radically altered over the years, as noted earlier. Ditching for agriculture was conducted during the early 1900s on the SR 50 Unit. Hacienda Road and other roads were built on the SR 50 Unit later. Some of ditches on the SR 50 Unit were filled in during the 1990s as part of a mitigation project associated with the widening of State Road 50. This has partially restored the area's original hydrology.

Law Enforcement

Known illegal activities on the refuge include poaching, vandalism, dumping, and trespass. The SR 50 Unit often incurs illegal airboat use, poaching, and trespass via ATVs. Without dedicated staff, the refuge is managed from the headquarters of Merritt Island NWR, which is about a 20-minute drive from the SR 50 Unit and a 40-minute drive from the Bee Line Unit. Law enforcement response times for the refuge are not immediate and vary depending upon the availability and location of the officer. All units of the refuge have private adjacent landowners, through which accessibility to the refuge is limited. Some portions of the SR 50 Unit are accessible only by a Marsh Master or airboat. Further, the non-contiguous nature of the checkerboard area of the Bee Line Unit makes it extremely difficult to post signs on and fence off the refuge. This makes it easier to illegally access the refuge.

Figure 13. Merritt Island NWR Complex organizational chart



III. Plan Development

OVERVIEW

Although fire management step down planning and other forms of natural resources management including exotic control and hydrologic restoration projects have occurred on the refuge since its establishment in 1971, a comprehensive plan addressing the four refuge action areas - wildlife and habitat management, resource protection, visitor services and refuge administration – has never been developed. This Draft CCP/EA process allowed the Service, the governmental and non-governmental partners, and the public the opportunity to take a comprehensive look at the refuge and its management, resources, and future. Plans are revised every 15 years or earlier if monitoring and evaluation determine that changes are needed to address new information and/or to achieve refuge purposes, vision, goals and/or objectives. The basic steps of the planning process involve gathering information, scoping for public input, developing the Draft CCP/EA, gathering public input on the Draft CCP/EA, developing a Final CCP, and implementing and monitoring the actions identified in the Final CCP.

PUBLIC INVOLVEMENT IN THE PLANNING PROCESS

The planning process began with various data-gathering sessions. As part of this process, the Service conducted the following reviews: Wildlife and Habitat Management, Visitor Services, and Wilderness. In addition, the Service developed a Core CCP Planning Team which took input from the public and from an Intergovernmental Coordination Planning Team.

The core planning team consisted exclusively of refuge and contract staff and a Service natural resource planner. Key tasks of this team involved defining and refining the vision; identifying, reviewing, and filtering issues; defining the goals, objectives and strategies; developing projects; and outlining the alternatives. Core team members included:

- Layne Hamilton, Project Leader, Merritt Island NWR Complex
- Mike Legare, Senior Wildlife Biologist, Merritt Island NWR Complex
- Ralph Lloyd, Deputy Project Leader, Merritt Island NWR Complex
- Dorn Whitmore, Senior Refuge Ranger, Merritt Island NWR Complex
- Candice Stevenson, Wildlife Refuge Specialist, Merritt Island NWR Complex
- Bill Miller, Natural Resource Planner/Wildlife Biologist, FWS, Southeast Region
- Billy Brooks, Fish and Wildlife Biologist, North Florida Ecological Services Field Office
- Tim Towles, Biological Scientist IV, Division of Habitat and Species Conservation, Florida Fish and Wildlife Conservation Commission

Members of the core planning team met regularly to review public comments, data, and information collected to write the Draft CCP/EA. Professional reviews of the refuge were conducted to determine status, trends, and constitution of refuge resources and facilities. Experts from the Service, including Regional Office representatives from Refuges and Visitor Services', regional experts representing Ecological Services, and refuge staff participated in a refuge Wildlife and Habitat Management Review in 2005. A Visitor Services Review was conducted concurrently with the Wildlife and Habitat Management Review in 2005. A Wilderness Review was conducted in 2006 by Service staff. In this review of the federally owned lands within the legislatively defined boundary of the tefuge, no additional lands were found suitable for designation as wilderness (Appendix H). The information garnered from these reviews helped the planning team analyze and develop recommendations for this Draft CCP/EA.

Following the initial gathering of information a notice of intent to prepare a CCP was published in the *Federal Register* on December 14, 2009, which marked the official beginning of the public scoping process. Once the concurrent CCP and NEPA processes were underway, two workshop style meetings were held on January 21, 2010. The first was held with inter-governmental partners during the morning and afternoon of January 21, 2010, while the second was held on the evening of January 21, 2010, with members of the public.

As mentioned, the initial planning meeting for the Draft CCP/EA was held January 21, 2010, and included representatives from the Service, FWC, SJRWMD, city of Titusville, Brevard County, and USDA National Resources Conservation Service (NRCS). Letters were written requesting participation of natural resource management representatives to join refuge staff in an agency workshop held on the morning and afternoon of January 21, 2010. This Inter-governmental Coordination Planning Team included representatives from the above-mentioned organizations. The workshop was attended by 23 agencies including refuge staff involved with local and regional resource management.

The Service prepared a press release on January 13, 2010, announcing a public scoping meeting to be held on the evening of January 21, 2010, to gather public input. The news release included the public scoping meeting date, time, location and meeting purpose and was provided to regional news outlets including the Orlando Sentinel and the Daytona News-Journal, which published articles on the meeting on January 19, 2010 and January 21, 2010, respectively. Scoping meeting details were also announced on the refuge's webpage (http://www.fws.gov/stjohns/) on December 22, 2010, and in the Merritt Island Wildlife Association *Habi-Chat* Winter 2009 newsletter. Thirty five members of the public attended the evening scoping meeting held at the Merritt Island NWR visitor center. We also received nineteen electronically mailed and three phoned comments in addition to the inputs received during our public scoping meeting.

The Service is seeking comments regarding this Draft CCP/EA as the next stage of public involvement. Adjustments will be made to the Draft CCP/EA accordingly in preparation for the final CCP.

SCOPING OF ISSUES AND CONCERNS

The planning team identified a number of issues, concerns, and opportunities related to fish and wildlife protection, habitat restoration, recreation, and management of threatened and endangered species. Additionally, the planning team considered federal and state mandates, as well as applicable ordinances, regulations, and plans. All public and Intergovernmental Coordination Team comments were considered; however, some issue fall outside the scope of the decision to be made within this planning process. The planning team developed a Draft CCP/EA that attempts to consider the most important issues facing the refuge. These issues are:

- Threats to rare, threatened, endangered and trust species
- Increasing demand for public use
- Fragmented ownership patterns
- Water resource management challenges
- Occurrence, invasion, and spread of pest species
- Challenges to implementing an appropriate fire regime to maintain habitat
- Lack of resources
- Growing human population, encroachment, and associated threats and impacts

In addition to these priority issues, other issues include the trust responsibilities of the refuge. The issues to be addressed during the 15-year life of the final CCP are divided into four categories: wildlife and habitat management; resource protection; visitor services; and refuge administration.

ISSUES

The refuge is biologically diverse, a place where over 300 species of fish, wildlife, and plants occur. The habitat diversity and location of the refuge offer fish and wildlife including federal and state listed species, migratory birds, secretive marsh birds, wading birds, and native species. The refuge also offers an undeveloped landscape of prime habitat. However, increased human population growth, urbanization, and suburbanization, and the development of lands around the refuge will eventually increase public use demands and are expected to increase associated impacts to the refuge. Unpermitted activities, including ATV and ORV use, presently occur on the refuge and have degraded habitat value. Additional direct and indirect activities potentially impacting the refuge over time include commercial, residential, and recreational uses around the refuge that contribute to a degradation of water quality, provide a seed source and potentially contribute to the spread of exotic species, and increase wildlife and habitat disturbance. Ongoing development of the landscape is consuming and fragmenting remaining off-refuge habitats which are also used and needed by many refuge wildlife species for additional breeding, nesting, foraging, migration, and dispersal opportunities.

Controlling the spread of exotic species, formulating a better understanding of refuge hydrology, maintaining and providing habitat opportunities for secretive marshbirds and wading birds, controlling unpermitted uses from destroying habitat value and function, providing a greater refuge presence, promoting a fire management program that utilizes biologic values as indicators of frequency and interval, providing for and protecting a functional refuge boundary, providing for appropriate and compatible forms of visitor services, and providing for the administration of refuge operations and maintenance are issues to be addressed in the15-year life of the final CCP.

WILDLIFE AND HABITAT MANAGEMENT

The refuge and its fish and wildlife have been affected by increasing development pressure and associated habitat loss; altered quality, quantity, timing and flow of freshwater; spread of exotic, invasive, and nuisance species; declines and threats to rare, threatened, and endangered species; and potentially from the effects of climate change on habitat function and value and/or species utilizing these trust resources.

Data Needs and Comprehensive Habitat Management

The refuge is unable to evaluate the status and trends of many fish and wildlife species and their habitats due to the lack of sufficient baseline data. In addition, the refuge lacks a comprehensive habitat management plan to help guide management, monitor results, and adapt management as necessary to maintain and where necessary restore habitats to as close to pre-drainage conditions as possible.

Refuge Hydrology

The refuge is part of the Upper St. Johns River Basin and as such, the predominant flow of refuge water occurs as sheet flow across the landscape in a north and westward direction to the St. Johns River. The predominant habitat type on the refuge is emergent or palustrine wetland cordgrass marsh. Uplands of pine/palmetto flatwoods and oak scrub occur as do a mix of disturbed settings including borrow pits, roads, levees, and ditches; but the defining and most influential natural force is water and its relationship with species occurring here is an important and little known variable for refuge management. Increased demand for water for human uses and the degradation of water supplies from non-point source pollution negatively impact water quality and quantity. Surface and

groundwater hydrology on the refuge has been altered through a series of dikes, levees, and flood control alternations, but the influence of these structures on refuge habitats and species is not fully understood. Flood control, water supply, and water quality issues will intensify as a growing population occupies more land in the immediate vicinity of the refuge and upstream of the St. Johns River watershed. Developing a greater understanding and basing impacts of hydrologic restoration on refuge hydrology will be critical to the selection of appropriate hydrologic restoration options that benefit long-term ecological processes of the refuge.

Freshwater Marshes
The refuge supports some of the last remaining remnant saltmarsh—a relic habitat type intermixed within cordgrass marshes and left over from the days when these lands were connected to tide—known in Florida. The St. Johns NWR marsh setting supports a wide array of bird species including six species federally designated as birds of management concern like the black rail; a variety of wading birds like the federally listed wood stork, and state listed species like the little blue heron and snowy egret; and more than 300 species of plants and animals such as suites of native amphibians, reptiles, fishes, mammals, invertebrates, and plants. As marshes continue to decline regionally, the protection and maintenance of refuge freshwater marshes will continue to play an increasingly important role in the long-term population and health of native species dependent on this habitat.

Climate Change
The role of climate change on the refuge is not understood. Climate change has the potential to impact the refuge, its resources, and future management while also exacerbating other wildlife and habitat management issues including fire intensity and frequency, spread of exotic, invasive and nuisance species, water relationships including availability and potential flood control, and impacts on changing patterns of suitable habitats for rare, threatened, and endangered species. Developing a clearer understanding of impacts associated with a changing climate on the refuge, its resources, and habitats is paramount to adapting management actions that meet the demands and changes brought forward by a rapidly changing climate.

Exotic, Invasive, and Nuisance Species
Non-native, invasive, and nuisance species negatively influence native species through habitat alternation, resource competition, predation, or any combination of these factors. All major habitat types on the refuge are infested at some level with exotic, invasive plants including: melaleuca, Brazilian pepper, Old World climbing fern, cogongrass, camphor tree, Chinese tallow, air potato, para grass, and several other Florida Exotic Pest Plant Council Category I invasive species(FLEPPC 2009). Throughout its existence, the refuge has been able to control populations of these species at maintenance levels through grants and cost share, despite the lack of a refuge-specific staff or budget. Controlling pest plants has been the refuge's priority management program. Existing and new exotic, invasive, and nuisance species will continue to infest native habitats on the refuge and throughout the Upper St. Johns River Basin. Future maintenance control efforts will be necessary to keep existing populations at maintenance levels and protect the refuge from off-site seed sources that continue to infest the refuge. Costs for exotic control efforts will continue to increase as labor, equipment, and materials used to treat exotic, invasive, and nuisance species rise. Given the extent to which exotic, invasive, and nuisance species are a problem for Florida's conservation lands and the current incidence of these species on the refuge, management must continue to limit the impacts of these species.

Rare, Threatened, and Endangered Species
The protection and recovery of threatened and endangered plants and animals are important responsibilities of the Service and national wildlife refuges. Four federally listed species utilize the refuge including wood stork, eastern indigo snake, American alligator, and northern crested caracara. Additionally, the refuge supports six bird species federally designated as birds of conservation

concern and nine species (eight birds and one reptile) listed by the State of Florida as either endangered, threatened, or a species of special concern. These species use a variety of habitats including open water, wetlands, and upland communities. The refuge's large component of freshwater marshes has become increasingly important on a regional scale due to the loss of this important habitat in central Florida, while the refuge's uplands are becoming more important as a sanctuary for species whose habitat is being lost to development. Without conservation lands and waters and protection measures, these species are likely to continue to decline.

RESOURCE PROTECTION

The refuge lacks many physical and administrative features that would protect refuge interests from non-permitted uses and help the refuge to better plan for present and future refuge needs. This is especially true when considering the unwieldy ownership and condition of Bee Line Unit's checkerboard. Parcels within this approved, platted, undeveloped subdivision of roughly one-sixth-acre lots are owned by hundreds of different entities. The refuge owns and manages roughly 45 percent of the total checkerboard area. This unit has a long history of unpermitted use - from illicit hunting activity to all forms of ATV/ORV use to dumping. Sport activities including ATVs and ORVs have played a long-term chronic role in damaging refuge resources. Mud pits and vehicular trails dot and crisscross the refuge landscape, creating disturbances to wildlife and habitat, potentially requiring the advent of expensive large-scale hydrologic restoration projects requiring many years to plan, build, and result monitor. Additional facilities including fencing, boundary posting, gates, signs, and staff and maintenance funds would be needed to ensure the refuge is protected from non-permitted uses at this scale and magnitude.

In order to increase protection of refuge interests and provide for a fully functional boundary, acquisition of inholdings, consolidation of lands through land swaps, cooperation and participation of partner agencies, and other forms of land acquisition would be necessary. In the Bee Line Unit checkerboard, the refuge lacks clarity regarding its management boundary, including the lack of complete, clearly defined surveys of the management boundary in key locations. The lack of this information results in the possibility for issues with encroachment, limits the ability to successfully post and enforce boundaries, and limits the ability for law enforcement to engage in even the most basic of refuge resource protection needs including trespass, vandalism, and protection from non-permitted uses.

VISITOR SERVICES

Priority visitor services management issues at the refuge are directly linked to the increasing and changing human population, developing of the landscape, increasing recreational uses of the region and demands for more, and the associated wildlife and habitat impacts of all of these. The refuge is presently closed to all but refuge-led or refuge-approved tours to support environmental education and interpretation and wildlife observation and photography. Requests are considered on a case-by-case basis and approved through the special use permit process. This closed status has contributed to a lack of appreciation and understanding of St. Johns NWR, the Upper St. Johns River Basin, the greater Refuge System, and the mission of the Service. In addition, the closed status of the refuge limits the awareness of the refuge and conveyance of specific messages to Brevard County and neighboring communities. The lack of visitor presence may exacerbate the use of non-permitted activities including ATVs/ORVs.

REFUGE ADMINISTRATION

Several administration concerns arise when looking at the current and future management needs of the refuge. Given the relative rural location of the two refuge units, coupled with the complexity of issues the refuge faces over the 15-year life of the final CCP, including boundary consolidation and protection, impacts resulting from hydrologic restoration, impacts associated with climate change, and the continued need to control exotic, invasive, and nuisance species, the refuge will require increased levels of coordination with the governmental partners, area residents, and not-for-profit organizations.

A key component that limits refuge administration is the lack of resources. Apart from the Merritt Island NWR fire management program's ability to deliver prescribed and unwarranted wildland fire support, there is a need for dedicated staff and funding to pursue the purposes, vision, and goals of the refuge. The lack of Service visibility and presence on the refuge further impacts the Service's ability to accomplish stated goals and objectives. Presently, a well-intentioned, reactive effort to provide Service law enforcement presence through the Merritt Island NWR Complex exists, but the lack of dedicated St. Johns NWR law enforcement personnel to proactively administer refuge regulations and provide boundary protection invites unpermitted activities such as mud-bogging and other forms of trespass. Additionally, maintenance, outreach and environmental education, and basic biological program needs are presently performed unfunded, through the Merritt Island NWR Complex staff. The refuge has one small storage building, several miles of unpaved roads and ditches that require maintenance, signs, and gates and fences at various levels of disrepair due to constant levels of vandalism, but no resources for necessary repair and maintenance.

Wilderness Review

Refuge planning policy requires a wilderness review as part of the comprehensive conservation planning process. The results of the wilderness review are included in Appendix H. In summary, no lands or waters of the refuge were found suitable for designation as wilderness at this time. As such, no further evaluation of wilderness was conducted.

PUBLIC REVIEW AND COMMENT

Postcards will be mailed to those parties on the comprehensive conservation planning process mailing list to provide an opportunity to request compact disk or paper copies of this Draft CCP/EA for review. In addition, the St. Johns NWR webpage (http://www.fws.gov/stjohns/) will provide a link to a downloadable version of this Draft CCP/EA. Copies will also be provided to the Florida State Clearinghouse for review, as well as to other interested governmental agencies and at the Merritt Island NWR Visitor Center.

IV. Management Direction

INTRODUCTION

The Service manages fish and wildlife habitats considering the needs of all resources in decision-making. But first and foremost, fish and wildlife conservation assumes priority in refuge management. A requirement of the Improvement Act is for the Service to maintain the ecological health, diversity, and integrity of refuges. Public uses are allowed if they are appropriate and compatible with wildlife and habitat conservation. The Service has identified six priority wildlife-dependent public uses. These uses are: hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation.

Described below is the proposed plan for managing the refuge over the next 15 years. This proposed management direction contains the goals, objectives, and strategies that will be used to achieve the refuge vision.

Three alternatives for managing the refuge were considered: Alternative A: Current Management (No Action Alternative); Alternative B: Management for Rare, Threatened, and Endangered Species; and Alternative C: Enhanced Wildlife and Habitat Diversity. Each of these alternatives is described in the Alternatives section of the EA. The Service chose Alternative C as the proposed management direction.

Implementing the proposed alternative would result in increased protection and management for vast assemblages of bird guilds including marsh, wading, and summering and wintering birds. Research would be increased, providing opportunities to better understand and manage for the diversity of habitats and wildlife. Implementing hydrologic studies would provide management with detailed information of water quantity, quality, timing, and delivery of ground and surface water systems. Continued control of invasive, exotic, and nuisance species would be provided. Management would evaluate the effectiveness of mechanical and limited agricultural options (e.g., mowing, cattle grazing) as an integrated approach with prescribed fire and exotic control to control vegetation and provide open marsh habitat for northern crested caracara and marsh birds. Management would have a better understanding of the role of climate change on refuge resources. Law enforcement presence would be enhanced, providing greater control over unpermitted uses including mud-bogging. A minor expansion proposal of the approved acquisition boundary of approximately 459 acres would provide options for landowners in the acquisition boundary expansion area to enter into acquisition strategies with the Service in an effort to connect the refuge to the larger network of publicly managed lands. Public awareness would improve as portions of the refuge would be opened for the first time to passive recreation, including wildlife observation, wildlife photography, and environmental education and interpretation. The compatibility of implementing a white-tailed deer and feral hog hunting program would be analyzed as an additional visitor services attribute. Finally, staff would be added, funding administered, and management would focus on improving existing local and regional partnerships.

VISION

St. Johns National Wildlife Refuge was established in 1971 in an attempt to save the highly endangered dusky seaside sparrow from extinction. The Service immediately set about managing refuge habitats to benefit the highly specialized sparrow. Unfortunately, these efforts proved to be a case of “too little, too late,” to save this sub-species, which eventually vanished and was formally declared extinct in 1990. While the refuge was unable to rescue this bird from the brink of oblivion, in the nearly 40 years since its creation, it has provided important habitat for a number of species.

In the future, St. Johns NWR would have quality emergent marsh habitat that would be free of exotic and invasive species and that would support healthy populations of rare species, properly functioning hydrology, appropriate public use, adequate staffing and partners, and a pattern of conservation lands sufficient to allow proper management of the refuge within the landscape.

GOALS, OBJECTIVES, AND STRATEGIES

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

These goals, objectives, and strategies reflect the Service's commitment to achieve the mandates of the Improvement Act, the mission of the Refuge System, and the purposes and vision of St. Johns NWR. The Service intends to accomplish these goals, objectives, and strategies within the 15 years following approval of the final CCP.

WILDLIFE AND HABITAT MANAGEMENT

The proposed wildlife and habitat management activities are provided under four subject areas: rare threatened and endangered species; hydrology; exotic, invasive and nuisance species; and native wildlife and habitat diversity. A Habitat Management Plan would need to be developed for the refuge to fulfill the goals, objectives, and strategies outlined in this chapter.

Rare, Threatened, and Endangered Species

Goal 1: Conserve, protect, and enhance populations of rare, threatened, and endangered species of plants and animals at existing or increased levels on the refuge and conserve, protect, manage, and restore the St. Johns River Upper Basin habitats occurring on the refuge to contribute to recovery goals.

Discussion: The refuge was originally established in 1971, to provide habitat for threatened and endangered species, in particular the dusky seaside sparrow (*Ammodramus maritimus nigrescens*). Unfortunately, the last known sighting of this subspecies in the wild was in 1980, and it was officially declared extinct in 1990. Despite this irrevocable loss to biodiversity, at least 20 other federal and state listed species still occur at St. Johns NWR, including four federally listed wildlife species. Today, St. Johns NWR is managed on their behalf, especially for rails and secretive marsh birds. Indeed, the refuge represents what may well be the most important wintering and breeding habitat for black rails in the eastern United States. It is also very valuable for king rails and many other species of marsh birds. Overall, marsh bird management would take precedence on the refuge over the next 15 years, and management focuses for other species or habitats would be secondary to the primary aim of marsh bird management.

Objective 1-1: Marsh Birds – Over the 15-year life of the CCP, prioritize habitat management for marsh birds such as black and king rails, wading birds, meadowlark, marsh wren, least bittern, Virginia rail, snipe, and northern harrier.

Discussion: This objective includes both marsh and secretive marsh birds such as rails. The refuge has an array of rare, threatened, and endangered marsh birds, though their presence, distribution, and abundance are not well-documented due to a lack of staffing and resources. In general, our aim is to maintain open *Spartina* (cordgrass) marsh on the refuge. The general rule of thumb in pursuing this management direction is that when shrubs overtop the grass, we would conduct a prescribed fire. We

would try to burn so as to reduce direct mortality on rails. The principal method of avoiding mortality is by having burn units that are not too large so as to trap birds. Having smaller burn units give birds a chance to more readily escape the flames, heat, and smoke of fires. Birds have serious fidelity to their territories and are reluctant to leave them. Having more burn units also allows the marsh to burn more slowly. Moreover, smaller burn units also contribute to the heterogeneity of age classes. We intend to alter the spatial patterns of prescribed fire. Adaptive management principles would be used to identify the preferred size, frequency, timing, and distribution of prescribed fire activity that best suits marsh birds. Prescribed fire management would be evaluated through monitoring marsh bird response. Frequency, seasonality, and size among other attributes of prescribed fire management would be adjusted to best accommodate for the life needs of marsh birds.

We would burn for summering birds in the winter, for wintering birds in the summer, and for year-round resident birds with smaller fires. Preferred fire frequency is the same for all bird guilds. The seasonality of burns would change; right now the season for burns is moving back towards the summer season and we plan to shift prescribed burning to late summer/early fall seasons (August-October). Small units promote an early season and slower management and we plan to maintain 10 fire units (Figures 10 and 11). In addition, if opportunities arise, we would burn the Checkerboard of the Bee Line Unit, adding fire units to the refuge compliment. With regard to firing logistics, backing cool fires facilitates fuel consumption in areas not routinely burned through head or flanking fires. Burning the southeast corner of each unit promotes less particulate matter in the air; for the possibility of burning without a southwest wind, there are smoke issues on Interstate 95. Finally, there can be smaller burns using levees we currently don't use.

Maintaining refuge hydrology is crucial for marsh birds. We intend to work with Brevard County to reduce impacts of the drainage ditch crossing the Bee Line Unit. Right now it appears to be lowering the water table, altering hydrology, and tending to dry the site out.

Strategies:

- Target two to five late summer/early fall (August-October) burns annually.
- Maintain present configuration of burn units at eleven and burn no greater than 1,000 acres under one prescribed burn event. Where opportunities present themselves (i.e., in the Checkerboard), increase the number of burn units from the present configuration.
- Develop a monitoring program for secretive marsh birds, and restoring the hydrologic setting.
- Utilize prescribed fire to maintain and where necessary, restore suitable habitat for marsh birds.
- Maintain or where appropriate decrease fire unit size to provide escape.
- Utilize biological indicators including shrub height, marsh cover, and marsh bird response to identify fire frequency, unit size, fire seasonality, and fire return intervals that maintain early successional habitats.
- Fill and/or plug drainage ditches as resources permit to restore refuge hydrologic setting to as close to pre-development conditions as possible.
- Remove four culverts on Bee Line Unit that drain to ditch, and coordinate with Brevard County on levee and ditch maintenance efforts.
- Work with partners, particularly the SJRWMD, to determine when adequate hydrology has been restored.
- Work with the Atlantic Coast Joint Venture, Division of Migratory Birds, Peninsular Florida LCC, and other partners to step-down black rail population objectives from national and regional waterbird conservations plans to the scale of the refuge.

- Incorporate nationwide Marsh Bird Monitoring Program into annual surveys using survey protocols identified by the program.
- Develop monitoring program for marsh birds using the refuge.
- Determine refuge role in regional and national species conservation plans.
- Control exotic and invasive plants to maintain habitat structure.
- Adapt management as necessary to best suit marsh bird management.

Objective 1-2: Suite of Resident, Wintering, and Summering Birds – Over the 15-year life of the CCP, continue and where appropriate enhance management for resident, wintering, and summering birds including common night hawk, eastern meadowlark, loggerhead shrike, chuck will's widow, Florida sandhill crane, and Southeastern American kestrel by increasing the frequency of growing season burns and restoring the hydrologic setting to pre-drainage conditions as closely as possible.

Discussion: This objective addresses the diverse suite of resident, wintering, and summering non-wading birds, including migratory birds. This guild does not include wading birds, northern crested caracara, wood stork, Cape Sable seaside sparrow, or state-listed wading birds. There is a lack of data on the mix of wintering birds using the refuge. To benefit these species, we will continue the prescribed fire program on the refuge, conducting an average of four prescribed fires per year on average and burning about 2,000 acres annually to maintain more open habitat conditions favorable for these birds. Historically, we conducted prescribed fires during the winter, while currently we are conducting more late summer burns. Adaptive management principles would be used to arrive at management strategies.

In terms of the refuge's overall management priorities, it should be emphasized that this objective and strategies are secondary to the primary objective of marsh bird/early successional stage marsh management. That is, this suite does not take precedence over marsh bird management.

Strategies:

- Where marsh bird populations would not be negatively impacted, alter spatial patterns of prescribed fire events to promote a diverse assemblage of habitats to support a wide array of resident, wintering, and summering birds.
- Identify preferred prescribed fire frequency for guild based on species response and biological indicators.
- Maintain burn unit size or where appropriate based on species response decrease burn unit size.
- Shift to late summer/early fall season burns to promote a wide variety of bird species.
- Where opportunities exist and where actions would not negatively impact marsh bird management or hydrologic restoration objectives, provide altered habitat (levees and ditches) to serve as forage, nesting, and resting opportunities for resident, wintering, and summering birds.
- Remove four culverts on Bee Line Unit that drain to flood control ditch and coordinate with Brevard County on levee and ditch maintenance efforts.
- Work with partners, particularly the SJRWMD, to determine when adequate hydrology has been restored.
- Determine refuge role in regional and national species conservation plans.
- Opportunistically include resident, wintering, and summering bird guild occurrence and status monitoring as an element of marsh bird monitoring
- Control exotic and invasive plants to maintain habitat structure.
- Adapt management as necessary to best suit marsh birds.

Objective 1-3: Wading Birds – Over the life of the CCP, maintain and enhance breeding and roosting habitat for wading birds on the refuge.

Discussion: This guild of rare waders on the refuge includes wood storks, snowy egrets, tri-colored herons, little blue herons, and white ibises. Each of these birds is listed as a Species of Special Concern in the State of Florida while the wood stork is federally listed as endangered. While they are documented as occurring on the refuge, there is a paucity of data as to their specific abundance, distribution, and patterns of use at St. Johns NWR. In order to provide resources for refuge wading birds, we would conduct nesting surveys, and as resources allow, opportunistically create rookery habitat for wading birds through the removal of fill and dike features to provide additional artificial islands. The refuge would remove non-native vegetation at the SR 50 borrow ponds and replace with native vegetation capable of producing canopy for roosting populations of wading birds.

Objective 1-3-1: Wood Storks – Over the 15-year life of the CCP, increase the integrity of SR 50 Unit rookery habitat by replacing all exotic plant species with native species to promote wood stork nesting and roosting.

Discussion: Wood storks are opportunistic feeders at the borrow pond, depending on hydrologic fluxuations of the St. Johns River. They appear to effectively utilize temporary food resources, that is, populations of forage fish that become stranded in shallow water. Management for marsh birds would provide incidental benefits for wood storks. Isolated, ephemeral ponds would likely attract more wood storks and would provide more edge effects. Wood storks gorge themselves on fish that get trapped in isolated ponds when they dry out periodically.

Less than a half-dozen wood storks roost at the SR 50 borrow pond every year. The refuge's aim is to establish a rookery at the borrow pond suitable for wood stork nesting. Mature Brazilian pepper (*Schinus terebinthifolius*) presently serve as roosting structure for wading birds including wood storks, and breeding wood storks occur at a borrow pond located about 10 miles to the south. The refuge would establish rookery structure for existing wood storks through the removal of non-native plants and establishment of native species. This also would establish an alternative setting for the off-refuge population if disturbed from its present site. In addition, the present configuration of the borrow pond provides for a very steep edge or slope. This borrow pond slope would shallow to provide better forage opportunities.

Strategies:

- Opportunistically create additional islands within the borrow pit by removing the landward connection of peninsular features within the borrow pit.
- In stages, remove exotic vegetation from the rim of the borrow pit, peninsular, and island features within the borrow pit and replace with willow, cypress, and other native vegetation suitable for nesting.
- In conjunction with state-listed wading bird nesting surveys, conduct nesting survey of the borrow pit on the SR 50 Unit.
- Improve foraging opportunities for wading birds by shallowing up the borrow pit slopes.
- Coordinate nest detection with the Service's North Florida Ecological Services Field Office (NFESFO) and adapt management program as necessary.

Objective 1-3-2: State-listed Wading Birds – Within 5 years of CCP approval, establish a wading bird rookery at the SR 50 Unit borrow pond.

Discussion: Similar to our wood stork objective, the refuge's aim is to create a rookery setting for wading birds at the SR 50 Unit borrow pit. The wading bird rookery would be home to a concurrent population of state-listed wading birds including federally listed wood storks. This guild of rare waders on the refuge includes snowy egrets, tri-colored herons, little blue herons, and white ibises. Each of these birds is listed as a Species of Special Concern in the State of Florida. While they are documented as occurring on the refuge, there is a paucity of data as to their specific abundance, distribution, and pattern of use on St. Johns NWR. As noted above, there is an opportunity on the refuge to create rookery habitat for these waders by improving habitat through removal of exotic species, by removing certain fill and dike features to provide additional artificial islands, and to shallow slopes of the existing borrow pond to provide better forage opportunities. Waders prefer to establish their nesting colonies on islands because of the added protection from terrestrial nest predators such as the raccoon.

Strategies:

- Maintain database to keep track of long-term trends in state-listed wading bird populations, presence, and distribution.
- Opportunistically create additional islands within the borrow pit by removing the landward connection of peninsular features within the borrow pit.
- In stages, remove exotic vegetation from the rim of the borrow pit, peninsular, and island features within the borrow pit and replace with willow, cypress, and other native vegetation suitable for nesting.
- Improve foraging opportunities for wading birds by shallowing up the borrow pit slopes.
- Conduct nesting survey of the borrow pit on the SR 50 Unit.

Objective 1-4: Northern Crested Caracara – Over the 15-year life of the CCP, using prescribed fire, maintain 300 acres of open habitat with a minimum of woody vegetation (less than 5 percent cover) of the Bee Line Unit; wetland woody plants include cabbage palm and wax myrtle. Within 3 years of CCP approval, evaluate other forms of vegetation control including use of mowing and/or cattle grazing to help maintain open prairie for crested caracara at the Bee Line Unit.

Discussion: Appropriate habitat (i.e., open habitats-less than 5 percent cover of woody vegetation, scattered cabbage palms, and palm hammocks) on the refuge exists for the caracara. However, this bird was earlier assumed to be an infrequent visitor to St. Johns NWR, because very few actual observations had been recorded. Observations of caracara on the adjacent Blue Heron Water Treatment Facility south of SR50 were considered uncommon. However, sightings of the caracara in other areas adjacent to the refuge are not uncommon. In October 2005, a road-killed caracara, attended by its mate, was discovered on SR50, approximately 0.5-mile east of the refuge's Hacienda Road entrance.

Brevard County surveyed for caracara at the Service's request, and these survey results are on record. Recently, at least two pairs of nesting caracara have been observed on the Bee Line Unit. Management for caracara is secondary or incidental to the primary management thrust of the refuge, which is focused on marsh birds.

The refuge would evaluate the effectiveness of mechanical and limited agricultural options (e.g., mowing, cattle grazing) to provide open marsh habitat on the Bee Line Unit. Potential mechanical (mowing) and agricultural (limited grazing) vegetation control would be evaluated as part of an integrated approach with prescribed fire and exotic control to provide open marsh habitat conditions for northern crested caracara and an array of marsh birds.

Strategies:

- Evaluate the use of mowing, cattle grazing, and/or other forms of vegetation maintenance to help maintain open habitats for northern crested caracara at the Bee Line Unit, while minimizing impacts to secretive marsh birds (e.g., by monitoring wildlife and habitat responses).
- Utilize prescribed fire to maintain and where necessary, restore suitable open habitat for caracara.
- Provide cabbage palms to encourage nesting in suitable locations and control cabbage palms where targeted habitat exceeds 5 percent woody vegetation cover to maintain open grassland setting.
- Maintain open cordgrass habitat in marshy areas through the use of prescribed fire with a minimum of woody vegetation, such as salt bush and wax myrtle.

Objective 1-5: Cape Sable Seaside Sparrow – Over the 15-year life of the CCP, stay abreast of translocation opportunities and CSSS recovery plan delivery/projects.

Discussion: The CSSS is a subspecies of seaside sparrow, that like the now-extinct dusky seaside sparrow (*A. maritimus nigrescens*), makes extensive use of short-hydroperiod freshwater wetlands composed of a mix of graminoid species almost devoid of trees and shrubs. The open *Spartina* marsh habitat preferred by the CSSS is likewise the same habitat preferred by the broader suite of marsh birds. Hence, the management strategies outlined for marsh birds in Objective 1-1 above would most likely meet the habitat requirements for the CSSS as well. We plan to stay abreast of the translocation and relocation efforts of the CSSS through the South Florida Ecoteam, which includes leadership members from the South Florida Ecological Services Field Office (SFESFO) – the Service entity responsible for CSSS recovery efforts.

The CSSS is a sedentary subspecies currently relegated to six distinct geographic areas in marl prairie habitat flanking Shark and Taylor sloughs in the Everglades. The sparrows in these areas are recognized as distinct subpopulations, and it has been determined by the Sustainable Ecosystems Institute's Final Report for the Everglades Multi-Species Avian Ecology Review sponsored by the Service (SEI Report), that three major subpopulations of CSSS are necessary to ensure the survival of the subspecies (SEI 2007). There is a high degree of uncertainty whether one of the core subpopulations located west of Shark River Slough (subpopulation A) will be able to persist in its current location given the much wetter conditions that are expected to occur there under the Comprehensive Everglades Restoration Plan (CERP). Further declines in suitable habitat availability at the Everglades sites, which are only a few feet above mean sea level, are to be expected as a result of climate change and sea level rise.

Since no additional locations in the Everglades or Big Cypress Swamp have been identified as potential suitable CSSS habitat, it has become necessary to consider other potential sites outside the known historic range of the subspecies. Such a strategy was espoused by the SEI Panel's findings that the CSSS has a considerable capacity to colonize unoccupied habitat, and that maintenance and creation of suitable habitat is essential but an emphasis on birds only in areas where they currently

occur is not the only option available and other options should be considered (SEI 2007). However, the panel recommended that translocation be attempted first at suitable unoccupied habitat in the Everglades to re-establish extirpated subpopulations.

The translocation protocol for sparrows outside their native range specifically addressed the introduction of the CSSS into the former habitat of the now extinct dusky seaside sparrow, which includes lands of Merritt Island and St. Johns NWRs. In the event that a detailed habitat analysis determines that a translocation attempt may have some degree of success, then perhaps a newly established population of birds could be treated as an experimental population that would provide additional refugia for the subspecies to help it weather the changes that are anticipated to occur under Everglades restoration in the near term and climate change in the long term.

Strategies:

- Coordinate with Peninsular Florida LCC to evaluate habitat suitability for potential translocation.
- Maintain coordination with the CSSS Recovery Team
- If the refuge rises in importance as a potential site, work with FWC and the Service's Ecological Services South Florida Field Office to evaluate the suitability of the refuge as a potential introduction site to support recovery of the CSSS.
- Investigate compatibility of any such translocation with existing refuge wildlife programs.
- Assess management options to recreate the appropriate hydrology and vegetation structure to support CSSS.

Objective 1-6: Eastern Indigo Snake – Over the 15-year life of the CCP, promote a fire return interval to maintain early successional habitat favorable for this species by conducting an average of four prescribed fires per year and burning about 2,000 acres annually.

Discussion: Occasional sightings of the eastern indigo snake have been made on the refuge over the years. From 1998-2001, two specimens were radio-tagged on the refuge as part of a larger study in Brevard County. These two individuals used both wetlands and upland habitats on the refuge. Both individuals were observed foraging in the *Spartina* wetlands and used the dike roads and tree hammocks for refugia. However, beyond this limited information, little is known about the status of this species. Eastern indigo snake management is secondary or incidental to the primary management thrust of the refuge, which focuses on marsh birds. Proposed management for marsh birds would provide incidental benefits for indigo snakes. This includes conducting more late summer burns.

Strategies:

- Utilize prescribed fire to provide suitable habitat for eastern indigo snakes.
- Promote a fire return interval to maintain early successional habitat.
- Use monitoring and adaptive management to identify preferred prescribed fire frequency for eastern indigo snake populations based on species response and biological indicators.
- Educate local public as to value of eastern indigo snake, to reduce accidental and deliberate mortality.

Objective 1-7: Gopher Tortoise – Over the 15-year life of the CCP, utilize prescribed fire to maintain the Bee Line Unit upland habitats (200 acres). Within 5 years of CCP approval, working with partners including universities develop a better understanding of status and trends of refuge population of gopher tortoises.

Discussion: Gopher tortoises inhabit areas with well-drained sandy soils, a sparse tree canopy and abundant low-growing vegetation. They typically occur in habitats such as sandhill, pine flatwoods, scrub, scrubby flatwoods, dry prairies, xeric hammock, pine-mixed hardwoods, and coastal dunes, which have historically been maintained by periodic wild fires. When fire is suppressed in these habitats, small trees, shrubs, and brambles begin to grow, becoming denser and higher, making it difficult for the gopher tortoise to move around and eventually shading out the low-growing plants and herbs upon which gopher tortoises feed. About 200 acres on the refuge are suitable for the gopher tortoise and about one-third of this is burned annually. This species will receive incidental benefit from other refuge management actions. There is a lack of baseline data concerning the gopher tortoise on the refuge and there is a need to understand status and trends.

Strategies:

- Utilize prescribed fire to provide suitable habitat for gopher tortoise.
- Establish baseline inventory of gopher tortoise on the refuge
- Adjust seasonality of prescribed burning towards late summer/early fall (August-October) to promote early successional habitats.
- Promote a fire return interval to maintain early successional habitat.
- Use monitoring and adaptive management to identify preferred prescribed fire frequency for gopher tortoise populations based on species response and biological indicators.
- Burn about one-third of suitable gopher tortoise habitat annually.
- Use established protocols for monitoring gopher tortoise.
- Educate local public as to value of gopher tortoise to reduce accidental and deliberate mortality.

Objective 1-8: Reptiles and Amphibians – Over the 15-year life of the CCP, working with partners including universities, gain sufficient information and understanding of refuge herpetofauna to be able to adjust management regimes to maintain and/or increase populations of all native reptiles and amphibians on the refuge.

Discussion: To date, 15 species of reptiles and amphibians are known to occur on the refuge. However, no specific research has been conducted on the herpetofauna of the refuge. Our limited knowledge is based primarily on incidental observations made by Merritt Island NWR Complex staff or the peripheral observations of researchers studying other fauna. Most of the species identified thus far are relatively conspicuous – either large or vocal – and no comprehensive survey or baseline inventory has yet been undertaken. Likewise, neither the presence nor the absence of exotic herpetofauna (e.g., brown anoles and Cuban tree frogs) has been confirmed.

We will continue the prescribed fire program on the refuge, conducting an average of four prescribed fires per year on average and burning approximately 2,000 acres annually to maintain more open habitat conditions favorable for these species. Reptiles and amphibians would receive incidental benefit from other refuge management actions targeting marsh birds, and a majority of herpetofauna would directly benefit from hydrologic restoration. In addition, hydrologic improvements would have a beneficial impact to a majority of refuge herpetofauna.

The refuge will either develop its own database on herpetofauna or contribute to a state or region-wide natural history database. If resources permit, we will also conduct research into status and trends of key species. Pending the results of this research, and consistent with the refuge's other higher priority objectives we will adapt management as indicated and feasible.

Strategies:

- Utilize prescribed fire to provide suitable habitat for reptiles and amphibians.
- Conduct prescribed fire during windows of opportunity in the late summer and early fall.
- Working with university partners, develop baseline inventory, conduct research, and monitor status and trends of select herpetofauna. Adapt refuge management based on results.
- Identify preferred prescribed fire frequency for select reptiles and amphibians based on species response and biological indicators.
- Track long-term trends in reptile and amphibian populations, presence, and distribution.
- Educate local public as to value of herpetofauna, to reduce accidental and deliberate mortality.

Refuge Hydrology

Goal 2: Emulate natural hydrologic processes on the refuge

Discussion: During the pre-European settlement era, the St. Johns River drained a watershed that extended from the river to the ridge along what is now known as the I-95 corridor, as well as adjacent uplands to the west. It is unknown if the water table was higher or lower during the prehistoric era than it is today. There are indications that the water table was actually lower in the Upper St. Johns River. The area as a whole was probably drier more than 500 years ago than it is today. From the early 1950s to the 1970s, as the post-war population boom enveloped Florida and Brevard County, the hydrology of the Upper St. Johns River Basin was heavily modified. Canals were dug to divert water for flood control and development. East-west highways were constructed, impeding sheet flow across the floodplain. Various subdivisions sprung up in and around the floodplain, increasing runoff during rain events from the increase in the area of impervious surfaces. All of this activity greatly altered the hydrology of the St. Johns River system. These past actions in the watershed continue to affect the refuge's ecological functions today. The refuge itself has been subjected to ditching and road construction, further modifying its hydrology.

Objective 2-1: Hydrology (Surface Water, Groundwater, Water Quality) – Over the 15 year life of the CCP, gain sufficient information and understanding of the hydrology of the refuge to be able to restore hydrology to as close to pre-drainage conditions as possible.

Discussion: Over the last 50 years, many factors have worked in concert to bring about declines in the habitat values associated with the high marshes of the St. Johns River floodplain. Ditching, road construction, and development altered water levels and the hydro-period. Drier conditions accelerated brush encroachment and facilitated widespread wildfires. Today, refuge surface waters include many shallow natural ponds, borrow pits, and water in canals and ditches. In total, surface water accounts for about 5 percent of the refuge's area.

Three aquifer systems underlie the refuge: the surficial, the intermediate, and the Floridan aquifer. Groundwater quality, especially the surficial aquifer, varies widely with water table fluctuations. Total dissolved solids in some of the aquifers are high. Chloride contents, for example, often exceed 1,000 parts per million (ppm).

While the refuge does not collect water quality data on the many small water bodies within the refuge on a regular basis, the SJRWMD does maintain 192 monitoring stations within the St. Johns River Basin outside the refuge. Six of these are located in the Upper St. Johns River Basin. Water quality

trends from 1990-2004 were more negative in the upper basin than in the basin as a whole. For example, total nitrogen increased at three stations and was stable at three. Total phosphorus decreased at one station, increased at three, and was stable at one. Turbidity increased at two stations and was stable at four. Total suspended solids increased at three stations and were stable at three.

Strategies:

- Coordinate with the SJRWMD to understand the hydrology of the refuge and adapt management as necessary to promote wildlife and habitat diversity.
- Work closely with the SJRWMD to ensure that Minimum Flows and Levels (MFLs) set for the St. Johns River adequately protect the hydrologic integrity of the refuge.
- Within 3 years of CCP completion, conduct spatially explicit water balance studies of the SR 50 and Bee Line Units that describe: (1) The quantity, timing, distribution, and variance of surface and ground waters; (2) runoff patterns that would have existed prior to construction of canals; (3) current runoff patterns; and (4) runoff patterns that would exist given proposed or potential development scenarios.
- Use results of water balance studies to predict changes to the salt marsh plant community and impacts on Service trust resources. Adapt management accordingly.
- Within 5 years of CCP completion, design and conduct studies of water chemistry and potentiometric surface to determine the quantity, timing, variability, and spatial extent of groundwater discharge on the SR 50 Unit.
- Within 10 years of CCP completion, evaluate the potential and ecological value of redirecting water from the canal crossing the Bee Line Unit into the high marsh and remnant channels apparent on recent aerial photographs. If the project has merit for conservation or restoration of Service trust resources, work with partners (e.g., SJRWMD and Brevard County) to develop a restoration plan and secure funding.
- Within 10 years of CCP completion, conduct a water quality assessment of canal waters passing through the refuge, especially on the Bee Line Unit. Work with the EPA, SJRWMD, and other partners to improve fishery habitat and dissolved oxygen levels.
- Based on the improved hydrologic understanding of the refuge, fill and/or plug drainage ditches as resources permit to restore refuge hydrologic setting to as close to pre-drainage conditions as possible.

Exotic, Invasive, and Nuisance Species

Goal 3: Control and eliminate, where feasible, exotic, invasive, and nuisance species on the refuge to maintain and enhance the biological integrity of the refuge's native coastal and floodplain habitats along the St. Johns River.

Discussion: The infestation of ecosystems by exotic, non-native, and invasive plants and animals is one of the most worrisome threats to biodiversity and indigenous and endemic species around the world. These alien and aggressive invaders compromise the biological integrity of native communities in a number of ways. Exotic, invasive, and nuisance plant and animal species are a serious threat to native species and habitats on the refuge as well.

Objective 3-1: Invasive Plant Species – Over the 15-year life of the CCP, continue control of all exotic plants at or below maintenance levels.

Discussion: Almost one-third of the plants in Florida are exotic (non-native). Of the estimated 1,200 exotic species in Florida, approximately 11 percent are invasive in natural areas, that is, their tendency is to spread aggressively and dominate or displace native species and communities. The nearby Merritt Island NWR has over 50 invasive exotic plants on or near the refuge.

To date, no comprehensive survey of exotic plants has yet been made at St. Johns NWR, but Complex staff have has observed some of these species at St. Johns NWR as well. Among the invasive and/or exotic plants likely to cause problems on the refuge are melaleuca, Brazilian pepper, and cogongrass. All of these have been controlled at times on the refuge by Complex staff, although not in any systematic, comprehensive way. Other species that have been treated on nearby public lands in the St. Johns River drainage and that may become problematic for the refuge in the future are camphor tree, guava, Chinese tallow, air potato, para grass, and several other species listed as Florida Exotic Pest Plant Council (FLEPPC) Category I invasive exotics.

Strategies:

- Continue control of invasives species at maintenance levels - control of an invasive species so that its population can be maintained at the lowest feasible level (USACE 2010)
- Within 3 years of CCP approval, develop and every 5 years thereafter, maintain and update an exotic plant database
- Continue to seek invasive plant control project funding from FDEP.
- Throughout the 15-year life of the CCP, coordinate with local Cooperative Invasive Species Management Areas (CISMAs) to develop an early detection and alert network and to help control invasive species.
- Work with partners to enhance efforts to control and eradicate target exotic, invasive, and nuisance species, including pursuing funding opportunities.
- Within 5 years of CCP approval, develop and begin to implement an Invasive Plant Species Control Plan, which would specify survey protocols, funding sources, partnering opportunities, control methods, and record-keeping.

Objective 3-2: Invasive/Feral Animal Species – Over the 15-year life of the CCP, increase control of invasive/feral animals so as to reach maintenance level. Coordinate with local CISMAs to develop, within 3 years of CCP approval, an early detection and alert network and to help control invasive animals. Use contractors, partners, and public hunts for the feral hog control effort.

Discussion: The two invasive animal species that threaten native biota on the refuge are feral hogs and feral house cats. The former are present in large numbers in all upland and marsh habitats of the refuge, where they negatively impact both flora and fauna. Swine cause widespread habitat damage and it is suspected that they also negatively impact wildlife through direct mortality (predation) and competition for food. There are no estimates of the size of the hog population on the refuge. The number of feral house cats on the refuge is probably small, but is also unknown at this time. If present, they could be adversely impacting secretive bird groups, such as rails, through direct predation and disturbance. It is believed that all feral house cats at St. Johns NWR are either released by the public or wander in from adjacent urban and suburban communities.

Strategies:

- Continue to seek invasive animal control project funding from FDEP.
- Work with partners to enhance efforts to control and eradicate target exotic, invasive, and nuisance species, including pursuing funding opportunities.
- Within 5 years of CCP approval, develop and begin to implement an Invasive Animal Species Control Plan, which will specify survey protocols, funding sources, partnering opportunities, control methods, and record-keeping.
- Coordinate with local CISMAs to develop an early detection and alert network and to help control invasive animals.
- Use contractors and evaluate using public hunts for feral hog control effort.
- Control invasives to maintenance level.

Native Wildlife and Habitat Diversity

Goal 4: Protect, manage, and enhance the natural diversity of fish, wildlife and habitats and the important landscapes of the refuge within the Upper St. Johns River Basin system to ensure that refuge fish and wildlife populations are sustained in perpetuity.

Discussion: Although not large by the standards of other national wildlife refuges, within its borders St. Johns NWR contains a surprising variety of plant and animal communities, including several types of wetlands (cordgrass or *Spartina* marsh, cattail marsh, and salt pans), forests (flatwoods pine and palmetto, mixed mesic hammock, and cabbage or sabal palm hammock), and scrub lands. Diverse wildlife species are associated with and dependent on these diverse habitats.

For its size, the refuge supports a wide variety of wildlife. Over the years, a small database has generated a species list and other biological information based on incidental research and causal observation (Adrian and Epstein 2005). Much information that was gathered was in association with studies and monitoring of the dusky seaside sparrow (Baker 1973 and others). The refuge is largely a fire-dependent ecosystem of wetlands associated with the St. Johns River Basin. Since much of the natural hydrology has changed and allowing a native grassy wetland to succeed towards a brushy wetland, fire management applications have been necessary to maintain the historically native Spartina-wetland ecosystem. Thus, much of the database currently stems from fire-related references (Sorensen and Epstein 2006).

Objective 4-1: Emergent Wetland Communities (cordgrass marsh, sawgrass marsh, cattail marsh) – Over the 15-year life of the CCP, maintain emergent wetland communities and their unique biota at roughly 83 percent of the refuge area and focus habitat management to maintain/support a wide array of native wildlife using the refuge.

Discussion: Marshes make up the dominant cover type on the refuge and are dominated by cordgrass (*Spartina bakeri*), and sawgrass (*Cladium jamaicense*). However, modifications to the area's hydrology described above have permitted brush, shrubs, and other vegetation to invade the cordgrass-dominated marshes. Groundsel (*Baccharis halimifolia)* and wax myrtle (*Myrica cerifera*) are the principal invasive species. The refuge uses prescribed fire to control brush encroachment. Cattail marshes are dominated by cattail (*Typha spp*.), stands of which are found around the edges of the natural ponds associated with the cordgrass marshes, as well as the borrow pits, canals, and other disturbed wetland areas.

Strategies:

- Use prescribed fire applications to reduce shrub cover and promote healthy growth of native *Spartina*.
- Investigate the possibility of improving the hydrology of the marsh to reflect historical conditions to naturally control growth of unwanted shrubs and exotic vegetation.
- Protect, enhance, and restore the natural hydrology of the St. Johns floodplain.
- Restoring sheet flow, reducing the impacts of off-refuge ditches, and removing ditches on the refuge should be a very high priority.
- Explore possibilities and effects of using mechanical treatment to maintain marsh interspersion.
- Further investigate the effects of prescribed fire on secretive marsh birds (focal species), including parameters such as fire intensity, seasonality, burn unit size, and fire return interval.
- Utilize biologic indicators including shrub height among other suites of indicators to determine suitability of habitat for prescribed fire.
- Limit burn unit sizes based on fire monitoring outputs to further protection of existing secretive marsh bird populations and recruit new populations
- Evaluate and adapt the current Fire Management Plan to reflect this information.
- Adapt management based on species and habitat monitoring.
- Manage at an ecosystem level, working with other agencies to develop management guidelines and recommendations for adjacent conservation lands for black rails and other secretive marsh birds.

Objective 4-2: Forested Wetland Communities (mesic and hardwood hammocks) – Over the 15-year life of the CCP, maintain diverse palm and mesic and hardwood hammocks at about 8 percent of the refuge area and enhance habitat quality of refuge hammocks to support a wide array of native wildlife using the refuge.

Discussion: Wooded wetland habitats comprise approximately 8 percent of the refuge's area, and include cabbage palm and hydric and mesic hardwood hammocks. Mixed hammocks have not only cabbage palms (*Sabal palmetto*), live oaks (*Quercus virginiana*), and laurel oaks (*Quercus laurifolia*), but also elms (*Ulmus spp.*), ashes (*Fraxinus spp.*), red mulberry (*Morus rubra*), sugarberry (*Celtis laevigata*), and other species. Other hammocks have almost pure stands of cabbage palms, with understories that are usually open with a scattering of saw palmetto and other vegetation.

Strategies:

- Continue to use prescribed fire to simulate the role of natural fire in the non-marsh habitats.
- Determine if changes in burn unit configurations are necessary to provide proper fire return intervals for the non-marsh habitats on the refuge.
- Monitor the fire effects to ensure that the purposes for using fire are being met.
- Monitor cabbage palm areas to determine if they are expanding into other habitats.
- Consider mechanical removal or chemical treatment to reduce palm coverage, if necessary.

Objective 4-3: Upland Communities (oak scrub, palmetto/pine flatwoods) – Over the 15-year life of the CCP, maintain diverse upland communities of the refuge at about 3 percent of the refuge area, and enhance habitat quality of uplands to support a wide array of native wildlife using the refuge.

Discussion: Scrub areas on the refuge are located on xeric sites, that is, sites with dry soils. This vegetation type occupies about 3 percent of the refuge area. Scrub vegetation can be described as having an overstory of 15- to 25-foot tall scrub oaks, with a scattered understory of palmetto and a few other shrub species. Two pine species are found naturally on the refuge: slash (*Pinus elliottii*) and pond (*Pinus serotina*). The most abundant understory species are saw palmetto (*Serenoa repens*), gallberry (*Ilex spp*.), and *Lyonia* spp. Flatwoods occur on flatwoods soils, which consist of poorly drained spodosols. Gopher tortoise, white-tailed deer (*Odocoileus virginianus*), and eastern wild turkey (*Meleagris gallopavo*) all utilize upland habitats found on the refuge for important life stages including as cover, for browse, and to rear young. The historic fire return interval for upland communities is 3 to 5 years, which can be used a guide, but an on-the-ground evaluation of the vegetative conditions are the real key to determining when to burn these habitats.

Strategies:

- Gear fire management objectives toward reestablishing the vegetation to pre-fire exclusion levels.
- Utilize prescribed fire to maintain upland communities at 3 percent of the refuge area.
- Conduct pre-burn monitoring to determine the need for the application of fire.
- Maintain exotic plants at or below maintenance levels.
- Utilize biological indicators to determine appropriate fire return intervals to enhance habitat quality in support of a wide array of native wildlife including gopher tortoise, white-tailed deer, and eastern wild turkey.

Objective 4-4: Mammals – Over the 15-year life of the CCP, maintain emergent marsh, open waters, and upland habitats for mammals such as white-tailed deer and round-tailed muskrat and evaluate mammalian response.

Discussion: Sixteen species of native mammals have been identified on the refuge through a combination of incidental sightings, from by-catch in bird trapping studies, and from preliminary small mammal studies. Included are the bobcat (*Lynx rufus*), cotton rat (*Sigmodon hispidus*), rice rat (*Oryzomys palustris*), eastern cottontail rabbit (*Sylvilagus floridanus*), marsh rabbit *(Sylvilagus bachmani*), eastern gray squirrel (*Sciurus carolinensis*), eastern mole (*Scalopus aquaticus*), Florida round-tailed muskrat, gray fox (*Urocyon cinereoargenteus*), nine-banded armadillo (*Dasypus novemcinctus*), opossum (*Didelphis marsupialis*), raccoon (*Procyon lotor*), river otter (*Lutra canadensis*), striped skunk (*Mephitis mephitis),* and white-tailed deer. No federal or state listed mammalian species are known to occur on the refuge. In addition to the native mammal fauna, the refuge also supports a population of feral hogs, the nuisance exotic discussed above. To date, no mammalian inventory has yet been conducted on the refuge.

Strategies:

- Develop inventory using standard survey protocols program for mammals using the refuge. Conduct at least one mammal inventory during the 15-year planning horizon.
- Utilize prescribed fire to maintain and where necessary, restore suitable habitat for native mammal species.
- Provide four prescribed fires per year on average and burn approximately 2,000 acres annually.
- Adjust seasonality of prescribed burning towards late summer/early fall (August-October) to promote early successional habitats.

- Maintain existing fire unit size to provide escape for ground-dwelling mammals, especially smaller, slower, less mobile species.
- Utilize biological indicators including shrub height, marsh cover, and mammal response to identify fire frequency, unit size, fire seasonality, and fire return intervals that maintain early successional habitats.
- Determine refuge role in regional and national species conservation plans.
- Control exotic and invasive plants to maintain habitat structure and function favorable to indigenous mammal species.

Objective 4-5: Climate Change – Over the 15-year life of the CCP, partner with SJRWMD in adaptive management efforts to manage habitats, ecosystems, and wildlife affected by climate change. Investigate opportunities to participate in regional climate change initiatives to better understand climate change impacts.

Discussion: The climate is changing, which means more than just rising average temperatures. For Florida and the St. Johns NWR, a changing climate could imply changes in such ecologically critical phenomena and agents of disturbance as lightning frequency; precipitation intensity, amounts, and distribution throughout the year; winds (both direction and strength); and humidity, all of which could have repercussions on plant and animal communities on the refuge. While specific impacts on the refuge's habitats and wildlife from climate change cannot be predicted with any certainty, it is certain that they will add to the dynamic and intensive stresses this heavily modified and fragmented landscape already faces.

Strategies:

- As materials and exhibits about the refuge are updated and revised, ensure that climate change, its causes, impacts, and mitigations are covered in new text.
- In conducting long-term monitoring, censuses, and inventories of habitats and wildlife on the refuge, management should be cognizant of the possible role of climate change in driving responses and adaptations on the part of local flora and fauna.
- Pursue adaptive management when approaching possible adverse impacts on wildlife habitat and populations due to climate change.
- Stay abreast of changes in regulatory regime including carbon emissions and possible opportunities or issues these may represent for the refuge.
- Within 5 years of CCP approval, contact USGS, NOAA, SJRWMD, and other coastal and Florida refuges to begin developing a monitoring protocol for climate change and its effects on habitats and wildlife.
- Using GPS and GIS, begin to develop baseline data for entry into a long-term database that will track changes in habitat configurations and locations on a decadal time scale.
- Employ adaptive management, changing emphases, priorities, and even purposes, goals, objectives and strategies of the refuge as dictated both by changing climate realities and opportunities.

RESOURCE PROTECTION

The proposed resource protection activities are provided for through two subject areas: refuge boundary and boundary protection.

Refuge Boundary

Goal 5: Working with the partners and neighbors, create functional refuge management areas to contribute to the protection and management of the conservation landscape of the Upper St. Johns River Basin.

Discussion: At present, the refuge is faced with a dysfunctional boundary, or patchwork of boundaries, especially in the Bee Line Unit (Figures 4 and 5). This complicated, unwieldy boundary is all but impossible to mark and maintain on the ground, which stymies overall management and encourages trespass and unpermitted activity, such as mud-bogging. Within the Bee Line Unit, at any given spot on the ground, neither the Service nor the public knows what is refuge, and therefore off-limits, and what is privately owned, and therefore accessible to owners and their guests, if not the public.

The refuge has two distinct boundaries – its management boundary within which the Service owns and manages these lands as the refuge, and its approved acquisition boundary within which lands may be acquired by the Service to be added to the refuge. Within the acquisition boundary are several rights-of-way to which various utilities and other parties have legal access or other approved interests.

Objective 5-1: Functional Refuge Management Boundary – Within 15 years of CCP approval, work with the partners to consolidate and secure ownership in the checkerboard area of the Bee Line Unit to create functional refuge management areas. Consider acquisition to connect lands that improve opportunities for public use.

Discussion: The Bee Line Unit's checkerboard pattern of public and private ownership (Figure 5) prevents the refuge from implementing many of the management objectives outlined in this plan including necessary prescribed fire, wildlife inventories, and habitat restoration. The present incongruous ownership pattern of the checkerboard creates extremely challenging management conditions, is unsafe due to its remoteness and lack of dedicated enforcement, and is presently an untended portion of the refuge. In addition, the refuge lacks a comprehensive survey of lands within its boundaries which challenges our ability to properly field locate, manage, and/or protect Service lands from unpermitted activities. Unpermitted use of and activities on Service lands within the checkerboard area include mud-bogging/ATVs which threaten wildlife and habitat resources through loss, fragmentation, alteration of habitats, disruption of natural processes, and through direct wildlife mortality and wildlife disturbance. Further, the checkerboard ownership pattern restricts management activities including fire management, exotic plant control, and boundary protection.

Consolidation of the Bee Line Unit's checkerboard would be a top priority under the final CCP, and all avenues to develop a reasonable management boundary to enable proper posting, protection, and management would be investigated. This includes but is not limited to land swaps, management agreements, and conservation easements with willing participants for lands better suited to deliver conservation for a diverse assemblage of wildlife. We intend to use a variety of methods to acquire and consolidate ownership of the refuge, especially the Bee Line Unit, enabling its protection and management. These methods include memoranda of understanding, easements, working with partners, and obtaining fee title based on a willing-seller approach. We would also pursue the same avenues of land protection to establish a connection from SR 50 Unit to the Fox Lake Unit and are proposing an acquisition boundary expansion to provide these additional options for willing

landowners. We will also work with Brevard County for corridor development. Consolidating ownership patterns will help tremendously with prescribed fire management and could provide additional access for wildlife-dependent recreation.

Strategies:

- Work with partners to consolidate and secure ownership in the checkerboard area of the Bee Line Unit to create functional refuge management areas.
- Consider acquisitions, land swaps, management agreements, conservation easements, and other measures based on a willing seller approach to protect these sites.
- Investigate providing access for public use on both Bee Line and SR 50 units.
- Consider acquisition to connect lands that improve opportunities for public use.
- Enter into agreement(s) with the Brevard County to use parkland for trailhead(s).
- Work with Brevard County to abandon the historic system of rights-of-ways.
- Acquire inholdings to establish undivided interests in northern part of the checkerboard.
- Consolidate ownership to develop more defensible, manageable boundaries.
- Provide a boundary survey to administer management and better protect Service lands.

Objective 5-2: Minor Expansion Proposal – Concurrent with and as part of the approval for this CCP, expand the refuge's acquisition boundary by 459 acres to provide additional connections between refuge lands and waters and the network of state and locally managed conservation areas.

Discussion: The proposed expansion includes 459 acres and is depicted in Figure 14. The refuge abuts or is in close proximity to a number of state and locally owned and managed natural areas, including Brevard County's Fox Lake Sanctuary and SJRWMD-managed lands to the west of the SR 50 Unit (Figure 8). The refuge's SR 50 Unit is not connected to the refuge's Fox Lake tract (Figure 14) through existing Service or partner conservation properties, which may limit the movement of certain species and deter the potential establishment of public access trails by the partners and/or the Service. The separation of these tracts also challenges the Service's ability to implement necessary prescribed fire on both the northern portion of the SR 50 Unit and the Fox Lake tract. Providing linkages between publicly managed lands and waters within the local landscape around the SR 50 Unit would help provide direct wildlife and habitat benefits, movement and dispersal corridors for wildlife species, and enhance management activities (e.g., the application of prescribed fire and increased management coordination between the conservation land management partners), in addition to offering the potential for greater public access opportunities to the nearby network of conservation lands.

In cooperation with willing sellers, the Service proposes to acquire or otherwise manage the identified properties within the minor expansion proposal (Figure 14). Strategies to acquire or otherwise protect these properties might include conservation easements, agreements, memoranda of understanding, land swaps, donations, and/or fee title acquisition from willing sellers. Appendix J outlines the minor expansion plan, provides acreages and priority evaluations, and further describes its value to the refuge.

Objective 5-3: Evaluate Future Conservation Focus Areas – Throughout the 15-year life of the CCP, continue to work with partners to evaluate, identify, and protect future conservation focus areas within the network of area conservation lands around the refuge to help provide wildlife corridors for the recruitment and dispersal of species and to help support the purposes, goals, and objectives of the refuge.

Discussion: The refuge would continue to work with the partners to support development of wildlife corridors to connect surrounding conservation lands and support species movement and dispersal. The Refuge would target lands that connect existing refuge interests with other partner conservation lands to

continue the establishment of wildlife corridors and provide a greater array of appropriate and compatible public access opportunities. Any important properties fulfilling the Service's interest to consolidate management or provide additional connectivity opportunities outside the approved acquisition boundary would be proposed either under a minor expansion proposal of less than 10 percent of the approved acquisition boundary, if applicable, or through a more involved land acquisition planning process if the proposal is beyond the allowed 10 percent. Options might include management agreements that transfer management authority to partner agencies. Where the refuge is best suited to manage, the Service would strive to acquire or otherwise obtain management authority for important habitats, habitat connections, and wildlife corridors (e.g., through conservation easements, agreements, donations, and fee title acquisition from willing sellers). Strategies to acquire or otherwise protect these properties might include conservation easements, agreements, memorandums of understanding, land swaps, donations, and/or fee title acquisition from willing sellers.

Strategies:

- Continue to provide opportunities for wildlife corridors from refuge interests to the network of existing conservation lands
- Consider swapping lands from the Bee Line Unit checkerboard for lands better suited to deliver conservation for a diverse assemblage of wildlife.
- Consider expanding access for appropriate and compatible forms of wildlife dependent recreation.

Objective 5-4: Rights-of-Way – Work with Brevard County to vacate or abandon rights-of-way (an artifact of 1914 land platting of the SR 50) within 5 years of CCP approval. Add right-of-way access to accommodate public use within 10 years of CCP approval.

Discussion: The Service will work with other agencies, utilities, and Brevard County to develop a complete understanding of all the various rights-of-way crisscrossing the refuge. In particular, there is a county road right-of-way on the SR 50 Unit that potentially inhibits management of this area; our aim is to work with the county to vacate or abandon this right-of-way. We will also collaborate with partners and other parties to explore the possibility of obtaining a right-of-way access or easement across county or private lands to the SR 50 Unit and the Fox Lake parcel. These would help facilitate public access and thus provides benefits for prospective refuge visitors and the wider public.

Strategies:

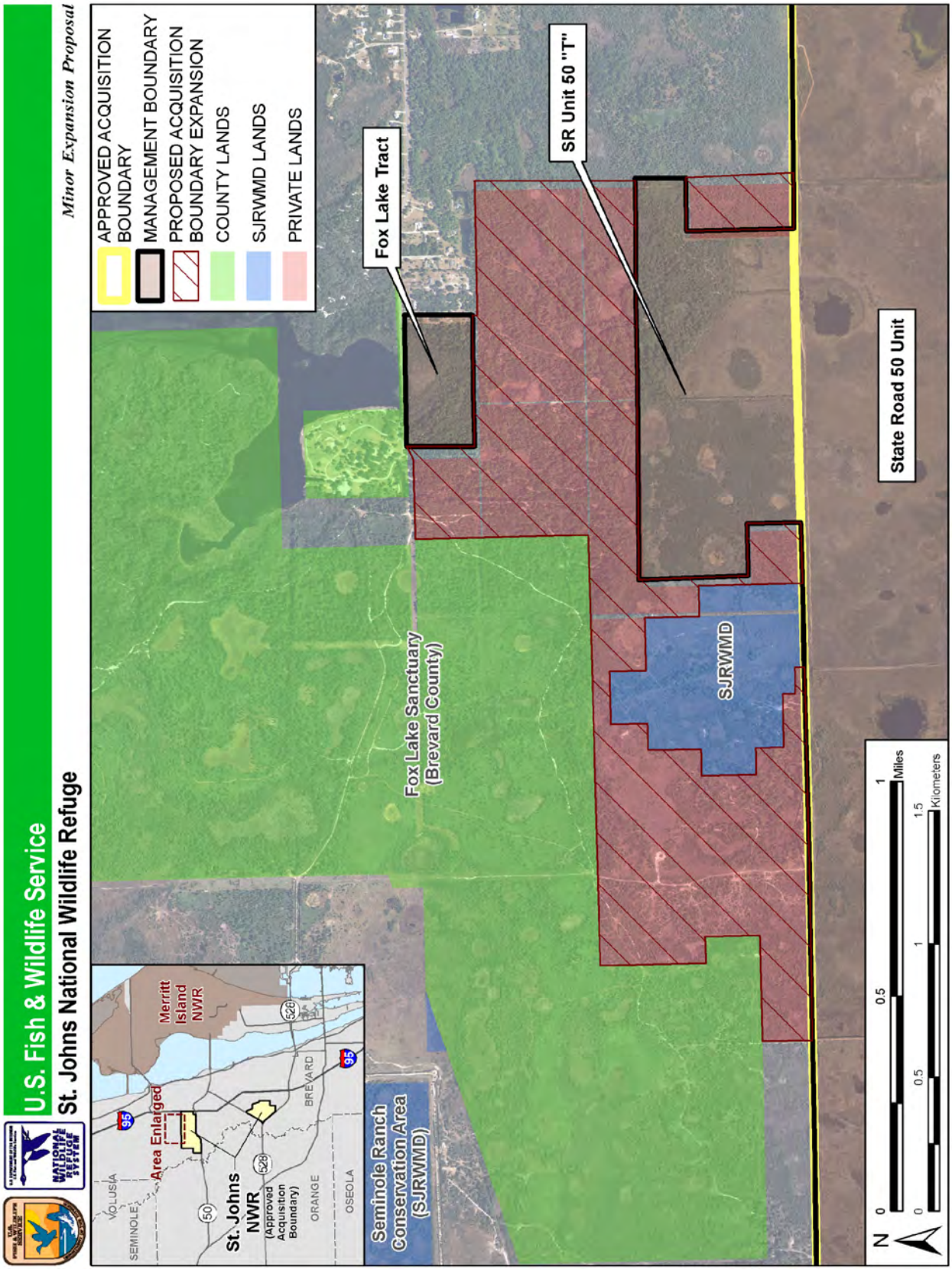
- Work with Brevard County to vacate or abandon rights-of-way, especially on the SR 50 Unit.
- Increase Service law enforcement staff and coordinate with governmental partners and landowners to increase patrol and enforcement to deter and prevent destructive unpermitted activities.
- Add right-of-way access to accommodate public use.

Boundary Protection

Goal 6: Work with partners and neighbors to protect refuge resources from unpermitted activities.

Discussion: At present, due to the bewildering proliferation of boundaries and the fragmented status of the checkerboard portion of the Bee Line Unit, we are unable to delineate and post these boundaries on the ground. The untenable checkerboard configuration results in overall boundaries

Figure 14. Minor expansion proposal – St. Johns NWR



that are several times longer than if a single exterior boundary were to clearly delineate the outside edge of the refuge. This unworkable situation has allowed for the explosive growth of trespass and mud-bogging in recent years.

Objective 6-1: Law Enforcement – Within 5 years of CCP approval, increase Service law enforcement staff and coordinate with governmental partners and landowners to increase patrol and enforcement to deter and prevent destructive illegal activities. Throughout the life of the CCP, continue collaboration with agencies and neighbors to control illegal activities.

Discussion: At present, the refuge continues to provide law enforcement without dedicated staff, from the headquarters of Merritt Island NWR Complex, a 20-minute drive from the SR 50 Unit and a 40-minute drive from the Bee Line Unit. These logistical considerations work against an active, on-the-ground law enforcement presence at the refuge. We will continue to collaborate with FWC, FDEP, and local law enforcement agencies in protecting refuge resources from illegal activities. We will also continue ad hoc consultation and communication with neighbors, landowners, and other civic organizations to control illegal activities. Even if posted signs are shot or knocked down, our aim is to re-post them. In the past, the refuge has tried to secure its boundaries through a variety of methods of varying efficacy.

Strategies:

- Continue to post refuge boundaries with “Boundary” and “Area Closed” signs as necessary to protect refuge resources, particularly on the southern side of the Bee Line Unit.
- Increase law enforcement staff.
- Increase patrols to protect refuge resources from illegal activities.
- Continue to support ad hoc consultation and communication with neighbors, landowners, and other civic organizations to control illegal activities.
- Support semi-annual interagency meeting to review status of enforcement and boundary issues.
- Coordinate with governmental partners and landowners to deter and prevent unpermitted activities including mud-bogging and all forms of ATV/ORV use.
- Nurture working relationships with surrounding landowners to provide cooperation and information.

Objective 6-2: Cultural Resources – Over the 15-year life of the CCP, continue to implement Section 106 of the National Historic Preservation Act. Within 15 years of CCP approval, complete and begin to implement a Cultural Resources Management Plan.

Discussion: The refuge is not known to have established or discovered cultural resources that are significant (i.e., eligible for inclusion on the National Register of Historic Places). However, its cattle dipping vats on the Bee Line Unit are becoming more historic with each passing year. The vats were part of an early to mid 1900s tick eradication program to control southern cattle fever (Thomas 2009). The round mound covered with trees on the Bee Line Unit could be investigated in a cultural resources assessment to see if it has any significance for historic or pre-historic archaeological resources (e.g., a shell midden, temporary hunting or fishing campsite, or semi-permanent settlement).

Strategies:

- Coordinate with the Service's Regional Historic Preservation Officer in developing the Cultural Resources Management Plan.
- Survey(s) would concentrate on Possum Bluff on the Bee Line Unit.
- If cultural resources are discovered, refuge would adapt management that best suits their protection and preservation.

VISITOR SERVICES

The proposed visitor services activities are provided under four refuge action areas: welcome and orient visitors, providing wildlife-dependent public use opportunities, outreach, and evaluating additional forms of public use. A visitor services step-down plan would need to be developed for the refuge to fulfill the goals, objectives, and strategies outlined in this section.

Welcome and Orient Visitors

Goal 7: The public will understand, support, and appreciate the purposes of the refuge and its wildlife and habitat.

Discussion: The purpose of this refuge, originally established four decades ago to protect a highly endangered subspecies, which ultimately became extinct, seemed to exclude public use, which would have interfered with the critical aim to save the dusky seaside sparrow. Later, with a continuing focus on providing habitat and protection for other threatened, endangered, and other listed species in this part of Florida, and with no dedicated staffing on site, providing the services and facilities needed to accommodate regular visitation would have demanded non-existent institutional resources. Public access and facilities is lacking at both units. Within the 15-year planning horizon of this CCP, the Service will endeavor to open the refuge to the public and provide the required facilities for public enjoyment and appreciation. Opportunities exist to expand visitor services, which up to this point has been open only to guided tours or through special use permits. Under this CCP, the St. Johns NWR would be opened to appropriate and compatible uses, providing ways to support environmental education and interpretation and wildlife observation and photography, and deliver messages about wildlife, habitat, and ethical conduct. Other types of wildlife focused uses such as hunting would be evaluated for appropriateness and compatibility and programs may be developed through step-down processes subject to further evaluation, public scoping, and if approved, potentially offering the public a wider range of uses. A visitor services plan would provide details necessary to support visitor services of the refuge and the facilities needed to welcome and orient visitors.

Objective 7-1: Opening the Bee Line Unit – Within 5 years of CCP approval and contingent upon available resources, open the Bee Line Unit of the St. Johns NWR to appropriate and compatible uses including wildlife observation, wildlife photography, and environmental education and interpretation.

Discussion: The refuge would open the Bee Line Unit to appropriate and compatible forms of wildlife-dependent uses. Brevard County owns, manages, and maintains the Fay Lake Wilderness Park, which offers opportunities to tie in with the refuge's existing system of levees and trails to Fay Lake's parking area and public use facilities (Figure 15). The refuge would seek a partnership with the county for visitor use of Fay Lake Park, providing parking for access and use of facilities. Proposed trail locations noted in Figure 15 would follow existing roads, are approximate, and subject to change given field conditions. Additional details concerning opening the Fay Lake trail including specific locations, infrastructure support, and operations would be expressed through a visitor services step-

down plan. Additional objectives under Goal 7 provide more information about the opening of the SR 50 Unit of the refuge to the listed uses.

Objective 7-2: Opening the SR 50 Unit – Within 7 years of CCP approval and contingent upon available resources, open the SR 50 Unit of the St. Johns NWR to opportunities for appropriate and compatible wildlife observation, wildlife photography, and environmental education and interpretation.

Discussion: In order to open the SR 50 Unit, the refuge would need to work with the Florida Department of Transportation, Brevard County, local landowners and neighbors, and other partners to provide safe access, connect lands, develop appropriate signage, and develop appropriate and safe parking and other forms of infrastructure. The refuge would pursue both approaches discussed below and depending on the ability to fulfill conditions necessary to support the approaches, would provide one access opportunity on the SR 50 Unit.

The refuge would pursue providing access to the SR 50 Unit via the proposed Hacienda Marsh (SR 50) Trail from SR 50 (Figure 16). Providing access here requires additional measures to assure visitor safety including the construction of a parking area, potential deceleration lane, and other infrastructure enhancements to provide a safe staging area for visitors. The main advantage of this approach is that no additional land acquisition would be required. However, there are several distinct challenges. SR 50 is a 4-lane highway with a posted speed limit of 60 miles per hour (MPH). In order to align with exiting refuge roads, the public entrance is located in the curve on SR 50. This presents hazards for visitors, particularly motorists turning across traffic to enter the refuge. In order to make the entrance safer, deceleration lanes would be required along with reduced traffic speeds on SR 50 at this location and traffic signage added. There would be additional public expense to construct parking lots, entrance roads, informational kiosk, and restrooms at this location.

In addition, the refuge would pursue establishing access opportunities for appropriate and compatible forms of visitor services from the north through the refuge's Fox Lake tract, originating from Brevard County's Fox Lake Park Sanctuary. Lands between the Fox Lake tract and SR 50 Unit are privately owned. Providing a trail system to connect the SR 50 Unit to the Fox Lake tract and the network of public lands to the north including the Fox Lake Park Sanctuary hinges upon partnerships with neighbors including potential land acquisition of privately held lands.

The refuge is proposing an acquisition boundary expansion of roughly 459 acres that includes both publicly held and refuge-managed lands. The purpose of the proposed acquisition boundary expansion is to provide the Service the ability to enter into acquisition agreements with willing sellers through a variety of mechanisms (e.g., including but not limited to fee title acquisition, conservation easements, MOUs), to connect the refuge's SR 50 Unit with the network of publicly managed lands in the area for the establishment of perpetual wildlife corridors and potentially providing visitor services opportunities (Appendix J). Connecting lands to and potentially utilizing Brevard County's Fox Lake Park benefits visitors in many ways as it already serves as a unique and quality visitor services site where parking and restroom facilities already exist and potentially available for public use and helps to connect the refuge to other naturally managed areas for additional visitor use options.

Proposed trail locations noted in Figure 16 would follow existing roads, are approximate, and subject to change given field conditions. Additional details concerning opening the SR 50 trail including specific locations, infrastructure, support, and operations would be expressed through a Visitor Services step-down plan. Additional Objectives under Goal 7 provide more information about the opening of the SR 50 Unit to the listed uses.

Strategies:

- Work with partners including refuge neighbors and Brevard County to develop safe access options from the north to SR 50 Unit via Fox Lake Park Sanctuary.
- Work with the partners including FDOT to provide infrastructure necessary to accommodate safe access from SR 50 to the unit including but not limited to parking areas, fences, and gates.

Objective 7-3: Welcome and Orient Visitors – In concert with the opening of the St. Johns NWR, develop materials that welcome and orient refuge visitors.

Discussion: The refuge was initially established to manage for threatened and endangered species, specifically the now extinct dusky seaside sparrow. Goals and objectives of this plan revise and update management direction, targeting management for the diversity of native wildlife and the habitats they occupy. Rare, threatened, and endangered species management would still play a principle role in management direction throughout the life of this plan, adding an important composite to the overarching direction of management to enhance wildlife diversity. The Service plans to open the refuge to appropriate and compatible forms of wildlife-dependent uses to share the spectacle of nature and the results of managing for enhanced wildlife diversity with visitors and guests of the region. The refuge would provide messaging from a setting that limited public uses and maximized protection and management for listed species to one where appropriate and compatible forms of wildlife-dependent public uses would be authorized and enabled through a shift in management focusing on wildlife diversity. To do this, the refuge would need adequate staff, funding, signage, information exchange, updated messaging, and increased public awareness. Strategies listed below would grow and change over time as the refuge monitors and evaluates impacts related to opening key points and places of interest to appropriate and compatible forms of wildlife-dependent uses.

Strategies:

- Develop welcome and orientation materials for visitors.
- Develop a standard refuge tear sheet (brochure) that would state rules and regulations.
- Develop messaging central to management for wildlife diversity.
- Develop kiosks to be placed at strategic locations and work with partners to deliver suitable messages.
- Develop trail maps for kiosks and tear sheets.
- Work with partners to collaborate on visitor service opportunities and location, share information about visitor services management, and enter into management agreements to share infrastructure and maintenance of key points of interest and facilities (e.g., trailheads, trails, restrooms).
- Provide visitor service information and routinely update refuge website: (http://www.fws.gov/stjohns).
- Work with the Merritt Island Wildlife Association to assist with developing, disseminating, and delivering key messages.
- Coordinate with partners to develop orientation (maps) brochures and other key messaging products to be disseminated at the Complex and partner facilities including Fay Lake Park and Fox Lake Park
- Routinely provide and update website information.

Figure 15. Proposed trail system – Bee Line Unit

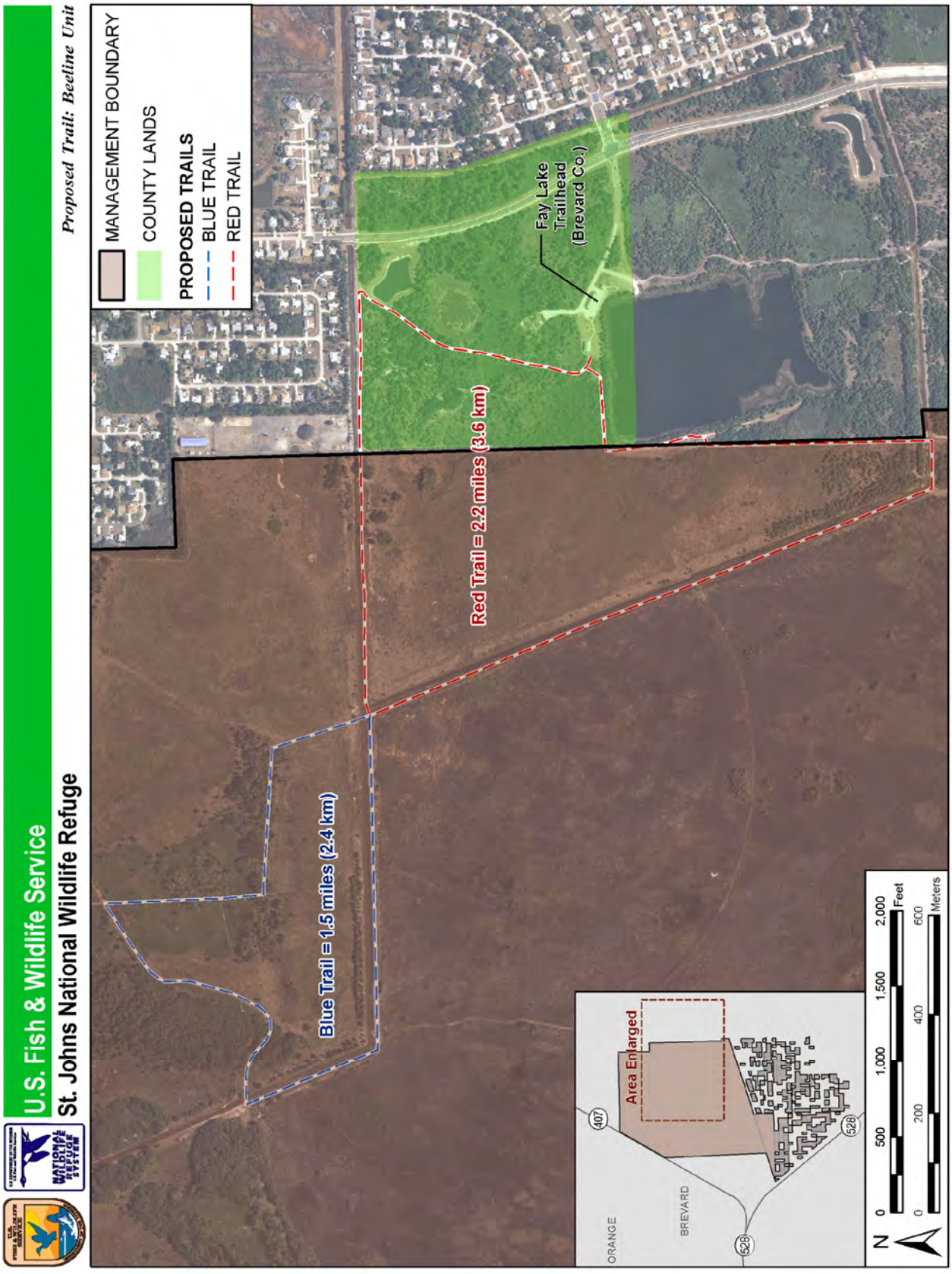
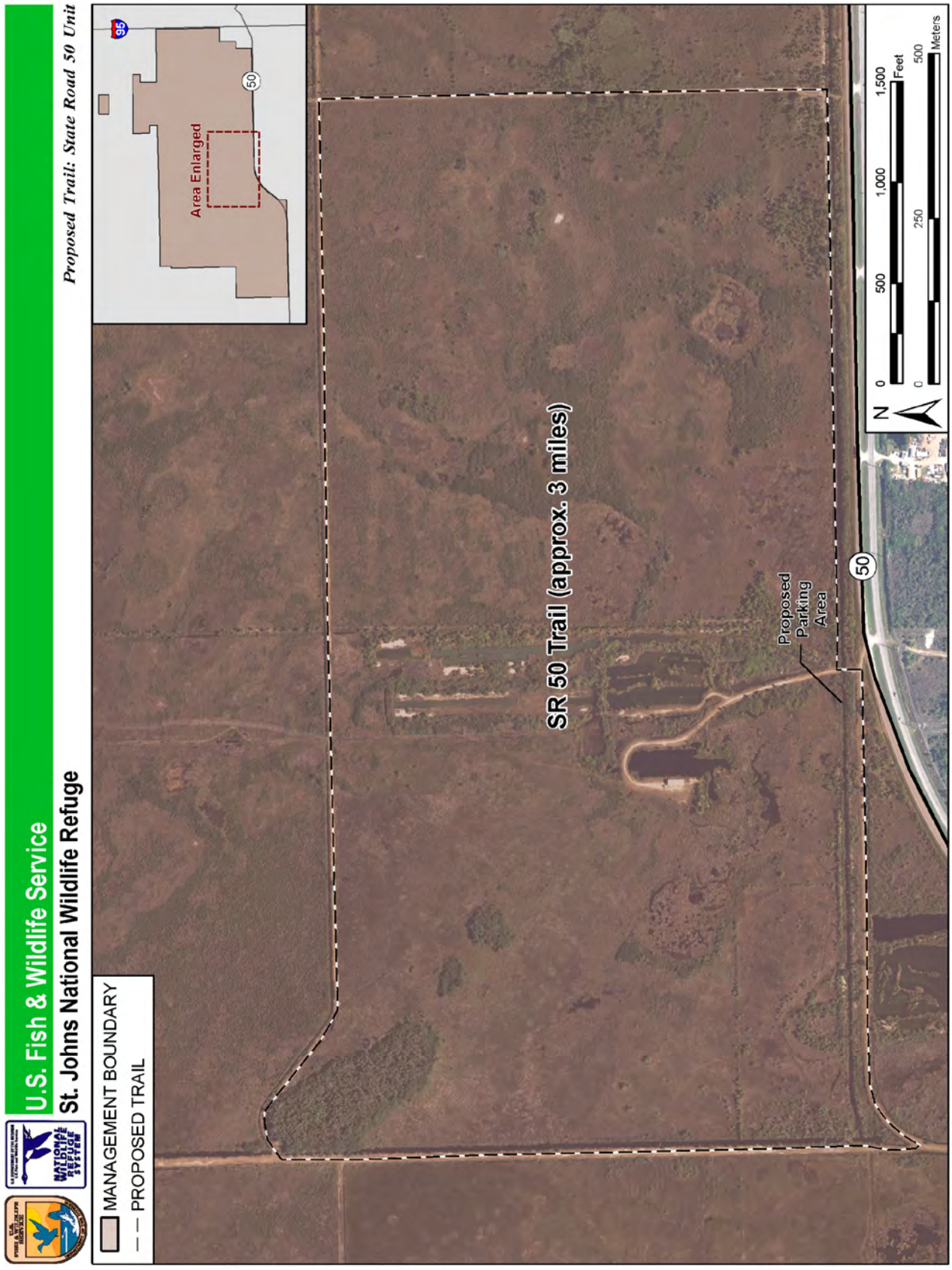


Figure 16. Proposed trail system – SR 50 Unit



Objective 7-4: Environmental Education – Within 5 years of CCP approval, in cooperation with partners, develop a curriculum-based environmental education program related to wildlife and climate change.

Discussion: No environmental education program exists at St. Johns NWR due to the lack of dedicated on-site refuge staff. However, the potential exists for an environmental education program since two schools are located near the refuge in Port St. Johns. The Bee Line Unit in particular has high potential for environmental education due to its proximity to these two schools. At present, it is not safe to bring school buses into the SR 50 Unit because of the lack of a deceleration lane and adequate parking. Environmental education could be expanded to include the unit if safe access and parking could be provided. The refuge would work with the neighborhood schools in developing an environmental education curriculum that supports Sunshine Standards (educational standards established by the Florida Department of Education).

Strategies:

- Continue occasional visits by Service staff to area schools to provide environmental education about the refuge and its resources.
- Work with partners, primarily the Brevard County School District, to develop a curriculum-based environmental education program related to wildlife and climate change within 5 years of CCP approval, and with local schools to conduct on-site environmental education.
- Offer opportunities for both classroom instruction and on-site visits.
- Coordinate with Brevard County to utilize Fay Lake Park as a point of departure.

Objective 7-5: Environmental Interpretation at the Bee Line Unit – Within 5 years of CCP approval, and contingent upon funding and staffing, work with Brevard County to provide visitor service opportunities from Brevard County's Fay Lake Park to the Bee Line Unit.

Discussion: The refuge would work with Brevard County to locate refuge trailheads, interpretive signage, and kiosk(s) at Fay Lake Park (Figure 15). Fay Lake Park is strategically located near the refuge's proposed Bee Line Unit trail series. Interpretive messaging in the form of signs and kiosks would provide a sense of awareness, support the need to deliver ethical behavior messaging, and would be integrated with Brevard County messaging thus contributing to a collaborative interpretive effort. Interpretive programs and messaging for the site would promote the benefits and challenges of managing for wildlife diversity, the need to understand and manage for refuge hydrology, the benefits and challenges of prescribed and unwanted wildland fire, challenges of climate change on refuge resources, the relationship of ethical behavior to wildlife and habitat management, and the interrelationship of species and habitats found on the refuge, among other messaging and interpretive options. The refuge would work closely with partners to ensure messaging and programs tie in with partner management and with neighbors to increase awareness and understanding of the refuge and its many attributes.

Strategies:

- Develop cooperative management agreements with Brevard County and private landowners where necessary.
- Develop a trailhead and kiosk(s) from Fay Lake Park onto the Bee Line Unit of the Refuge.
- Establish network of trails and provide informational kiosks at strategic access points.
- Coordinate with Brevard County for placement.

- Enter into MOUs or other appropriate agreements with Brevard County for maintenance and upkeep of trails and kiosks.
- Key resources for kiosks to highlight are secretive marsh birds, wildlife diversity, refuge hydrology, climate change, and the use of prescribed fire.
- Provide ethical behavior messaging consistent with marsh management.

Objective 7-6: Environmental Interpretation at the SR 50 Unit – Within 7 years of CCP approval, evaluate feasibility of providing access to the SR 50 Unit.

Discussion: The refuge would work with Brevard County, St. Johns River Water Management District, neighbors, and the Florida Department of Transportation to locate refuge trailheads, interpretive signage, kiosk(s), and a parking area for the SR 50 Unit (Figure 16). As mentioned in Objective 7-2, a few options would be considered to open SR 50 Unit key points of interest. In order to support visitor use, interpretive messaging in the form of signs and kiosks would be developed to provide a sense of awareness, support the need to deliver ethical behavior messaging and would be integrated with Brevard County messaging thus contributing to a collaborative interpretive effort. The refuge would work with partners to identify connections and opportunities of the SR 50 Unit and collaboratively provide key messaging for the unit, including promoting the benefits and challenges of managing for wildlife diversity, developing a greater understanding of refuge hydrology, the benefits and challenges of prescribed and unwanted wildland fire, challenges of climate change on refuge resources, the relationship of ethical behavior to wildlife and habitat management, and the inter-relationship of species and habitats found on the refuge, among other messaging and interpretive options. The refuge would work closely with partners to ensure messaging and programs tie in with partner management and with neighbors to increase awareness and understanding of the refuge and its many attributes.

Strategies:

- Develop cooperative management agreements with Brevard County, St Johns River Water Management District, and private landowners where necessary.
- Establish network of trails and provide informational kiosks at strategic access points.
- Coordinate with Brevard County for placement.
- Enter into MOUs or other appropriate agreements with Brevard County for maintenance and upkeep of trails and kiosks.
- Key resources for kiosks to discuss are secretive marsh birds, refuge hydrology, climate change, managing for wildlife diversity, and the use of prescribed fire for refuge management, among others.
- Provide ethical behavior messaging consistent with marsh management.

Objective 7-7: Wildlife Observation and Photography at the Bee Line Unit – Within 5 years of CCP approval, open the Bee Line Unit to wildlife observation and photography, possibly to marked foot trails and kiosk at trailhead; foot traffic would be confined to existing dikes and roads. Evaluate potential connectivity to regional trails networks. Access would be subject to closure for administrative purposes.

Discussion: To date, there has been virtually no public use on the Bee Line Unit. This objective would provide guidance for the program, facilities, and staffing available to establish these public uses on the Bee Line Unit. As non-consumptive forms of recreation, wildlife observation and photography are the two most popular uses of Refuge System, and they can generally be permitted with minimal impacts on the wildlife resource. The refuge has the potential to provide wildlife enthusiasts such as birders the opportunity to see and photograph several rare or secretive species of marsh birds.

Strategies:

- With Service recreation and site planners and public use specialists, investigate and determine the most favorable spatial configuration and orientation of facilities such as foot trails, trailhead(s), kiosks, and which dikes, levees, and roads to run trails along.
- Work with partners to overcome refuge access obstacles.
- Work with partners to include the refuge and its future trails in a regional trail network.
- Consider placing a permanent (fixed) or portable blind for serious bird observers and photographers.
- Develop program of organized wildlife observation and photography events on the refuge.
- Utilize volunteers and partners in promoting and managing these opportunities.

Objective 7-8: Wildlife Observation and Photography at the SR 50 Unit – Within 7 years of CCP approval, open the SR 50 Unit to wildlife observation and photography, to possibly include a parking lot, marked foot trails, and kiosk at trailhead; foot traffic would be confined to existing dikes and roads. Evaluate potential connectivity to regional trails networks. Access would be subject to closure for administrative purposes.

Discussion: To date, the only public use of the SR 50 Unit has been for limited (guided) wildlife observation and photography. This objective would expand the program, facilities, and staffing available to accommodate an increase in these public uses on the SR 50 Unit. As non-consumptive forms of recreation, wildlife observation and photography are the two most popular uses of the Refuge System, and they can generally be permitted with minimal impacts on the wildlife resource. The refuge has the potential to provide wildlife enthusiasts such as birders the opportunity to see and photograph several rare or secretive species of marsh birds.

Strategies:

- With Service recreation and site planners and public use specialists, investigate and determine the most favorable spatial configuration and orientation of facilities such as parking lots, foot trails, trailhead(s), kiosks, and which dikes and roads to run trails along.
- Work with Brevard County to provide public access to the refuge through Fox Lake Park.
- Work with Florida Department of Transportation to evaluate development of a safe parking area and trailhead on SR 50.
- Work with partners to overcome refuge access obstacles.
- Work with partners to include the refuge and its future trails in a regional trail network.
- Consider placing a permanent (fixed) or portable blind for serious bird observers and photographers.
- Develop program of organized wildlife observation and photography events on the refuge.
- Utilize volunteers and partners in promoting and managing these opportunities.

Objective 7-9: Outreach – Over the 15-year life of the CCP, communicate key messages and issues with off-site audiences to build support within the local community and beyond for the refuge, its purposes, and its management.

Discussion: To date, the refuge has conducted very limited outreach due to the absence of dedicated, on-site staff. Controlling illegal activities could be a focus of outreach. We would work to obtain one 0.5 FTE park ranger to manage public use and outreach. Refuge rules and regulations need to be emphasized in outreach. Other key issues to be included are: habitat management using fire as a tool; ethical outdoor behavior; resource protection; boundary-related needs; invasive exotic

plants; threatened and endangered and other listed species; interior salt marshes due to salt pans and the area's special hydrology; the impact of existing surrounding development and pressures on the habitats and ecological processes; the extinct dusky seaside sparrow as an example of what can happen when things go too wrong too fast to save a species.

Strategies:

- Obtain one new 0.5 FTE park ranger to manage public use and outreach on the refuge.
- Outreach will be conducted by Merritt Island NWR Complex staff led by the new shared ranger.
- Continue to provide outreach to news media and the local community and to provide presentations and tours.
- Work with partners to reach out and communicate with the public.
- Maintain and regularly update the refuge website, including possibly notification of prescribed fires under "Hot Topics."
- Continue to participate in the Space Coast Birding and Wildlife Festival, including presentations and tours.
- Consider public meetings to discuss illegal activities and develop information on ethical behavior to disseminate to the public.
- Develop species lists (birds, mammal, amphibian, and reptile) for the refuge.
- Notify public and agencies about specific burns and prescribed fire generally.
- Educate neighbors on key threats the refuge faces (e.g., exotics, wildland fire, trespass).
- Engage the news media in coverage of illegal activities to publicize their occurrence to the broader public.

Goal 8: Evaluate the possibility of opening additional areas of the refuge and/or evaluate the possibility of offering additional appropriate and compatible wildlife-dependent public uses.

Discussion: This goal relates to evaluating potential activities that may be made available on the refuge after further evaluation and planning efforts are instituted. As stated above, since its establishment, the refuge has generally been closed to the public, with certain very specific and limited exceptions. Goal 7 expressed the direction of opening the refuge to passive recreational opportunities including environmental education and interpretation and wildlife observation and photography. The refuge intends to work with partners to evaluate the appropriateness, compatibility, and suitability of other opportunities to further public use of the refuge over the 15 year life of the plan. Additional public input for specific uses would be necessary to ensure potential uses are evaluated and implemented based on a broad spectrum of opinions, ideas, and issues.

Objective 8-1: Evaluate Hunting Opportunities – Working with partners, within 3 years of CCP approval, determine whether or not the refuge can support primitive weapon (i.e., bow and muzzle-loader) and youth hunts for deer and feral hog.

Discussion: To date, no hunting has been permitted at St. Johns NWR due to its closed status. However, limited hunting opportunities for deer and feral hog do exist, since populations of both occur on the refuge. White-tailed deer populations may potentially support a limited hunt, such as a quota hunt. Additionally, feral hog removal from the refuge would support wildlife and habitat management goals and objectives to minimize impacts from exotic species. The Service would have to work closely to coordinate any hunt with FWC. Given the proximity of nearby residential development, public safety would be of the highest priority. Restricting hunts to bow and muzzle-loader would help reduce the potential for hunting-related accidents. A comprehensive evaluation of hunting

opportunities would be necessary to establish hunting as a form of public use on the refuge. The refuge would evaluate the suitability of species to support hunting. If hunting is found to be a suitable and compatible form of public use, we would develop step-down plan(s) based on population evaluations and seek additional public input throughout the process.

Strategies:

- Cooperate closely with FWC to analyze the suitability of the refuge's deer populations to organized hunting.
- Working with partners including FWC, determine the status and sustainability of refuge deer populations necessary to support primitive weapon and youth deer hunts while providing for self-sustaining populations of deer.
- Based on evaluation of the refuge deer heard and the need to control feral hog populations, develop a hunting package that includes a step-down hunt plan that involves public scoping, participation, and integrates public comments.

Objective 8-2: Evaluate Additional Uses and/or Areas – Over the 15-year life of this CCP, evaluate St. Johns NWR's ability to support additional opportunities for appropriate and compatible public uses.

Discussion: Additional forms of appropriate and compatible wildlife-dependent uses, forms of access and location of uses may evolve as the refuge integrates new visitor service opportunities with the abundance of partner-managed lands already open to public use. The refuge would work with partners on a regular basis to evaluate a range of public use and access alternatives. The evaluation would include other areas and/or uses not previously outlined in the above goals and objectives.

REFUGE ADMINISTRATION

Goal 9: Provide sufficient staff, volunteers, facilities, and equipment to manage and protect the natural and cultural resources of the refuge.

Discussion: To date, a severe shortage of staffing and funding resources have sharply inhibited active management of the refuge's habitats and wildlife populations and restricted almost all public use. The one exception has been fire management conducted by Complex staff for the purposes of habitat maintenance and controlling fuel loads. During the lifetime of this CCP, the Service aims to increase staffing, the number of volunteers, and the availability of facilities and equipment to accommodate a projected increase in both habitat and wildlife management and public use.

Objective 9-1: Staffing – Within 15 years of CCP approval, provide 0.5 FTE law enforcement officer to protect refuge resources from illegal activities, 1.0 FTE biological technician, 0.5 FTE wage grade maintenance worker, and 0.5 FTE refuge ranger.

Discussion: This objective proposes 2.5 FTE of dedicated staffing for St. Johns NWR, when none has ever existed in the 4-decade history of the refuge. Adding this level of staffing would allow the refuge to accomplish goals and objectives, never before realized, in all three major program areas of wildlife management, habitat management, and visitor services. The Merritt Island NWR Complex would continue to provide a base level of personnel support for St. Johns NWR's management efforts.

Strategies:

- Hire FTE biological science technician.
- Hire 0.5 FTE law enforcement officer to be shared with Merritt Island NWR Complex.
- Hire 0.5 FTE maintenance technician to be shared with Merritt Island NWR Complex.
- Hire 0.5 FTE refuge ranger to be shared with Merritt Island NWR Complex.

Objective 9-2: Volunteers – Over the 15-year life of this CCP, utilize volunteers for increased environmental education and interpretation activities and programs, trail maintenance, outreach, wildlife surveys, expanded exotic control, and refuge cleanups.

Discussion: To date, very limited use has been made of volunteers on the refuge. Thus, there is ample room for expanding the volunteer program. The refuge has utilized volunteer assistance coordinated primarily through MIWA friends and volunteer group on a case-by-case basis. Throughout the Refuge System, volunteers provide enormous, crucial support in a number of ways. The opportunity exists at St. Johns NWR to tap into this source of manpower, enthusiasm, and knowledge, thereby extending staff's reach and capacity to accomplish tasks.

Strategy:

- Increase number of volunteers to assist with development of environmental education and interpretation programs, public use needs including interpretation and trail maintenance and upkeep, and biological inventorying, monitoring, and surveying.

Objective 9-3: Facilities – Over the 15-year life of this CCP, continue to maintain one tool and equipment storage shed, perimeter fencing, 5-6 gates, 10 culverts, and 10-12 miles of unpaved access roads. Within 5 years of CCP approval, consider developing kiosks, trails, associated parking, gates, information signs, trailheads, and observation blinds, and evaluate the need for access for hunting on the SR 50 and Bee Line Units.

Discussion: The CCP contemplates expanding the very modest existing facilities on the refuge. There are currently no facilities related to public use. These new proposed facilities would primarily support proposed public uses and visitor services. They are needed to allow wildlife watchers and photographers areas to pursue their activities effectively, safely, and with minimal impact on wildlife and habitat resources.

Objective 9-4: Equipment – Over the 15-year life of this CCP, continue to maintain a small complement of fire-fighting equipment on site. Within 7 years of CCP approval, add 1-2 vehicles and equipment for exotic plant control activities.

Discussion: The limited stock of existing equipment on-site is all related to fire fighting and fire management (i.e., prescribed fires and unwanted wildland fires). Much of the equipment used in fire activities comes from Merritt Island NWR Complex and returns to that refuge upon completion of the action in question. This CCP proposes adding a small additional set of equipment related to the proposed intensification of biological program needs including control for invasive plants, levee and road maintenance, and potential hydrologic restoration.

V. Plan Implementation

INTRODUCTION

Refuge lands are managed as defined under the Improvement Act. Congress has distinguished a clear legislative mission of wildlife conservation for all national wildlife refuges. National wildlife refuges, unlike other public lands, are dedicated to the conservation of the Nation's fish and wildlife resources and wildlife-dependent recreational uses. Priority projects emphasize the protection and enhancement of fish and wildlife species first and foremost, but considerable emphasis is placed on balancing the needs and demands for wildlife-dependent recreation and environmental education.

To accomplish the purpose, vision, goals, and objectives contained in this Draft CCP/EA for St. Johns NWR, this section identifies projects, funding and personnel needs, volunteers, partnership opportunities, step-down management plans, a monitoring and adaptive management plan, and plan review and revision.

PROPOSED PROJECTS

Listed below are the proposed project summaries and their associated costs for fish and wildlife population management, habitat management, resource protection, visitor services, and refuge administration over the next 15 years. This proposed project list reflects the priority needs identified by the public, planning team, and refuge staff based upon available information. These projects were generated for the purpose of achieving the refuge's objectives and strategies. The primary linkages of these projects to those planning elements are identified in each summary. Among these projects is a list of step-down management plans to be developed. Step-down plans provide more detail and specific tasks, stepping down from the CCP. The Service prepares step-down plans in conjunction with the provisions set forth in NEPA.

Annual funding for staff, facilities, operations, and maintenance is an integral part of project implementation. The general cost estimates provided will be updated and adjusted annually. Essential needs are addressed, such as eliminating biological threats and problems, meeting Refuge System mission requirements, and fulfilling the purposes for which the refuge was established. There are no assurances that these projects will be either partially or fully funded. However, with the help and cooperation of conservation partners, the Service will use this CCP to focus on funding the operations and maintenance needs of the refuge.

Implementing the proposed management activities would result in increased protection for marsh wading, wintering, and summering birds with management for marsh birds as the primary focus over the 15-year life of the CCP. Increased information on refuge resources including information gained from hydrologic studies and species and habitat inventorying, monitoring, and researching would enhance refuge decision-making. Ecological benefits from continuing efforts to maintain exotic, invasive, and nuisance species would be seen. Additionally, the refuge would monitor for the impacts of climate change on refuge resources and address concerns related to these findings through an adaptive management approach.

The refuge would continue to coordinate with partners and form new partnerships to enhance resource protection opportunities. The refuge would seek to establish wildlife corridors from existing refuge managed lands to regional conservation lands through a variety mechanisms. These include

but are not limited to acquisition boundary expansion, land acquisition based on a willing-seller approach, conservation easements, land swaps, and other less than fee title acquisition mechanisms. Cultural and historic resources would be identified through the implementation of a cultural resources assessment and management would be adapted to protect cultural or historic resources discovered.

A new suite of visitor service experiences would be established, providing for passive recreation opportunities including opening portions of the refuge to appropriate and compatible uses including wildlife observation and photography and implementing an environmental education and interpretation curriculum for neighboring and regional schools. Working with partners, information kiosks and trailheads would be developed to educate and orient visitors to the refuge and greater Refuge System. An existing infrastructure of established roads and levees would provide readymade trails for walking, hiking, and biking access for the public to enjoy and experience wildlife.

To achieve this, the refuge would work with governmental and non-governmental partners, area communities, and local businesses and pursue additional staffing and funding to address management concerns.

For the purposes of achieving the goals and objectives developed for the refuge, the CCP has grouped management strategies into specific projects. The CCP described 24 projects for development and management. The projects are not in hierarchical or significance order as all are equally important to provide management and protection for our trust resources. Additional staff would be needed to implement these projects. All projects would require the close coordination with partner agencies and organizations.

WILDLIFE AND HABITAT MANAGEMENT

Project 1. Standardize surveying and monitoring program and conduct baseline inventories for the refuge.

The refuge has not conducted routine baseline inventories for avifauna apart from secretive marsh bird surveys conducted from 1993 to 2004. The refuge lacks an updated inventory of flora and fauna composition, and habitat conditions. This project would build upon the earlier avifauna survey methodologies (e.g., transect length, location of survey) to all species and additional locations on the refuge, providing a much needed inventory of species composition, abundance, habitat conditions, and status and trends.

Wildlife and Habitat Management Objectives: 1-1-8, 3-1-2, 4-1-5
Resource Protection Objectives: 6-1
Visitor Services Objectives: 7-3-4, 7-7-9, 8-1-2
Refuge Management Objectives: 9-1-2, 9-4

Project 2. Conduct annual marsh bird surveys.

The refuge requires updated and consistent inventories of its marsh bird populations including the suite of rails, wading birds, and species of management concern that together constitute the highest priority wildlife management component over the 15-year life of this Plan. This project seeks to build from previous marsh bird surveys conducted on the SR 50 Unit. The project would utilize protocols of and integrate survey methodologies with the National Marsh Bird Monitoring Protocol, including conducting three annual visits per site based on seasonality and response to habitat management efforts, recording at a minimum presence/absence and abundance of marsh bird species.

Wildlife and Habitat Management Objectives: 1-1-2, 2-1, 3-1-2, 4-1, 4-5
Visitor Services Objectives: 7-1-2, 7-4-9, 8-2
Refuge Management Objectives: 9-1-2, 9-4

Project 3. Determine fire effects on priority species.

In order to maintain priority habitat types such as the refuge's predominant composition of *Spartina bakerii* marsh, an integrated approach to habitat management is necessary that includes implementation of prescribed fire. Prescribed fire return intervals on the refuge have primarily been based on fuel loads rather than ecological and/or species response which may limit species recruitment, utility, and success, and may limit habitat maintenance and development. This project would monitor the response of focal species (e.g., rail species) and habitat conditions (e.g., *Spartina bakerii* marsh) to determine appropriate sizes, seasonality, and frequency of prescribed fires necessary to maintain marsh habitat conditions best suited for rail and other marsh birds.

Wildlife and Habitat Management Objectives: 1-1-8, 2-1, 3-1-2, 4-1-5
Visitor Services Objectives: 7-4-9, 8-2
Refuge Management Objectives: 9-1-2, 9-4

Project 4. Conduct wading bird nesting surveys.

The SR 50 Unit borrow pit area is home to the federally listed wood stork and four state listed species of special concern - little blue heron, snowy egret, tri-colored heron and white ibis. Wading birds utilize the dredge spoil islands as rookeries and forage in the surrounding borrow pit edges, wetlands and marshes. The refuge presently lacks a systematic, routine analysis of our wading bird populations. Sporadic and inconsistent inventories have been conducted on the refuge since it was established in 1971, but the refuge has little baseline knowledge of wading bird nesting success, status and trends. This project would provide for a routine level of wading bird nesting surveys conducted throughout the year at the SR 50 Unit borrow pit area to monitor status and trends of refuge wading bird populations.

Wildlife and Habitat Management Objectives: 1-2, 1-3-1-2, 2-1, 3-1-2, 4-1-2, 4-5
Visitor Services Objectives: 7-2-4, 7-6, 7-8-9, 8-1-2
Refuge Management Objectives: 9-1-2, 9-4

Project 5. Improve wading bird habitat in the SR 50 Unit borrow pits.

As mentioned in Project 4, the SR 50 Unit borrow pit is home to wading birds that use this area for nesting, forage habitat, and resting. The borrow pit itself is a deep, steeply sloped dredge pit used to create the SR 50 highway prior to refuge establishment. The existing littoral zone has low forage value due to the steep slopes rendering it all but unusable as foraging habitat for wading birds. In addition, wading birds nest on a series of fill spoil islands left over from past dredge events. These islands were once connected to the remaining system of borrow levees and dikes where nesting birds would be easier prey targets for small mammals and exotic species. In addition, non-native, invasive and exotic species occur on the levees and dikes. This project would provide an integrated approach to improve habitat for wading birds, including: improving foraging opportunities for wading birds by shallowing up the borrow pit slopes; creating additional artificial islands to increase nesting opportunities from the present series of levees and dikes in the SR 50 Unit borrow pit area; and treating/removing exotic vegetation and planting native species.

Wildlife and Habitat Management Objectives: 1-3, 1-3-1-2, 2-1, 3-1, 3-2, 4-5
Visitor Services Objectives: 7-2-4, 7-6, 7-8, 7-9, 8-1-2
Refuge Management Objectives: 9-1-2, 9-4

Project 6. Evaluate the use of mechanical (e.g., mowing) and agricultural (e.g., grazing) vegetation control on the Bee Line Unit

Cattle grazing was historically provided on parts of what is now the refuges' Bee Line Unit prior to its acquisition by the Service in 1979. The refuge annually renewed a cattle grazing permit on about 600 aces of the Bee Line Unit as a condition of the 1978-79 negotiations to acquire a portion of the Bee Line Unit's original 2,013 acres. The refuge (Hill 1994) evaluated the grazing program and determined that in its present configuration, grazing was not a compatible management alternative and the grazing program was phased out. This project would reevaluate the use of mowing and grazing on the Bee Line Unit as an integrated approach along with prescribed fire and exotic control to maintain open habitat for northern crested caracara and marsh birds.

Wildlife and Habitat Management Objectives: 1-1-2, 1-4, 1-6, 1-7-8, 3-1, 4-1, 4-4,
Resource Protection Objectives: 5-1

Project 7. Conduct a hydrologic study of the refuge.

The refuge lacks baseline hydrologic information of its surface and groundwater infrastructure. Dikes, levees, ditches and canals are scattered throughout the Bee Line and SR 50 units and impacts of these structures to refuge resources are not fully known. This project seeks to fully understand the refuge's hydrologic setting and conditions, and identify hydrologic restoration projects targeting restoration to benefit the refuge species of concern.

Wildlife and Habitat Management Objectives: All objectives
Resource Protection Objectives: 5-1, 5-3-4, 6-2
Visitor Services Objectives: 7-1-2, 7-4-6, 8-1-2
Refuge Management Objectives: 9-1-4

Project 8. Restore hydrologic setting of Bee Line Unit

Natural hydrologic conditions of the refuge have been impacted by historic drainage projects. Particularly, four existing open-ended culverts act to drain the historic salt marsh. Working with the partners including Brevard County who maintain a major canal that traverses the refuge, this project seeks to restore portions of the hydrologic setting by providing more surface flow and less point source drainage/discharge across the natural marsh through the removal or replacement of the five culverts.

Wildlife and Habitat Management Objectives: All objectives
Visitor Services Objectives: 7-1, 7-3-5, 7-7, 7-9, 8-1-2
Refuge Management Objectives: 9-1-4

Project 9. Continue to identify, locate, and control non-native, invasive plants on the refuge.

This project would continue the refuge's program of treating non-native, invasive, and nuisance plants over the 15-yer life of this CCP. The refuge is infested with and has treated populations of with Old World climbing fern, Brazilian pepper, cogon grass, tallow tree and melaleuca. Off-site seed sources of these and other non-native, invasive species will continue to provide source material and if left untreated, may approach infestation levels requiring significant resources to maintain. The project

would provide a maintenance level of control for all Florida Exotic Pest Plant Council (FLEPPC) Category I and Category II pest plants, specifically targeting the species listed above with recurring funding provided for annual retreatments.

Wildlife and Habitat Management Objectives: All objectives
Resource Protection Objectives: 6-2
Visitor Services Objectives: 7-1-6, 7-9, 8-1-2
Refuge Management Objectives: All objectives

Project 10. Monitor for the impacts of climate change on refuge resources.

St. Johns NWR comprises approximately 6,300 acres of relic salt marsh and scattered upland habitats where four federally listed animals, seven species of management concern, and eight additional state listed species occur. The refuge lacks baseline information concerning the role climate change will play on refuge resources, particularly changing patterns of suitable habitat for priority wildlife and plant species. This project would monitor refuge habitat conditions and document changes resulting from the effects of climate change and use these results in an adaptive management strategy to benefit a diverse assemblage of wildlife.

Wildlife and Habitat Management Objectives: All objectives
Resource Protection Objectives: 5-1, 5-3, 6-2
Visitor Services Objectives: 7-4-6, 7-9, 8-2
Refuge Management Objectives: All objectives

RESOURCE PROTECTION

Project 11. Provide a refuge boundary survey.

The refuge lacks the ability to identify Service interests in the field, particularly in the checkerboard area which threatens our ability to protect the refuge from illicit uses, hinders our ability to manage refuge lands, and perpetuates the inability to properly protect the refuge boundary. This project would provide for a comprehensive boundary survey of refuge interests to be used by the refuge for law enforcement and resource management purposes, and as the principle aid to properly administer and enforce a secure boundary.

Wildlife and Habitat Management Objectives: All objectives
Resource Protection Objectives: All objectives
Visitor Services Objectives: 7-1, 7-3-5, 7-7, 7-9, 8-1-2
Refuge Management Objectives: 9-1

Project 12. Consolidate ownership of the Bee Line Unit – checkerboard.

This project would help support costs associated with acquiring lands strategically positioned within the Bee Line Unit's checkerboard that support wildlife and habitat objectives as well as helping to secure the boundary. The refuge would seek to acquire lands based on a willing-seller approach, through conservation easements, land swaps, through partnerships, and/or memorandum of understanding as examples, employing these mechanisms individually or in combination. Consolidating ownership of the Bee Line Unit to better manage habitats and deter illicit uses is a top priority of the refuge over the 15-year life of this CCP. In addition to providing long-term boundary management solutions to secure the refuge from illicit and chronic ATV-use, consolidating ownership would provide the potential for additional public access for a wide range of wildlife-dependent public use opportunities.

Wildlife and Habitat Management Objectives: All objectives
Resource Protection Objectives: All objectives
Visitor Services Objectives: 7-1, 7-3-5, 7-7, 7-9, 8-1-2
Refuge Management Objectives: 9-1

Project 13. Acquire lands to establish wildlife corridors.

This project would help support costs associated with acquiring lands within the proposed refuge acquisition boundary expansion area (Figure 14) to connect refuge lands with the network of nearby conservation lands (Figure 8), providing manageable corridors for wildlife movement and dispersal. The refuge would seek to acquire lands based on a willing-seller approach through a variety of mechanisms including but not limited to conservation easements, land swaps, and/or memorandum of understanding as examples and would employ these mechanisms individual or in combination.

Wildlife and Habitat Management Objectives: All objectives
Resource Protection Objectives: All objectives
Visitor Services Objectives: 7-1-2, 7-4-6, 7-9, 8-1-2
Refuge Management Objectives: 9-1-2

Project 14. Seek abandonment of Brevard County road easement rights-of-way.

This project seeks to work with Brevard County to abandon road and ditch rights-of way that predate the establishment of the refuge. The rights-of-way present a management concern as they will affect the ability to restore hydrology and manage public access. Rights-of-way abandonment was discussed during the 1970s land acquisition phase, but no agreement or transfer with Brevard County was ever formalized. The project would vacate the county rights-of-way and provide more control for future management.

Wildlife and Habitat Management Objectives: All objectives
Resource Protection Objectives: All objectives
Visitor Services Objectives: All objectives
Refuge Management Objectives: 9-1-2

Project 15. Replace and maintain the Bee Line Unit's checkerboard fence system and boundary signage

The refuge has installed gates and perimeter fencing along the Bee Line Unit checkerboard to protect it from illicit access and uses. However, acts of vandalism including cutting and destroying sections of fence have occurred. The refuge has no provisions to maintain the system and in its present condition, the fence system does not adequately protect refuge resources and interests. An integrated approach of consolidating ownership, adding law enforcement presence, and securing and posting a functional boundary would collectively serve to protect the Bee Line Unit from chronic and illegal uses over the 15-year life of this CCP. This project facilitates one component of this integrated approach to securing and implementing management goals, objectives, and strategies identified in this CCP.

Wildlife and Habitat Management Objectives: All objectives
Resource Protection Objectives: 5-1, 6-1-2
Visitor Services Objectives: 7-1, 7-3-5, 7-7, 7-9, 8-1
Refuge Management Objectives: All objectives

Project 16. Conduct a cultural resources assessment.

The existence of cultural and archaeological resources on the refuge is unknown and no systematic surveys have been conducted since the refuge was established. Management has provided clear guidance to staff, volunteers, partners, and contractors to notify management in the event cultural resources are discovered, but none have been to date. This project would provide a one-time cultural resources survey to fully understand the refuge's cultural and archeological setting. If discovered, the refuge would adapt management to protect these resources.

Resource Protection Objectives: All objectives
Visitor Services Objectives: All objectives
Refuge Management Objectives: 9-1-2, 9-4

VISITOR SERVICES

Project 17. Increase outreach and opportunities for environmental education and interpretation.

This project would focus on building better understanding and appreciation for the St. Johns NWR through a community education program. An environmental education program would be developed with Campus Charter School and perhaps other schools in the Port St. Johns area. Within one year of filling the park ranger position, the refuge would establish contact with the elementary school and perhaps others school in the area. Identify one or more teachers to assist in the development of a curriculum relating to the refuge (e.g., wildlife, wetland plant communities, climate change) that would meet Florida's teaching standards for selected grades 4-6. After the curriculum is developed, work with the teacher(s) to begin implementing the classroom curriculum. This would be followed by field trips to the Bee Line Unit. At the end of the first year, critique the curriculum with the teacher(s), make any necessary changes, and make plans for the following school year.

Wildlife and Habitat Management Objectives: All objectives
Resource Protection Objectives: 6-1-2
Visitor Services Objectives: All objectives
Refuge Management Objectives: 9-1-2

Project 18. Develop a system of trails for the Bee Line Unit.

Forge a partnership with Brevard County Parks and Recreation to develop a trail from Fay Lake Park into the refuge. This project would provide for wildlife-dependent use in the form of wildlife observation, wildlife photography, and environmental education and interpretation via hiking and biking. The existing parking and restroom infrastructure of Fay Lake Park would be utilized to provide these wildlife-dependent recreation opportunities. A trail head kiosk would be developed in the County Park which would lead to a loop hiking trail through a portion of the refuge. The trail would provide opportunities for the public to: experience the refuge, view wildlife, and learn more about the conservation network of lands that make up the Upper St. Johns River ecosystem. The project would also include crafting an agreement between Brevard County and the refuge to detail the roles and responsibilities of each agency. Trail details including applicable refuge-specific regulations would be provided in the visitor services plan.

Wildlife and Habitat Management Objectives: 1-1-8, 3-1-2, 4-1-5
Resource Protection Objectives: 5-1, 5-3-4, 6-1
Visitor Services Objectives: 7-1, 7-3-5, 7-7, 7-9, 8-1-2
Refuge Management Objectives: 9-1-2

Project 19. Develop a system of trails for the SR 50 Unit.

This project involves establishing infrastructure to support a trail system for the SR 50 Unit. Objective 7-2 discusses two options to provide access for visitor service opportunities and both approaches are described through this project to ultimately establish one SR 50 Unit trail system.

Providing access from SR 50 would be pursued to establish a refuge-owned and -managed location thus providing entry and access to the Hacienda Marsh Trail (Figure 16). The trail is configured on an existing series of levees and roads so minimal maintenance and operational support to establish the loop trail itself would be necessary. On the other hand, SR 50 is a busy 4-lane highway and several improvements would be needed to establish a trail head at this location. Within 5 years of the approval of this CCP, the refuge would request agency funding for the design of a parking lot, deceleration lane, fencing, trail head kiosk, and interpretive signs. The loop trail would follow established roads and provide visitors with an opportunity to enjoy the wildlife and marsh community of this section of the refuge. During the design of the trail, the refuge would work with county and regional trail planners to evaluate the potential to connect with other trails planned on adjacent lands. When open, the trail would be accessible to pedestrian and bicycle traffic during daylight hours.

Another approach to providing access to the SR 50 Unit includes establishing access opportunities from the north, originating from Brevard County's Fox Lake Park Sanctuary with access through the Fox Lake tract to the SR 50 Unit interior. Lands between the Fox Lake tract and SR 50 Unit are privately owned. Providing a trail system to connect the SR 50 Unit to the Fox Lake tract and the network of public lands to the north, including the Fox Lake Park Sanctuary, hinges upon partnerships with neighbors including potential land acquisition of privately held lands. The refuge is proposing an acquisition boundary expansion of roughly 459 acres that includes both privately held and refuge managed lands. The purpose of the proposed acquisition boundary expansion is to provide the Service the ability to enter into acquisition agreements with willing sellers through a variety of mechanisms (e.g., including but not limited to fee title acquisition, conservation easements, MOUs), to connect the SR 50 Unit with the network of publicly managed lands in the area for the establishment of perpetual wildlife corridors and potentially providing visitor services opportunities (Appendix J and Objective 5-2).

If lands are acquired, this approach would provide infrastructure to support visitor use including but not limited to providing safe access, entering into cooperative agreements or other agreement mechanisms with Brevard County for use of Fox Lake Sanctuary as a trail head, trail design and development, signage, boundary posting, and kiosk development. Connecting lands to and potentially utilizing Brevard County's Fox Lake Park benefits visitors in many ways as it already serves as a unique and quality visitor services site where parking and restroom facilities exist.

Wildlife and Habitat Management Objectives: All objectives
Resource Protection Objectives: 5-1-4, 6-1
Visitor Services Objectives: 7-2-4, 7-6, 7-8, 7-9, 8-1-2
Refuge Management Objectives: 9-1-2

Project 20. Evaluate the potential for deer and feral hog hunting on the refuge.

Work with FWC to evaluate the potential for conducting a primitive weapon hunt for deer and feral hogs on the refuge to ensure a healthy white-tailed deer population and to continue to control exotic feral hog populations. This project would provide a complete understanding of the refuge's feral hog and white-tailed deer populations. If overabundant, white-tailed deer can decimate native plants populations. When densities of deer become too high for the habitat to support, deer become very

destructive to habitat. This negatively affects the health of deer as well as other species and, unless deer numbers are reduced, the heard will destroy the food base upon which it depends and may decline to very low numbers. Consequently the management of deer through harvest of both sexes is often necessary (Schaefer and Main 2008). Feral hogs are a non-native species found on the refuge that uproot and destroy habitats used by native species. Rooting behavior of hogs causes consequential damage to native vegetation. Rooting destabilizes the soil surface, which can lead to erosion and exotic plant establishment, and uproot or weaken native vegetation (Giuliano 2010). An integrated approach to controlling feral hogs would include methods such as trapping and hunting, the latter depending on the potential to assist in feral hog control. This Draft CCP/EA does not propose opening the refuge to these types of uses, but establishes that the Service would evaluate the appropriateness and compatibility of these uses on the refuge during the 15-year life of the CCP. A future planning process and NEPA document would evaluate these uses on the refuge.

Wildlife and Habitat Management Objectives: 3-2, 4-1-4
Resource Protection Objectives: All objectives
Visitor Services Objectives: All objectives
Refuge Management Objectives: All objectives

REFUGE ADMINISTRATION

Project 21. Hire a law enforcement officer to be shared with the Merritt Island NWR Complex.

In an effort to protect refuge resources, fences, gates, and signage have been installed at key areas to minimize unlawful activities such as mud-bogging, vandalism, hunting, and trash and debris dumping. Despite the refuge's best efforts, the occurrence of these and other illicit activities continue to plague the refuge, especially off-road vehicle use which has caused serious and consequential damage to Bee Line Unit habitats. This project proposes to increase law enforcement presence and protect resources from illegal activities through the addition of a law enforcement officer shared with the Complex. The position would regularly work with partners including Brevard County Sherriff's Office and FWC law enforcement personnel to best manage law enforcement issues.

Wildlife and Habitat Management Objectives: 1-1-8, 3-1-2, 4-1-5
Resource Protection Objectives: All objectives
Visitor Services Objectives: All objectives
Refuge Management Objectives: All objectives

Project 22. Hire a full- time biological technician.

This project would secure funding to hire a full-time biological technician and would coordinate with the Merritt Island NWR Complex's senior biologist to manage the St. Johns NWR biology program. This includes assisting the Complex's senior biologist in developing inventorying and monitoring protocols and implementing these projects on the refuge. The biological technician would assist the senior biologist with planning and implementation of the exotic control program and would conduct treatments to control non-native, exotic, and nuisance species. In addition, the biological technician would provide inputs and oversee technical components of the refuge's hydrologic restoration.

Wildlife and Habitat Management Objectives: All objectives
Resource Protection Objectives: All objectives
Visitor Services Objectives: All objectives
Refuge Management Objectives: All objectives

Project 23. Hire a maintenance worker to be shared with the Merritt Island NWR Complex.

St. Johns NWR would continue to be administered through the Complex, which includes five other refuges. This project would provide for half of a shared maintenance worker position to conduct maintenance and otherwise support facilities, equipment, and operational components of the refuge.

Wildlife and Habitat Management Objectives: 1-4, 3-1-2, 4-1-3
Resource Protection Objectives: 5-1, 5-4, 6-1-2
Visitor Services Objectives: All objectives
Refuge Management Objectives: All objectives

Project 24. Hire a refuge ranger to be shared with the Merritt Island NWR Complex.

This project would ensure that the visitor services projects proposed in this CCP would be administered by dedicated personnel. The CCP proposes opening the refuge to visitor service opportunities such as environmental education, environmental interpretation, wildlife observation, and wildlife photography. It identifies foot and bike trails to be used as access routes for these wildlife-dependent uses. The shared refuge ranger would take the lead role in administering proposed visitor service goals, objectives, strategies, and projects and would assist with the development of visitor service step-down plans.

Wildlife and Habitat Management Objectives: 1-1-8, 3-1-2, 4-1-5
Resource Protection Objectives: All objectives
Visitor Services Objectives: All objectives
Refuge Management Objectives: All objectives

Project 25. Improve refuge maintenance, operations, and facilities management.

The refuge has no dedicated equipment or maintenance budget to manage, administer, or provide for planned projects. This project would establish dedicated funds to provide for the acquisition, operation, and maintenance of existing and proposed refuge equipment and infrastructure including but not limited to fire breaks, fences and gates, culverts, levees and dikes, unimproved access roads, mowing, heavy equipment, and vehicles.

Wildlife and Habitat Management Objectives: All objectives
Resource Protection Objectives: All objectives
Visitor Services Objectives: All objectives
Refuge Management Objectives: All objectives

FUNDING AND PERSONNEL

Implementation of the CCP would require increased funding and personnel support from a variety of internal and external sources. New projects are indentified in the Refuge Operating and Needs System (RONS), while maintenance needs for existing facilities and projects are identified through the Service Asset and Maintenance Management System (SAMMS). The CCP does not constitute a commitment (from the Congress) for staffing increases, operational and maintenance increases, or funding for future land acquisition, but provides direction for future management and represents wildlife resource needs based on sound biological science and input from the public.

To achieve the goals, objectives and strategies outlined in this Draft CCP/EA, additional personnel, operations, maintenance facilities, and funds are needed. One full-time position would be needed in addition to the three positions shared between St. Johns NWR and the Merritt Island NWR Complex (Figure 17). The proposed St. Johns NWR positions would be located at the Merritt Island NWR Complex headquarters. Increase in staff would also necessitate an increase in base funding above standard yearly levels that presently only allow for inflation. Table 8 summarizes the proposed projects with first-year (initial) cost, recurring cost to maintain projects, and proposed FTE responsible for overseeing or necessary for project delivery.

Table 8. Summary of projects

PROJECT NUMBER	PROJECT TITLE	FIRST YEAR COST ($1,000)	RECURRING ANNUAL COST ($1,000)	STAFF (FTE'S)
1	Standardize surveying and monitoring program and conduct baseline inventories for the refuge.	50	15	Biological Technician
2	Conduct annual marsh bird surveys.	6	6	Biological Technician
3	Determine fire effects on priority species.	10	10	Biological Technician
4	Conduct wading bird nesting surveys	1	1	Biological Technician
5	Improve wading bird habitat in the SR 50 Unit borrow pit.	50	5	Maintenance Worker
6	Evaluate the use of mechanical (e.g., mowing) and agricultural (e.g., grazing) vegetation control on the Bee Line Unit	100	0	MINWR Complex Staff
7	Conduct a hydrologic study of the refuge.	350	0	MINWR Staff, RO Hydrologist, partners
8	Restore hydrologic setting of southeast corner of SR 50 Unit.	50	0	Maintenance Worker
9	Continue to identify, locate, and control non-native, invasive plants on the refuge.	100	25	Biological Technician, Maintenance Worker
10	Monitor for the impacts of climate change on refuge resources.	250	100	MINWR Complex staff

PROJECT NUMBER	PROJECT TITLE	FIRST YEAR COST ($1,000)	RECURRING ANNUAL COST ($1,000)	STAFF (FTE'S)
11	Provide a refuge boundary survey	300	0	MINWR Staff, Realty and Survey Divisions, Contractor
12	Consolidate ownership of the Bee Line Unit – Checkerboard.	5/acre	3,045.2	MINWR Complex Staff
13	Acquire lands to establish wildlife corridors.	5/acre	2,294	MINWR Complex Staff
14	Seek abandonment of county road easement rights-of-way.	5	0	MINWR Complex Staff
15	Replace and maintain the Bee Line Unit's Checkerboard fence system and boundary signage.	60	60	Maintenance Worker, Refuge Ranger
16	Conduct a Cultural Resources Assessment.	25	0	Regional Archaeologist, Refuge Ranger
17	Increase outreach and opportunities for environmental education and interpretation.	10	5	Refuge Ranger
18	Develop a wildlife trail at Fay Lake Park.	50	20	Refuge Ranger and Maintenance Worker
19	Develop a wildlife trail at the SR 50 Unit.	250	20	Refuge Ranger and Maintenance Worker
20	Evaluate the potential for deer and feral hog hunting on the refuge.	5	0	Refuge Ranger, Biological Technician, Maintenance Worker, Law Enforcement Officer
21	Hire a law enforcement officer to be shared with the Merritt Island NWR Complex.	75	75	0.5 FTE
22	Hire a full-time biological technician.	62.5	80	1.0 FTE

PROJECT NUMBER	PROJECT TITLE	FIRST YEAR COST ($1,000)	RECURRING ANNUAL COST ($1,000)	STAFF (FTE'S)
23	Hire a maintenance worker to be shared with Merritt Island NWR Complex.	33	33	0.5 FTE
24	Hire a refuge ranger to be shared with Merritt Island NWR Complex.	30	40	0.5 FTE
25	Improve refuge maintenance, operations, and facilities management.	200	100	Maintenance Worker

PARTNERSHIP/VOLUNTEERS OPPORTUNITIES

St. Johns NWR is administered through the Merritt Island NWR Complex where the Merritt Island Wildlife Association (MIWA) provides volunteer support and organizational structure. The refuge would utilize MIWA and its profound outreach programs as a principle mechanism to deliver conservation messages and provide information about the St. Johns NWR. The refuge would seek to increase awareness of the refuge to our private lands neighbors including residents of Port St. Johns. The refuge would seek to increase partnership opportunities with local non-governmental chapters of organizations such as Florida Audubon, The Sierra Club, and The Nature Conservancy and increase partnerships with law enforcement agencies such as FWC and Brevard County Sherriff's Office to build strengths in boundary protection and to provide support for our efforts to control unpermitted uses such as mud-bogging. In addition, the St. Johns NWR would increase and improve coordination with agency partners including Brevard County, City of Titusville, Port of St. John, FWC, and SJRWMD to implement many of the land management, resource protection, and visitor service projects identified in this CCP.

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. These plans (Table 9) are also developed in accordance with the NEPA, which requires the identification and evaluation of alternatives and public review and involvement prior to their implementation.

Table 9. St. Johns NWR step-down management plans

Step-down Plan	Completion Date
Integrated Pest Management Plan	2012
Cultural Resources Assessment	2012
Visitor Services Plan	2013
Hunt Plan*	2013
Wildlife and Habitat Management Plan	2013
Fire Management Plan Update	2012

**Step-down plan and completion date based on and subject to evaluation.*

MONITORING AND ADAPTIVE MANAGEMENT

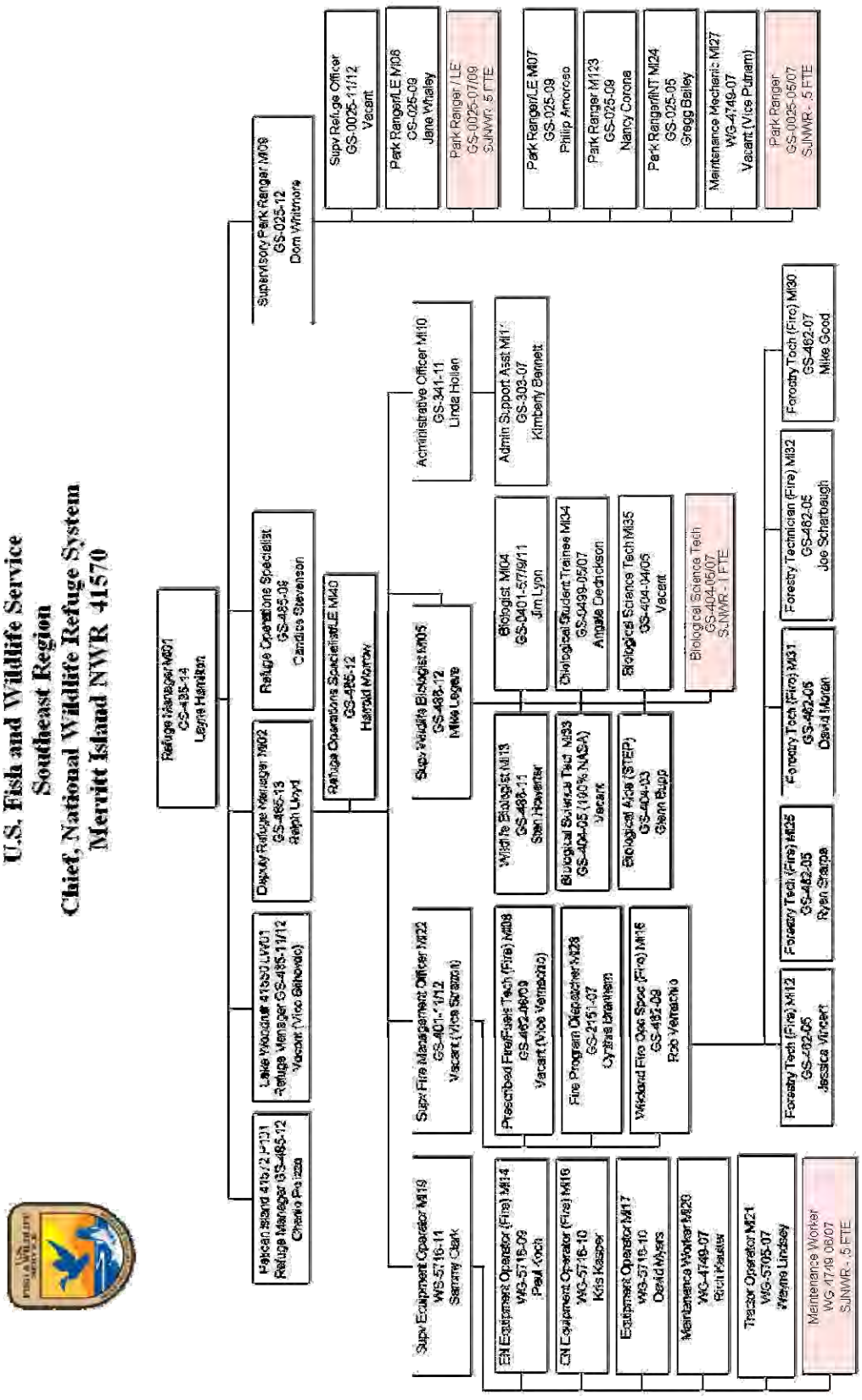
Adaptive management is a flexible approach to long-term management of biotic resources that is directed over time by the results of ongoing monitoring activities and other information. More specifically, adaptive management is a process by which projects are implemented within a framework of scientifically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

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

PLAN REVIEW AND REVISION

This final CCP would be reviewed annually as the refuge's annual work plans and budgets are developed. It would also be reviewed to determine the need for revision. A revision would occur if and when conditions change or significant information becomes available, such as a change in ecological conditions or a major refuge expansion. The final CCP would 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 the final CCP and step-down management plans would be subject to public review and NEPA compliance.

Figure 17. Proposed organizational chart for Merritt Island NWR Complex with St. Johns NWR additions



SECTION B. ENVIRONMENTAL ASSESSMENT

I. Background

INTRODUCTION

The Service prepared this Environmental Assessment (EA) for St. Johns NWR in compliance with the National Environmental Policy Act (NEPA) and the National Wildlife Refuge System Improvement Act (Improvement Act). The Improvement Act requires the development of comprehensive conservation plans for all refuges. Following a public review and comment period on the Draft CCP/EA, a final decision will be made by the Service that will guide St. Johns NWR management actions and decisions over the next 15 years, provide understanding about the refuge and management activities, and incorporate information and suggestions from the public and refuge partners.

This Draft CCP/EA proposes a management direction which is described in detail through a set of goals, objectives, and strategies. The Draft CCP/EA addresses current management issues, provides long-term management direction and guidance for the refuge, and satisfies the legislative mandates of the Improvement Act. While the Draft CCP/EA provides general management direction, subsequent step-down plans would provide more detailed management direction and actions.

This EA determines and evaluates a range of reasonable management alternatives. The intent is to support informed decision-making regarding future management of the refuge. Each alternative presented in this EA was generated with the potential to be fully developed into a final CCP. The predicted biological, physical, social, and economical impacts of implementing each alternative are analyzed in this EA. The Service will use this analysis to determine if the alternatives represent no significant impacts, thus requiring the preparation of a Finding of No Significant Impact, or if the alternatives represent significant impacts, thus requiring more detailed analysis through an Environmental Impact Statement and a Record of Decision. Following public review and comment, the Service will select an alternative to be fully developed for this refuge.

This CCP is needed to address current management issues, to provide long-term management direction for the refuge, and to satisfy the legislative mandates of the Improvement Ac, which requires the preparation of a comprehensive conservation plan for all national wildlife refuges.

PURPOSE AND NEED FOR ACTION

The purpose of this EA is to meet the purpose(s) of the refuge and the goals identified in the Draft CCP (for which we evaluate each alternative). The purpose is to ensure that St. Johns NWR provides protection for threatened and endangered species and native biodiversity by emulating the natural fire regime and hydrological processes and controlling invasive and exotic organisms, while allowing for appropriate and compatible public uses. The need of the EA is to adopt a 15-year management plan that provides guidance for future management and that meets the mandates of the Improvement Act.

DECISION FRAMEWORK

Based on the assessment described in this document, the Service would select an alternative to implement the CCP for St. Johns NWR. The final CCP would include a Finding of No Significant Impact, which is a statement explaining why the selected alternative would not have a significant effect on the quality of the human environment. This determination is based on an evaluation of the

Service and Refuge System mission, the purpose(s) for which the refuge was established, and other legal mandates. Assuming no significant impact is found, implementation of the CCP will begin and will be monitored annually and revised when necessary.

PLANNING STUDY AREA

St. Johns NWR is located in Brevard County in east-central Florida. Situated in the Upper St. Johns River Basin, the 6,421.8-acre refuge is managed as a satellite of the Merritt Island NWR Complex (Figure 1). While St. Johns NWR itself is not staffed, staff from Merritt Island NWR Complex conducts management activities on the refuge. It is comprised of two management units (Figure 2): the 4,385.4-acre SR 50 Unit, which includes the 30.9-acre Fox Lake tract (Figure 3), and the 2,036.4-acre Bee Line Unit (Figures 4 and 5). At the SR 50 Unit, the Service manages most lands and waters within the acquisition boundary. However, this is not the case at the Bee Line Unit, where several tracts of this unit are under private ownership.

This EA will identify management on refuge lands, as well as those lands proposed for acquisition by the Service.

AUTHORITY, LEGAL COMPLIANCE, AND COMPATIBILITY

The Service developed this Draft CCP/EA in compliance with the Improvement Act and Part 602 of the Fish and Wildlife Service Manual (National Wildlife Refuge System Planning). The actions described within this Draft CCP/EA also meet the requirements of NEPA. The refuge staff achieved compliance with NePA through the involvement of the public and the incorporation of an EA in this document, with a description of the alternatives considered and an analysis of the environmental consequences of the alternatives (Section B, Chapters III and IV). When fully implemented, the CCP will strive to achieve the vision and purposes of St. Johns NWR.

The CCP's overriding consideration is to carry out the purposes for which the refuge was established. Fish and wildlife management is the first priority in refuge management, and the Service allows and encourages public use (wildlife-dependent recreation) as long as it is compatible with, or does not detract from the refuge's mission and purposes.

COMPATIBILITY

The National Wildlife Refuge System Administration Act of 1966, as amended by the Improvement Act, states that national wildlife refuges must be protected from incompatible or harmful human activities to ensure that Americans can enjoy Refuge System lands and waters. Before activities or uses are allowed on a national wildlife refuge, the uses must be found to be compatible. A compatible use "...will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuge." In addition, "wildlife-dependent recreational uses may be authorized on a refuge when they are compatible and not inconsistent with public safety."

An interim compatibility determination is a document that assesses the compatibility of an activity during the period of time the Service first acquires a parcel of land to the time a formal, long-term management plan for that parcel is prepared and adopted. The Service has completed an interim compatibility determination for the six priority general public uses of the Refuge System, as listed in the Improvement Act. These uses are hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation.

PUBLIC INVOLVEMENT AND THE PLANNING PROCESS

In accordance with Service guidelines and NEPA recommendations, public involvement has been a crucial factor throughout the development of the Draft CCP/EA for St. Johns NWR. This Draft CCP/EA has been written with input and assistance from interested citizens, conservation organizations, and employees of local and state agencies. The participation of these stakeholders and their ideas has been of great value in setting the management direction for St. Johns NWR. The Service, as a whole, and the refuge staff, in particular, are very grateful to each one who has contributed time, expertise, and ideas to the planning process. The staff remains impressed by the passion and commitment of so many individuals for the lands and waters administered by the refuge.

On January 21, 2010, the Service conducted two well-attended scoping meetings – an agency scoping meeting in the morning and a public scoping meeting in the evening. Both meetings were held at the Merritt Island NWR Complex. Attendees at both meetings raised dozens of issues, concerns, and opportunities related to wildlife, habitat, illegal activities, and the potential for legitimate public uses that they believed should be addressed in the CCP.

A complete summary of the issues and concerns is provided in Appendix D.

II. Affected Environment

For a description of the affected environment, see Section A, Chapter II, Refuge Overview.

III. Description of Alternatives

FORMULATION OF ALTERNATIVES

Alternatives are different approaches or combinations of management objectives and strategies designed to achieve the refuge's purpose and vision, and the goals identified in the Draft CCP/EA; the priorities and goals of the South Florida Ecosystem Team; the goals of the Refuge System; and the mission on the Fish and Wildlife Service. Alternatives are formulated to address the priority issues, concerns, and problems identified by the Service and the public during public scoping.

The three alternatives identified and evaluated represent different approaches to provide permanent protection, restoration, and management of the refuge's fish, wildlife, plants, habitats, and other resources, as well as compatible wildlife-dependent recreation. Refuge staff assessed the biological conditions and analyzed the external relationships affecting the refuge. This information contributed to the development of refuge goals and, in turn, helped to formulate the alternatives. As a result, each alternative presents different sets of objectives for reaching refuge goals. Each alternative was evaluated based on how much progress it would make and how it would address the identified issues related to fish and wildlife populations, habitat management, resource protection and conservation, visitor services, and refuge administration. A summary of the three alternatives is provided in Table 10.

DESCRIPTION OF ALTERNATIVES

Serving as a basis for each alternative, a number of goals and sets of objectives were developed to help achieve the refuge's purpose and the mission of the Refuge System. Objectives are desired conditions or outcomes that are grouped into sets and, for this planning effort, consolidated into three alternatives. These alternatives represent different approaches to managing the refuge over a 15-year time frame while still meeting its purposes and goals. The three alternatives are summarized below. A comparison of each alternative follows the general description.

ALTERNATIVE A - (CURRENT MANAGEMENT - NO ACTION)

Alternative A continues refuge management activities and programs at levels similar to recent management activities and levels.

Wildlife and Habitat Management

Wildlife and habitat management activities would continue at programs and levels comparable to management in the recent past.

We would continue the prescribed fire program on the refuge, conducting an average of four prescribed fires per year and burning about 2,000 acres annually, to maintain more open habitat conditions. Historically, we conducted winter burns, but currently we are conducting more late summer burns, and this trend would continue. The more open habitat conditions maintained by our fire management program would generally favor many native species, including the following:

- Marsh birds (e.g., black and king rails, wading birds, eastern meadowlark, marsh wren, least bittern, Virginia rail, snipe, northern harrier)

- A number of resident, wintering and summering birds including the common night hawk, eastern meadowlark, loggerhead shrike, chuck will's widow, Florida sandhill crane, and southeastern American kestrel

- Northern crested caracara

- Eastern indigo snake

- Gopher tortoise

- A variety of reptiles and amphibian species

Under Alternative A, surface water would continue to occupy about 5 percent of the refuge area. We would aim to maintain the current ratio of filled/plugged versus functioning drainage ditches on the SR 50 Unit. We would also continue to encourage the locally high water table by maintaining plugged or filled drainage ditches on the SR 50 Unit so as to reduce runoff and facilitate infiltration. However, there would be no active management of water quality. Still, the refuge would continue to protect emergent wetlands that buffer and filter the St. Johns River.

Emergent wetland communities, that is, saw grass marsh, cord grass marsh, and salt pans, with their unique biota, occupy about 83 percent of the refuge area, and Alternative A would maintain this percentage cover. Forested wetland communities (e.g., hammocks) also have diverse biota. These currently comprise approximately 8 percent of the refuge, and Alternative A would continue this level. Upland communities such as oak scrub and pine flatwoods would be maintained at about 3 percent of the refuge area, also their current level.

The Service currently does not actively collect data related to climate change trends and effects on the refuge, and this situation would continue under Alternative A. To control the impact of invasive plant species on native habitats and wildlife, we would continue periodic aerial and ground detection and control of Brazilian pepper, cogongrass, old world climbing fern, and other Category I species. We would also continue to monitor informally for the presence and abundance of invasive and feral animals like the feral hog, continuing to use a hog trapper and staff to control feral animals occasionally and opportunistically.

We have conducted secretive marsh bird surveys in the recent past, and under Alternative A, these would continue to be conducted in the future, although infrequently. The lack of firm data on the mix of wintering birds using the refuge would continue. There would be no active management for the wood stork, state-listed wading birds, or the Cape Sable seaside sparrow, which does not presently occur on the refuge.

Resource Protection

The current inadequate level of resource protection efforts would continue under Alternative A. Boundaries would not change under this alternative, and the lack of a functional refuge management boundary would continue to be problematic. In particular, effective resource protection would continue to be hindered by the fragmented ownership, and the unmarked, unfenced boundaries of the checkerboard area of the Bee Line Unit. In addition, there would be no active management of rights-of-way. Existing rights-of-way issues are an artifact of land platting of the SR 50 Unit almost a century ago in 1914.

Under this alternative, the Service would continue to provide law enforcement for St. Johns NWR without dedicated staff. Rather, law enforcement support would continue to travel at intervals from the headquarters of Merritt Island NWR, a 20-minute drive from the SR 50 Unit and a 40-minute drive from the Bee Line Unit. We would continue to collaborate with FWC, FDEP, and local law enforcement agencies in trying to protect refuge resources from illegal activities such as trespass, unauthorized use of ATV's and/or ORV's. We would also continue ad hoc consultation and communication with neighbors, landowners and other civic organizations to control illegal activities.

With regard to cultural, historic, and archaeological resources, we would continue to implement Section 106 of the NHPA to provide protection for these resources. Otherwise, there would be no active management of cultural resources and no comprehensive baseline inventory as to the extent of those resources on the refuge.

Visitor Services

Under Alternative A, visitor services and public use would continue to be similar to past and present refuge management activities. In general, the refuge would remain officially closed to the public, with certain limited exceptions.

No active, permanent interpretation occurs on-site at present, except for occasional guided tours of the refuge arranged in advance, such as for example, during the Space Coast Birding and Wildlife Festival. This situation would continue under Alternative A. With regard to public outreach, Merritt Island staff would continue to maintain the St. Johns NWR website and outreach to news media and the local community. Outreach, including presentations and tours, would also occur during the refuge's annual participation in the afore-mentioned Space Coast Birding and Wildlife Festival.

There would be no active program of environmental education on-site. However, Merritt Island NWR Complex staff would continue infrequent visits to local K-12 schools to provide environmental education about the refuge and its resources. St. Johns NWR itself would remain closed to wildlife observation and photography except for occasional guided tours. The refuge would also continue to be closed to all hunting.

Refuge Administration

Under Alternative A, St. Johns NWR administration would remain unchanged. The refuge would continue to lack dedicated staffing of its own and would continue to be managed part-time by off-site Merritt Island NWR Complex staff as a collateral duty. The refuge would continue to count on 3-4 volunteers from the community to conduct occasional special guided educational tours and control exotic plants under staff supervision.

With regard to facilities, the refuge would continue to maintain its current assets, including one tool and equipment storage shed, perimeter fencing, 5-6 gates, 10 culverts, and 10-12 miles of unpaved access roads. We would also continue to maintain a small cache of fire-fighting equipment on-site at the storage shed.

ALTERNATIVE B - MANAGEMENT FOR RARE, THREATENED, AND ENDANGERED SPECIES

In general, Alternative B represents an expansion of the management efforts contained in Alternative A. As its name suggests, this alternative also more heavily emphasizes management for the benefit of rare, threatened, and endangered species.

Wildlife and Habitat Management

In Alternative B, the focus of wildlife and habitat management would be on rare, threatened, and endangered species. One group that would be targeted is marsh birds (e.g., black and king rails, wading birds, meadowlarks, marsh wren, least bittern, Virginia rail, snipe, and northern harrier). Management on behalf of these species would primarily occur through prescribed burning. Utilizing ecological indicators, the refuge would promote a fire return interval to maintain early successional habitat on behalf of these species. We would adjust the seasonality of prescribed burning towards late summer/early fall (August-October) to promote early successional habitats over and above even the recent trend in this direction. In addition, we would maintain burn unit size or where necessary based on habitat conditions and species response provide smaller burn units to promote rails, promote late summer burns (August and September) to provide suitable habitat characteristics for black rails, and determine the size, seasonality, and frequency of prescribed fires to benefit rail species.

We would also develop a monitoring program for secretive marsh birds using the refuge, adapting management as necessary. Furthermore, the Service would work to restore the hydrologic setting to benefit marsh birds on the refuge. We would work with the Atlantic Coast Joint Venture, Division of Migratory Birds, Peninsular Florida LCC, and other partners to step-down black rail population objectives from national and regional waterbird conservations plans to the scale of the refuge.

The above methods would also be intended to benefit the suite of resident, wintering, and summering birds including common night hawk, eastern meadowlark, loggerhead shrike, chuck will's widow, Florida sandhill crane, and southeastern American kestrel. We would determine the role played by the refuge in regional and national species conservation plans, particularly with regard to rare, threatened, and endangered species. Restoring the hydrologic setting to as close to pre-drainage conditions as possible would also benefit this suite of birds.

Under Alternative B, management for the wood stork and state-listed wading birds, including the snowy egret, tricolored heron, and little blue heron, would expand. In conjunction with state-listed wading bird nesting surveys, the refuge would conduct a nesting survey of the SR 50 Unit borrow ponds. We would also opportunistically remove fill and dike features from peninsulas of the borrow ponds to provide additional artificial islands.

On behalf of Northern crested caracara, Alternative B would maintain open habitat with a minimum of woody vegetation; wetland woody plants targeted for reduction include wax myrtle. We would also evaluate the use of mowing, cattle grazing, and/or other forms of vegetation maintenance to help maintain open prairie for crested caracara at the Bee Line Unit, while minimizing impacts to secretive marsh birds (e.g., through controlling the numbers, density, and area used by cattle and by monitoring wildlife and habitat responses).

As noted in Alternative A above, the Cape Sable seaside sparrow does not now occur on St. Johns NWR, but this subspecies occupies an ecological niche similar to that once occupied by the now extinct dusky seaside sparrow for which the refuge was established to manage and protect. This alternative would expand efforts from Alternative A. The Service would stay abreast of Cape Sable seaside sparrow reintroduction and introduction discussions within the state. We would work with our South Florida Ecological Services Filed Office and the FWC to evaluate the suitability of the refuge as a potential introductory site to support recovery of the Cape Sable seaside sparrow. We would also assess management options to recreate the appropriate hydrology and vegetation structure to support this species.

Expanding the prescribed fire program of Alternative A would also be the primary method of managing for the eastern indigo snake, gopher tortoise, and reptiles and amphibians generally. Under Alternative B, the Service would coordinate with the SJRWMD to better understand the hydrology of the refuge. To help fill in the information gaps, we would develop a hydrologic study to understand the relationships of water quality, water quantity, and timing of flows within and across the refuge. Subsequently, the refuge would adapt management as necessary to promote rare, threatened, and endangered species.

Invasive plant control would expand from Alternative A under Alternative B. Within 2 years of CCP approval, the refuge would develop, and every 5 years thereafter, maintain and update an exotic plant database. We would coordinate with local CISMAs to develop an early detection and alert network and to help control invasive animals. We would also coordinate control efforts with SJRWMD, FWC, and Brevard County. The objective would be to control invasive species at maintenance levels.

Likewise, invasive animal control would expand under Alternative B. We would increase control of invasive/feral animals. It would coordinate with local CISMAs to develop an early detection and alert network and to help control invasive animals. We would use permittees and partners for the feral hog control effort. Overall, our aim would be to control invasive animals to a maintenance level.

Under Alternative B, management of emergent marshes would expand. We would focus management activities in the emergent marsh habitats to ensure high-quality marsh to best support secretive marsh birds. Management of both forested wetland communities such as mesic hammocks and upland communities such as scrub and pine flatwoods would be the same as in Alternative A. Management of these community types would be secondary to marsh management activities. Overall, in Alternative B, the relative percentages and composition of habitat types on the refuge would remain unchanged.

Management for mammals would be a lower priority than for rare, threatened, and endangered species, most of which at St. Johns NWR are birds. In this alternative, we would maintain emergent marsh and open waters for round-tailed muskrat. We would also conduct rare, threatened and endangered species surveys during 15-year planning horizon.

In this alternative, the refuge would proactively address climate change, particularly with regard to its potential to impact rare species. The Service would partner with SJRWMD and adapt management of habitats and ecosystems for rare, threatened, and endangered species adversely affected by climate change. We would also investigate opportunities to participate in regional climate change initiatives to better understand climate change impacts.

Resource Protection

In general, Alternative B would expand the level of resource protection associated with Alternative A. In pursuit of more functional refuge boundaries, the Service would cooperate with partners to consolidate and secure ownership in the checkerboard area of the Bee Line Unit to create functional refuge management areas. We would consider acquisitions, land swaps, management agreements, conservation easements, and other measures based on a willing-seller approach to protect these sites. We would also work with Brevard County to abandon the county's historic rights-of-way and would seek to provide a boundary survey to accurately represent and better protect refuge boundaries.

Alternative B would expand from Alternative A through the implementation of a Minor Expansion Proposal (MEP) of less than 10 percent (approximately 459 acres) of the refuge's approved acquisition boundary to connect lands and develop corridors proximal to the SR 50 Unit for dispersal and movement of wildlife (Appendix J and Objective 5-2). The proposed acquisition boundary expansion associated with the proposal (Figures 14 and 18) would remain the same as discussed in Alternative C; however, under Alternative B the refuge would maintain its closed status for existing refuge managed lands and any newly acquired lands.

Law enforcement capacity would expand from Alternative A. We would increase law enforcement staff and coordinate with governmental partners and landowners to increase the number of patrols and level of enforcement to deter and prevent unpermitted activities. With regard to cultural, historic, and archaeological resources, the refuge would continue to implement Section 106 of the NHPA to provide protection for these resources. Otherwise, there would be no active management of cultural resources and no comprehensive baseline inventory as to the extent of those resources on the refuge.

Visitor Services

Under Alternative B, visitor services and public use would be similar to Alternative A, current management direction, with certain minor expansions. In general, the refuge would remain officially closed to the public, except during authorized and planned visits. No active, permanent interpretation would occur on-site, except for occasional guided tours of the refuge arranged in advance, such as for example, during the Space Coast Birding and Wildlife Festival. With regard to public outreach, we would continue to maintain the St. Johns NWR website and reach out to news media and the local community. Outreach would be expanded and given more of a threatened, endangered, and rare species focus

The refuge would work with partners to develop a curriculum-based environmental education program focused on changing patterns of suitable habitat for threatened and endangered species due to climate change. We would work with local schools to conduct on-site environmental education specific to threatened and endangered species. The refuge would remain closed except for occasional guided tours. It would also remain closed to hunting.

Refuge Administration

Under Alternative B, St. Johns NWR administrative capacity would expand somewhat over that of Alternative A. The Service would provide a shared (with Merritt Island NWR Complex) law enforcement officer to protect refuge resources from illegal activities. The refuge would also receive a full-time biological technician/biologist and a shared maintenance worker. Thus, total refuge staffing would increase from 0 to 2.0 FTE under this alternative.

With regard to volunteer support of the refuge, Alternative B would expand on Alternative A. We would utilize volunteers for increased environmental education and interpretation activities and programs, outreach, threatened and endangered species surveys, boundary identification, expanded exotics control, and refuge cleanups.

With respect to facilities, Alternative B would be identical to Alternative A: the refuge would continue to maintain its current assets, including one tool and equipment storage shed, perimeter fencing, 5-6 gates, 10 culverts, and 10-12 miles of unpaved access roads. We would also continue to maintain a small cache of fire-fighting equipment on-site at the storage shed.

Alternative B would expand somewhat on the equipment available under Alternative A: the refuge would add 1-2 vehicles and equipment for exotic plant control activities.

ALTERNATIVE C - ENHANCED WILDLIFE AND HABITAT DIVERSITY (PROPOSED ALTERNATIVE)

This alternative would focus on enhancing all native wildlife and habitat diversity on the refuge, not focusing exclusively or primarily on rare, threatened and endangered species, as Alternative B does.

Wildlife and Habitat Protection

With respect to marsh birds, Alternative C would expand on Alternative B. The staff would determine the role to be played in regional and national species conservation plans. Based on ecological indicators targeting marsh bird and habitat responses, we would utilize prescribed fire to maintain and where necessary restore early successional habitats. We would adjust spatial, seasonal, and temporal patterns of prescribed fire events to promote a diverse assemblage of wildlife including marsh birds.

Concerning the suite of resident, wintering, and summering birds on the refuge, Alternative C would represent an expansion from Alternative A. Through prescribed burning and utilizing ecological indicators, refuge management would promote an ecologically based fire return interval to maintain early successional ecological stages of all fire-maintained habitats. We would increase the frequency of growing season burns. In addition, the hydrologic setting would be restored to as close to pre-drainage conditions as possible to benefit refuge wildlife.

Under Alternative C, management for wood stork and state-listed wading birds would expand from Alternative A. It would be identical to Alternative B: in conjunction with state-listed wading bird nesting surveys, we would conduct a nesting survey of the SR 50 Unit borrow ponds. We would also opportunistically remove fill and dike features from peninsulas in the borrow ponds to provide additional artificial islands.

On behalf of northern crested caracara, Alternative C, like Alternative B, would maintain open habitat with a minimum of woody vegetation; wetland woody plants targeted for reduction include wax myrtle. We would also evaluate the use of mowing, grazing, and/or other forms of vegetation control to help maintain open prairie for crested caracara at the Bee Line Unit while minimizing impacts to secretive marsh birds (e.g., through controlling the numbers, density, and area used by cattle and by monitoring wildlife and habitat responses).

Alternative C would do more than Alternative A, but less than Alternative B with regard to considering use of the refuge in Cape Sable seaside sparrow recovery efforts. In this alternative, refuge staff would stay abreast of Cape Sable seaside sparrow reintroduction and introduction discussions within the state.

Alternative C's management for the eastern indigo snake would expand efforts from Alternative A. Through prescribed burning and utilizing ecological indicators, the refuge would promote a fire return interval to maintain early successional habitat for the benefit of this species. Management for the gopher tortoise and reptiles and amphibians in general would be the same as in Alternative A – continuing the refuge's current prescribed fire program. In addition, over the 15-year planning horizon, with university partners, we would aim to develop a baseline inventory and research on refuge herpetofauna.

Under Alternative C, management of the refuge's hydrology, including groundwater, surface water, and water quality, would expand from Alternative A. The Service would coordinate with the SJRWMD to develop a better understanding of the hydrology of the refuge. To help fill in the information gaps, and using experts, we would develop a hydrologic study to understand the relationships of water quality, water quantity, and timing of flows within and across the refuge. Later, the refuge would adapt management as necessary to promote wildlife and habitat diversity.

Invasive plant control in Alternative C would be identical to that proposed for Alternative B. Within 2 years of CCP approval, the refuge would develop, and every 5 years thereafter, maintain and update an exotic plant database. We would coordinate with local CISMAs to develop an early detection and alert network and to help control invasive animals. We would also coordinate control efforts with SJRWMD, FWC, and Brevard County. The objective would be to control invasives at a maintenance level.

Invasive animal control would expand further on the efforts proposed by Alternative B. The refuge would increase control of invasive/feral animals. It would coordinate with local Cooperative Invasive Species Management areas to develop an early detection and alert network and to help control invasive animals. We would use not only permittees and partners for the feral hog control effort, but also public hunts (unlike Alternative B, which does not propose using public hunts) if after evaluation hunting is determined to be an effective tool to control feral hog populations. Overall, our aim would be to control invasive animals to a maintenance level.

Under Alternative C, management of all vegetation communities on the refuge would expand from Alternative A. We would focus habitat management on maintaining and supporting a wide array of native wildlife using the refuge. Overall, however, in Alternative C, the relative percentages and composition of the major habitat types on the refuge would not change; the aim would be to increase the quality rather than quantity of the various habitat types.

Management for mammals would expand from Alternative A. We would strive to maintain emergent marsh and open waters for a diversity of mammals such as white-tailed deer and round-tailed muskrat. We would also conduct a mammal inventory during the 15-year planning horizon.

With regard to climate change, the refuge would partner with SJRWMD in adaptive management efforts to manage habitats, ecosystems, and wildlife affected by climate change. The Service would investigate opportunities to participate in regional climate change initiatives to better understand the role climate change may have on refuge resources and would adapt management based on discovery of climate change related impacts.

Resource Protection

Like Alternative B, under Alternative C, the refuge would work with partners to consolidate and secure ownership in the checkerboard area of the Bee Line Unit to create functional refuge management areas. We would consider acquisitions, land swaps, management agreements, conservation easements, and other measures based on a willing-seller approach to protect these sites. We would work with Brevard County to vacate or abandon rights-of-way as well as adding right-of-way access to accommodate public use. We would seek to provide a boundary survey to accurately represent and better protect refuge boundaries.

Alternative C would expand from Alternative B through the implementation of a Minor Expansion Proposal of less than 10 percent (approximately 459 acres) of the refuge's approved acquisition boundary to connect lands and develop corridors to the SR 50 Unit for dispersal and movement of wildlife. In addition, Alternative C expands on Alternative B by investigating the provision of access for public use.

Under Alternative C, law enforcement would be the same as Alternative B, that is, it would expand from Alternative A. We would increase Service law enforcement staff and coordinate with governmental partners and landowners to increase the number of patrols and level of enforcement to deter and prevent destructive illegal activities. With regard to cultural, historical, and archaeological resources, the refuge would continue to implement Section 106 of the NHPA to provide protection for these resources. In addition, Alternative C would complete and begin to implement a Cultural Resources Management Plan within 15 years of CCP approval.

Visitor Services

Alternative C would expand on Alternative A with regard to visitor services and public use. To expand opportunities for interpretation, staff would work with partners to evaluate a range of access alternatives for St. Johns NWR. Working with Brevard County, the refuge would seek to develop facilities such as a trailhead and kiosk from the county's Fay Lake Park into the refuge's Bee Line Unit (Figure 15) and would consider developing an interpretive trail and kiosk on the SR 50 Unit (Figure 16). The refuge would also explore, based on potential and varied acquisition opportunities from willing sellers through and subject to the proposed MEP provided in this Draft CCP/EA, opportunities to provide public access to the SR 50 Unit from Brevard County's Fox Lake Park Sanctuary through the Fox Lake tract. In conducting outreach, this alternative would expand Alternative A with a wildlife and habitat diversity focus and would include messaging that targets ethical behavior. We would work strategically with partners to coordinate the proposed new shared refuge ranger's activities.

Alternative C would expand Alternative A's environmental education efforts. In Alternative C, the refuge would work with partners to develop curriculum-based environmental education programs related to wildlife and climate change. We would also work with local schools to conduct on-site environmental education. In addition, the refuge would be opened to wildlife observation and photography, and would provide facilities to enhance the visitor experience (e.g., marked foot trails, kiosks at trailheads, and a safe parking area). We would establish foot traffic on existing dikes and roads and would evaluate potential connectivity to regional trails networks. The refuge and any future trails would remain subject to closure for administrative purposes. Commercial photography and tours/guides would be available on a case-by-case basis, permitted through the special use permit process. Access for uses determined to be appropriate and compatible would be walking, hiking and bicycling. Bicycling (i.e., sport activities including mountain biking, and off-trail biking) not supporting appropriate and compatible uses (e.g., wildlife observation and photography and environmental education and interpretation) is not considered an appropriate form of access.

Staff would work with partners including the FWC to evaluate the potential for primitive weapon hunting (e.g., bow and muzzle-loader) and a youth hunt on the SR 50 Unit and the Bee Line Unit. Species to be considered for hunts would include white-tailed deer and feral hog.

Refuge Administration

In all respects, refuge administration under Alternative C would expand from Alternative A and increases slightly from Alternative B. Alternative C, when fully implemented, would provide for new shared positions with Merritt Island NWR Complex, including a law enforcement officer, maintenance worker, and a refuge ranger. A full-time biological technician/biologist is also proposed for a total of 2.5 new positions.

The volunteer program would also expand on Alternative A. We would utilize volunteers for increased environmental education and interpretation activities and programs, trail maintenance, outreach, wildlife surveys, expanded exotic control, and refuge cleanups.

Under Alternative C, both facilities and equipment would expand on Alternative A. The refuge would consider developing kiosks, trails, and associated parking with access from existing county parks or provided for on refuge lands specific to the need to provide safe and secure access. It would evaluate the need for access for hunting for the SR 50 and Bee Line Units. We would also add 1-2 vehicles and equipment for exotic plant control activities.

FEATURES COMMON TO ALL ALTERNATIVES

Although the alternatives differ in many ways, there are similarities among them as well. These common features are listed below to reduce the length and redundancy of the individual alternative descriptions.

Each of the alternatives would focus on the protection and recovery of rare, threatened, and endangered species of plants and animals on the refuge, in keeping with the original refuge purposes. Each of the alternatives would also utilize prescribed fire as the primary means of habitat manipulation and management to pursue the goal of benefiting listed species. Each would continue to conduct an average of four prescribed fires per year, burning approximately 2,000 acres annually to maintain more open habitat conditions favorable for these species. Each would also emphasize more late summer burns.

Each alternative would seek to emulate and restore natural hydrological processes to the extent feasible. Surface water would continue to represent about five percent of the refuge area under each of the three alternatives. The refuge would continue to encourage a high water table by maintaining plugged or filled drainage ditches on the SR 50 Unit so as to reduce runoff and facilitate infiltration. None of the alternatives would actively manage water quality. Each alternative would protect the emergent wetlands that buffer and filter the St. Johns River.

The mix, distribution, and configuration of habitats on the refuge would be the same under each alternative. Each would maintain emergent wetland communities at about 83 percent of the refuge area, forested wetland communities at eight percent, and upland communities at three percent. The remaining land cover composition of the refuge is a mix of disturbed habitats including borrow pits and roads.

Mammals, reptiles, and amphibians on the refuge would be managed indirectly by each alternative, using prescribed fire to maintain the same more open habitat conditions that would also benefit rare birds.

All three alternatives would control exotic plants and invasive animals to some extent. At a minimum, they would continue periodic aerial and ground detection and control of Brazilian pepper, cogongrass, Old World climbing fern, and other Category I species. Each alternative would monitor for the presence and abundance of feral animals, especially the feral hog. We would continue to use both a hog trapper and staff to control feral animals.

Each alternative aims to protect the refuge's natural and cultural resources from illegal activities. Service law enforcement staff would cooperate with other law enforcement agencies in the area, as well as with local residents and concerned citizens. The refuge's cultural resources would be protected by all of the alternatives.

All three alternatives would aim for the public to understand, support, and appreciate the purposes of the refuge as well as its wildlife and habitat values. At a minimum, each alternative would offer occasional guided tours of the refuge arranged in advance, maintaining the refuge website and outreach to news media and local community, and participation in periodic festivals, presentations and tours. We would provide environmental education in nearby schools.

Merritt Island NWR Complex staff would continue to support the refuge under all three alternatives, as would volunteers. Certain facilities and equipment, mostly for fire-fighting, would be maintained by each alternative, as would be roads and dikes.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER ANALYSIS

The alternatives development process under NEPA and the Improvement Act is designed to allow consideration of the widest possible range of issues and potential management approaches. During the alternatives' development process, many different solutions were considered. The following alternative components were considered but not selected for detailed study in this Draft CCP/EA for the reason(s) described.

Under custodial management, the Service would passively manage habitat on the refuge without the use of prescribed fire. This alternative was considered but rejected because without regular fire to burn ground cover and maintain a relatively open condition and control the encroachment of woody, scrubby vegetation, many of the refuge's habitats would quickly grow up with scrub/shrub, and lose much of their value for the rare, threatened, and endangered wildlife we are interested in managing for, namely secretive marsh and wading birds, the caracara, eastern indigo snake, and gopher tortoise.

Another alternative considered but dismissed would have ambitiously provided for visitor services and facilities on the refuge, beyond the trails and kiosks proposed under the proposed alternative (C). Under this alternative, St. Johns NWR would have developed a visitor service center or visitor contact station and a full complement of other facilities and recreational opportunities. This alternative would have incurred prohibitively high costs and staffing demands.

COMPARISON OF THE ALTERNATIVES BY ISSUE

Table 10. Comparison of alternatives by management issues for St. Johns NWR

KEY TOPICS (ISSUES)	Alternative A (Current Management – No Action Alternative)	Alternative B (Rare, Threatened, and Endangered Species)	Alternative C (Enhanced Wildlife and Habitat Diversity)
WILDLIFE AND HABITAT MANAGEMENT			
GOAL 1: Conserve, protect, and enhance populations of rare, threatened, and endangered species of plants and animals at existing or increased levels on the refuge and conserve, protect, manage, and restore the St. Johns River upper basin habitats occurring on the refuge to contribute to recovery goals.			
Marsh birds (e.g., Black and King Rails, wading birds, meadowlarks, marsh wren, least bittern, Virginia Rail, Snipe, Northern Harrier)	Continue prescribed fire program on the refuge, conducting an average of four prescribed fires per year on average and burning ~2,000 acres to maintain more open habitat conditions favorable for these species. Historically conducted winter burns. Currently conducting more late summer burns. Have conducted secretive marsh bird surveys.	Expand from Alternative A. Through prescribed burning and utilizing ecological indicators, promote a fire return interval to maintain early successional habitat. Adjust seasonality of prescribed burning towards late summer/early fall (August-October) to promote early successional habitats. Develop a monitoring program for secretive marsh birds using the refuge, adapting management as necessary. Restore hydrologic setting to benefit marsh birds on the refuge. Work with the Atlantic Coast Joint Venture, Division of Migratory Birds, Peninsular Florida LCC, and other partners to step-down black rail population objectives from national and regional waterbird conservations plans to the scale of the refuge. Maintain or where appropriate based on	Expand on Alternative B. Determine the role played by the refuge in regional and national species conservation plans. Based on ecological indicators targeting marsh bird and habitat responses, utilize prescribed fire to maintain and where necessary restore early successional habitats. Based on ecological indicators, adjust spatial, seasonal, and temporal patterns of prescribed fire events to promote a diverse assemblage of wildlife including marsh birds. Adapt management as necessary to best suit marsh bird management

KEY TOPICS (ISSUES)	Alternative A (Current Management – No Action Alternative)	Alternative B (Rare, Threatened, and Endangered Species)	Alternative C (Enhanced Wildlife and Habitat Diversity)
		species response provide smaller burn units to promote rails. Promote late summer burns (August and September) to provide suitable habitat characteristics for black rails. Determine the size, seasonality, and frequency of prescribed fires to benefit rail species.	
Suite of resident, wintering and summering birds including Common Night Hawk, Eastern Meadowlark, Loggerhead Shrike, Chuck Will's Widow, Florida Sandhill Crane, Southeastern American Kestrel)	Continue prescribed fire program on the refuge, conducting an average of four prescribed fires per year on average and burning ~2,000 acres to maintain more open habitat conditions favorable for this species. Historically conducted winter burns. Currently conducting more late summer burns. Lack of data on the mix of wintering birds using the refuge.	Expand from Alternative A. Through prescribed burning and utilizing ecological indicators, promote an ecologically based fire return interval to maintain early successional ecological stages of all fire maintained habitats targeting benefits to rare, threatened, and endangered bird species. Increase frequency of growing season burns. Determine the role played by the refuge in regional and national species conservation plans, particularly with regard to rare, threatened, and endangered species. Restore hydrologic setting to as close to pre-drainage conditions as possible to benefit rare, threatened, and endangered birds on the refuge. Adapt management as necessary to best suit marsh bird management.	Expand from Alternative A. Through prescribed burning and utilizing ecological indicators, promote an ecologically based fire return interval to maintain early successional ecological stages of all fire maintained habitats. Increase frequency of growing season burns. Restore hydrologic setting to as close to pre-drainage conditions as possible to benefit refuge wildlife. Where opportunities exist and where actions would not negatively impact marsh bird management or hydrologic restoration objectives, provide altered habitat (levees and ditches) to serve as forage, nesting, and resting opportunities for resident, wintering, and summering birds. Adapt

KEY TOPICS (ISSUES)	Alternative A (Current Management – No Action Alternative)	Alternative B (Rare, Threatened, and Endangered Species)	Alternative C (Enhanced Wildlife and Habitat Diversity)
			management as necessary to best suit marsh bird management.
Wood Stork and State-listed Wading Birds	No active management.	Expand from Alternative A. In conjunction with state-listed wading bird nesting surveys, conduct nesting survey of the borrow pit on the SR 50 Unit. Opportunistically remove fill and dike features from any peninsulas in the borrow pit to provide additional artificial islands. Implement colonial nesting bird surveys. Remove exotic vegetation from rim of borrow pit and replace with native vegetation. Coordinate with nest detection with NFESFO. Improve foraging opportunities for wading birds by making the borrow pit slopes shallow.	Same as Alternative B.
Northern Crested Caracara	Continue prescribed fire program on the refuge, conducting an average of four prescribed fires per year on average and burning ~2,000 acres to maintain more open habitat conditions favorable for these species. Historically conducted winter burns. Currently conducting more late summer burns.	Expand from Alternative A. Maintain open habitat with a minimum of woody vegetation; wetland woody plants include wax myrtle. Consider mowing and other forms of vegetation maintenance to keep vegetation low and open.	Same As Alternative B.

KEY TOPICS (ISSUES)	Alternative A (Current Management – No Action Alternative)	Alternative B (Rare, Threatened, and Endangered Species)	Alternative C (Enhanced Wildlife and Habitat Diversity)
Cape Sable Seaside Sparrow (CSSS)	No active management and does not currently occur on the refuge.	Expand from Alternative A. Stay abreast of CSSS reintroduction and introduction discussions within the State. Work with SFESFO and the FWC to evaluate the suitability of the refuge as a potential introductory site to support recovery of the CSSS. Assess management options to recreate the appropriate hydrology and vegetation structure to support CSSS.	Expand from Alternative A. Stay abreast of CSSS reintroduction and introduction discussions within the state.
Eastern Indigo Snake	Continue prescribed fire program on the refuge, conducting an average of four prescribed fires per year on average and burning ~2,000 acres to maintain more open habitat conditions favorable for these species. Historically conducted winter burns. Currently conducting more late summer burns.	Expand from Alternative A. Through prescribed burning and utilizing ecological indicators, promote a fire return interval to maintain early successional habitat.	Same as Alternative B.

KEY TOPICS (ISSUES)	Alternative A (Current Management – No Action Alternative)	Alternative B (Rare, Threatened, and Endangered Species)	Alternative C (Enhanced Wildlife and Habitat Diversity)
Gopher Tortoise	Continue prescribed fire program on the refuge, conducting an average of four prescribed fires per year on average and burning ~2,000 acres to maintain more open habitat conditions favorable for these species. Historically conducted winter burns. Currently conducting more late summer burns.	Expand from Alternative A. Adjust seasonality of prescribed burning towards late summer/early fall (August-October) to promote early successional habitats. Promote a fire return interval to maintain early successional habitat. Protect existing burrow sites which occur in marginal, disturbed sites.	Same as Alternative A.
Reptiles and Amphibians	Continue prescribed fire program on the refuge, conducting an average of four prescribed fires per year on average and burning ~2,000 acres to maintain more open habitat conditions favorable for these species. Historically conducted winter burns. Currently conducting more late summer burns.	Same as Alternative A.	Expand from Alternative A. Over 15-year planning horizon, with university partners, develop baseline inventory and research on refuge herpetofauna. Identify preferred prescribed fire frequency for select reptiles and amphibians based on species response and biological indicators. Track long-term trends in reptile and amphibian populations, presence, and distribution. Educate local public as to value of herpetofauna, to reduce accidental and deliberate mortality.

KEY TOPICS (ISSUES)	Alternative A (Current Management – No Action Alternative)	Alternative B (Rare, Threatened, and Endangered Species)	Alternative C (Enhanced Wildlife and Habitat Diversity)
GOAL 2: Emulate natural hydrological processes on the refuge.			
Refuge Hydrology (Ground Water, Surface Water, Water Quality)	Surface water continues to occupy about 5% of refuge area. Maintain current ratio of filled/plugged vs. functioning drainage ditches on the SR 50 Unit. Continue to encourage high water table by maintaining plugged or filled drainage ditches on the SR 50 Unit so as to reduce runoff and facilitate infiltration. No active management of water quality. Protect emergent wetlands that buffer and filter the St. Johns River.	Expand from Alternative A. Coordinate with the SJRWMD to understand the hydrology of the refuge. To help fill in the information gaps, develop a hydrologic study to understand the water quality, water quantity and timing of flows within and across the refuge. Adapt management as necessary to promote rare, threatened and endangered species.	Expand from Alternative A. Coordinate with the SJRWMD to understand the hydrology of the refuge. To help fill in the information gaps, develop a hydrologic study to understand the water quality, water quantity and timing of flows within and across the refuge. Adapt management as necessary to promote wildlife and habitat diversity.
GOAL 3: Control and eliminate, where feasible, exotic, invasive, and nuisance species on the refuge to maintain and enhance the biological integrity of the refuge's native coastal and floodplain habitats along the St. Johns River.			
Invasive Plant Species	Continue periodic aerial and ground detection and control of Brazilian pepper, cogongrass, old world climbing fern, and other Category I species.	Expand from Alternative A. Within 3 years of CCP approval, develop and every 5 years thereafter, maintain and update an exotic plant database. Coordinate with local CISMAs to develop an early detection and alert network and to help control invasive animals. Coordinate control efforts with SJRWMD, FWC, and Brevard County. Control invasive species to maintenance level.	Same as Alternative B.

KEY TOPICS (ISSUES)	Alternative A (Current Management – No Action Alternative)	Alternative B (Rare, Threatened, and Endangered Species)	Alternative C (Enhanced Wildlife and Habitat Diversity)
Invasive/Feral Animal Species	Continue to monitor informally for presence and abundance of feral animals. Continue to use hog trapper and staff to control feral animals.	Expand from Alternative A. Increase control of invasive/feral animals. Coordinate with local CISMAs to develop an early detection and alert network and to help control invasive animals. Use permittees and partners for feral hog control effort. Control invasive species to maintenance level.	Expand on Alternative B. Use permittees and evaluate using public hunts for feral hog control effort. Control invasive species to maintenance level.
GOAL 4: Protect, manage, and enhance the natural diversity of fish, wildlife, and habitats and the important landscapes of the refuge within the Upper St. Johns River Basin system to ensure that refuge fish and wildlife populations are sustained in perpetuity.			
Emergent (palustrine) Wetland Communities (saw grass marsh, cord grass marsh)	Maintain emergent wetland communities and their unique biota at about 83% of the refuge area.	Expand from Alternative A. Focus management activities in the emergent marsh habitats to ensure high quality marsh to best support secretive marsh birds.	Expand from Alternative A. Focus habitat management to maintain /support wide array of native wildlife using the refuge including secretive marsh birds.
Forested Wetland Communities (hammocks)	Maintain diverse hammock and flatwood forested communities at about 8% of the refuge area.	Same as Alternative A. Management of forested community types would be secondary to marsh management activities.	Expand from Alternative A. Enhance habitat quality of refuge hammocks to support a wide array of native wildlife using the refuge.
Upland Communities (oak scrub, pine/palmetto flatwoods)	Maintain communities at about 3% of the refuge area.	Same as Alternative A. Management of other community types would be secondary to marsh management activities.	Expand from Alternative A. Enhance habitat quality of other refuge community types to support a wide array of native wildlife using the refuge.

KEY TOPICS (ISSUES)	Alternative A (Current Management – No Action Alternative)	Alternative B (Rare, Threatened, and Endangered Species)	Alternative C (Enhanced Wildlife and Habitat Diversity)
Mammals	Continue prescribed fire program on the refuge, conducting an average of four prescribed fires per year on average and burning ~2,000 acres to maintain more open habitat conditions favorable for these species. Historically conducted winter burns. Currently conducting more late summer burns.	Expand from Alternative A. Maintain emergent marsh and open waters for round-tailed muskrat. Conduct rare, threatened and endangered species surveys during 15-year planning horizon.	Expand from Alternative A. Maintain emergent marsh and open waters for mammals such as deer and round-tailed muskrat. Conduct mammal inventory during 15-year planning horizon.
Climate Change	No active data collection related to climate change.	Expand From Alternative A. Partner with SJRWMD and adapt management of habitats and ecosystems for rare, threatened and endangered species affected by climate change. Investigate opportunities to participate in regional climate change initiatives to better understand climate change impacts. Monitor for the impacts of climate change on rare, threatened, and endangered species.	Expand from Alternative A. Partner with SJRWMD in adaptive management efforts to manage habitats, ecosystems and wildlife affected by climate change. Investigate opportunities to participate in regional climate change initiatives to better understand climate change impacts. Monitor for the impacts of climate change on refuge resources.

KEY TOPICS (ISSUES)	Alternative A (Current Management – No Action Alternative)	Alternative B (Rare, Threatened, and Endangered Species)	Alternative C (Enhanced Wildlife and Habitat Diversity)
RESOURCE PROTECTION GOALS			
GOAL 5: Working with partners and neighbors, create functional refuge management areas to contribute to the protection and management of the conservation landscape of the Upper St. Johns River Basin.			
Functional Refuge Management Boundary	Effective resource protection continues to be hindered by fragmented ownership of checkerboard area of Bee Line Unit.	Expand from Alternative A. Work with partners to consolidate and secure ownership in the checkerboard area of the Bee Line Unit to create functional refuge management areas. Consider acquisitions, land swaps, management agreements, conservation easements, and other measures to protect these sites. Provide a refuge boundary survey to better address trespass issues.	Expand from Alternative B. Investigate providing access for public use. Consider acquisition to connect lands that improve opportunities for public use. Provide a refuge boundary survey to better address trespass issues.
Minor Expansion Proposal (MEP) of Refuge's Approved Acquisition Boundary	No active management. refuge would work with partners to increase awareness of the benefits of connecting publically owned lands.	Expand from Alternative A. Expand the existing approved acquisition boundary by approximately 459 acres to provide protected wildlife corridors for species. Connect refuge interests with the network of public conservation lands of the Upper St. Johns River Basin	Expand from Alternative B. Provide additional opportunities for visitor use.

KEY TOPICS (ISSUES)	Alternative A (Current Management – No Action Alternative)	Alternative B (Rare, Threatened, and Endangered Species)	Alternative C (Enhanced Wildlife and Habitat Diversity)
Future Conservation Focus Areas	No active management. refuge has discussed the topic of connecting refuge lands to the network of publically owned lands in the area with partner agencies but no action has ensued.	Expand from Alternative A. Continue to work with partners to evaluate, identify, and protect future conservation focus areas within the network of area conservation lands around the refuge to help provide wildlife corridors for the recruitment and dispersal of species and to help support the rare, threatened, and endangered species.	Expand from Alternative A. Continue to work with partners to evaluate, identify, and protect future conservation focus areas within the network of area conservation lands around the refuge to help provide wildlife corridors for the recruitment and dispersal of species and to help support a wide array of wildlife species. Provide additional opportunities for visitor use.
Rights-of-Way (ROW)	No active management. Existing ROW issues are an artifact of land platting of the SR 50 Unit and checkerboard portion of the Bee Line Unit.	Expand from Alternative A. Work with Brevard County to vacate or abandon ROWs.	Expand from Alternative B. Add ROW access to accommodate public use
GOAL 6: Work with partners and neighbors to protect refuge resources from illegal activities.			
Law Enforcement (LE)	Continue to provide LE without dedicated staff, from the headquarters of Merritt Island NWR Complex, a 20-minute drive from the SR 50 Unit and a 40-minute drive from the Bee Line Unit. Continue to collaborate with FWC, FDEP, and local law enforcement agencies in protecting refuge resources from unpermitted activities. Continue ad hoc	Expand from Alternative A. Increase Service LE staff and coordinate with governmental partners and landowners to increase patrol and enforcement to deter and prevent destructive unpermitted activities. Add 0.5 FTE LE position, shared with Merritt Island NWR Complex. Support semi-annual interagency meeting to review status of	Same as Alternative B.

KEY TOPICS (ISSUES)	Alternative A (Current Management – No Action Alternative)	Alternative B (Rare, Threatened, and Endangered Species)	Alternative C (Enhanced Wildlife and Habitat Diversity)
	consultation and communication with neighbors, landowners and other civic organizations to control illegal activities.	enforcement and boundary issues. Coordinate with governmental partners and landowners to deter and prevent unpermitted activities including mud-bogging and all forms of ATV/ORV use.	
Cultural Resources	Continue to implement Section 106 of the NHPA; otherwise, no active management of cultural resources.	Same as Alternative A.	Expand from Alternative A. Within 15 years of CCP approval, complete and begin to implement a Cultural Resources Management Plan (CRMP).
VISITOR SERVICES GOALS			
GOAL 7: The public will understand, support, and appreciate the purposes of the refuge and its wildlife and habitat values.			
Opening the Refuge	No active program occurs on site. The refuge has been closed to unsupervised public use since its establishment.	Same as Alternative A.	Expand Alternative A. Open the refuge at strategic locations to appropriate and compatible forms of wildlife dependent uses.
Welcome and Orient Visitors	No active program occurs on site. The refuge has been closed to unsupervised public use since its establishment.	Same as Alternative A.	Expand Alternative A. In concert with the opening of the St. Johns NWR, develop welcome and orientation materials for visitors, including developing tear sheets, trail maps, kiosk panels, and routinely provide and update website information.

KEY TOPICS (ISSUES)	Alternative A (Current Management – No Action Alternative)	Alternative B (Rare, Threatened, and Endangered Species)	Alternative C (Enhanced Wildlife and Habitat Diversity)
Environmental Education (EE)	No active program occurs on-site. Continue infrequent visits by Merritt Island NWR Complex staff to schools to provide EE about refuge and its resources.	Expand Alternative A. Work with partners to develop curriculum-based EE program focused on changing patterns of suitable habitat for T&E species due to climate change. Work with local schools to conduct on-site EE specific to T&E species.	Expand Alternative A. Portions of the refuge would be open to environmental interpretation opportunities. Work with partners to develop curriculum-based EE program related to wildlife and climate change. Work with local schools to conduct on-site EE.
Environmental Interpretation	No active, permanent interpretation occurs on-site, except for occasional guided tours of the refuge arranged in advance, for example, Space Coast Birding and Wildlife Festival.	Same as Alternative A.	Expand on Alternative A Portions of the refuge would be open to environmental interpretation opportunities Work with partners to evaluate a range of access alternatives. Explore providing environmental interpretation opportunities with partners. Work with the partners including adjacent landowners to connect the SR 50 Unit with the Fox Lake tract and with the network of publically owned natural areas in the area to increase environmental interpretation options. Develop a trailhead and trail system on existing access roads/dikes, and kiosk(s) from Fay Lake Park into the refuge. Develop an interpretive trail and kiosk(s) on the SR 50 Unit. Provide

KEY TOPICS (ISSUES)	Alternative A (Current Management – No Action Alternative)	Alternative B (Rare, Threatened, and Endangered Species)	Alternative C (Enhanced Wildlife and Habitat Diversity)
			access through hiking, walking and appropriate forms of bicycling
Wildlife Observation and Photography	Refuge remains closed except for occasional guided tours.	Same as Alternative A.	Open portions of the refuge to wildlife observation and photography, to possibly include parking lot, marked foot trails, and kiosk at trailhead; foot traffic would be confined to existing dikes and roads. Evaluate potential connectivity to regional trails networks. Provide access through hiking, walking, and appropriate forms of bicycling. Subject to closure for administrative purposes.
Outreach	Merritt Island staff continues to maintain refuge website and outreach to news media and local community. Refuge annually participates in Space Coast Birding and Wildlife Festival, including presentations and tours.	Expand Alternative A with a rare and T&E species focus.	Expand Alternative A Portions of the refuge would be open to environmental interpretation opportunities. Provide a wildlife and habitat diversity focus. Work strategically with partners to coordinate park ranger's activities.

KEY TOPICS (ISSUES)	Alternative A (Current Management – No Action Alternative)	Alternative B (Rare, Threatened, and Endangered Species)	Alternative C (Enhanced Wildlife and Habitat Diversity)
GOAL 8: Evaluate additional forms of public use - evaluate the possibility of opening the St. Johns NWR to appropriate and compatible wildlife-dependent public use.			
Hunting	Refuge continues to be closed to all hunting.	Same as Alternative A.	Work with partners to evaluate the potential for primitive weapon hunting (bow and muzzle-loader) and/or youth hunt. Species to be considered for hunts would include white-tailed deer and feral hog.
Additional Uses or Areas	Refuge continues to be closed except for occasional guided tours.	Same as Alternative A.	Work with partners to evaluate the St. Johns NWR's ability to support additional opportunities for appropriate and compatible public uses.
REFUGE ADMINISTRATION GOAL			
GOAL 9: Provide sufficient staff, volunteers, facilities, and equipment to manage and protect the natural and cultural resources of the refuge.			
Staffing	Refuge continues to have no dedicated staffing of its own and is managed part-time by off-site Merritt Island NWR Complex staff as a collateral duty.	Expand on Alternative A. Provide 0.5 FTE Law Enforcement Officer, 1.0 FTE biotech/biologist, and 0.5 FTE WG maintenance worker to administer refuge programs and protect refuge resources from unpermitted activities	Expand on Alternative A. Provide 0.5 FTE Law Enforcement Officer, 1.0 FTE Biological Technician. 0.5 FTE WG maintenance worker and 0.5 FTE Refuge Ranger to administer refuge programs including proposed visitor services opportunities and protect refuge resources from unpermitted activities.

KEY TOPICS (ISSUES)	Alternative A (Current Management – No Action Alternative)	Alternative B (Rare, Threatened, and Endangered Species)	Alternative C (Enhanced Wildlife and Habitat Diversity)
Volunteers	Currently, 3-4 volunteers continue to conduct occasional special guided educational tours on the refuge, and control exotic plants.	Expand on Alternative A . Utilize volunteers for increased environmental education and interpretation activities and programs, outreach, T&E species surveys, boundary ID, expanded exotic control, and refuge cleanups.	Expand on Alternative A. Utilize volunteers for increased environmental education and interpretation activities and programs, trail maintenance, outreach, wildlife surveys, expanded exotic control, and refuge cleanups.
Facilities	Refuge maintains one tool and equipment storage shed, perimeter fencing, 5-6 gates, 10 culverts, and 10-12 miles of unpaved access roads.	Same as Alternative A.	Expand on Alternative A. Consider developing kiosks, establishing trails, and providing safe access including associated parking with access from existing County parks and FDOT ROWs.
Equipment	Refuge continues to maintain small complement of fire-fighting equipment on site.	Expand on Alternative A. Add 1-2 vehicles; add equipment for exotic plant control activities, survey and monitoring equipment, maintenance equipment as necessary.	Same as Alternative B.

IV. Environmental Consequences

OVERVIEW

This section analyzes and discusses the potential environmental effects or consequences that can be reasonably expected by the implementation of each of the three alternatives described in Chapter III of this EA. For each alternative, the expected outcomes are portrayed through the 15-year life of the CCP.

EFFECTS COMMON TO ALL ALTERNATIVES

A few potential effects will be the same under each alternative and are summarized under seven categories: environmental justice, climate change, other management, land acquisition, cultural resources, refuge revenue-sharing, and other effects.

ENVIRONMENTAL JUSTICE

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" was signed by President Clinton on February 11, 1994, to focus federal attention on the environmental and human health conditions of minority and low-income populations, with the goal of achieving environmental protection for all communities. The order directed federal agencies to develop environmental justice strategies to aid in identifying and addressing disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. The order is also intended to promote nondiscrimination in federal programs substantially affecting human health and the environment, and to provide minority and low-income communities with access to public information and opportunities for participation in matters relating to human health or the environment.

None of the management alternatives described in this EA would disproportionately place any adverse environmental, economic, social, or health impacts on minority and low-income populations. Implementation of any action alternative that includes public use and environmental education is anticipated to provide a benefit to the residents residing in the surrounding communities.

CLIMATE CHANGE

The U.S. Department of the Interior issued an order in January 2001, requiring federal agencies under its direction that have land management responsibilities to consider potential climate change impacts as part of long-range planning endeavors.

The increase of carbon within the earth's atmosphere has been linked to the gradual rise in surface temperatures commonly referred to as global warning. In relation to comprehensive planning for national wildlife refuges, carbon sequestration constitutes the primary climate-related impact to be considered in planning. The U.S. Department of Energy's *Carbon Sequestration Research and Development* (U.S. Department of Energy 1999) defines carbon sequestration as "...the capture and secure storage of carbon that would otherwise be emitted to or remain in the atmosphere."

The land is a tremendous force in carbon sequestration. Terrestrial biomes of all sorts—grasslands, forests, wetlands, tundra, perpetual ice, and desert—are effective both in preventing carbon emissions and in acting as a biological "scrubber" of atmospheric carbon monoxide. The conclusions of the

Department of Energy's report noted that ecosystem protection is important to carbon sequestration and may reduce or prevent the loss of carbon currently stored in the terrestrial biosphere.

Conserving natural habitat for wildlife is the heart of any long-range plan for national wildlife refuges such as St. Johns NWR. The refuge would continue to play a role in carbon sequestration, primarily in its marsh habitats (Pant et al. 2003). All the alternatives proposed in this DCCP would conserve or restore land and water, and would thus enhance carbon sequestration. This, in turn, would contribute positively to efforts to mitigate human-induced global climate changes.

The impacts of climate change on St. Johns NWR during the first 15 years of implementation are likely to include an increased risk of tropical cyclones or hurricanes (Webster et al. 2005), drought (Dai et al. 2004), and vegetation shifts (Box et al. 2004), as well as the spread of non-native species (Mooney and Hobbs 2000).

Tropical cyclones can negatively affect the refuge through flooding and tree damage. Flooding can also damage refuge infrastructure (e.g., roads, dikes, drainage ditches and canals) and affect habitat. Nesting birds, including listed species, may be adversely affected by high winds and tree-falls. Known nest sites of listed species can be checked after storms to assess damage and potentially rescue fledglings.

Droughts can affect the refuge in two major ways: by reducing water quantity and by increasing the risk of wildfires. Improved coordination with the SJRWMD will help safeguard this valuable resource on the refuge. The refuge's fire management plan helps minimize the frequency and intensity of wildfires during periods of drought.

Changes in temperature, rainfall, wind patterns, and other factors that affect the distribution of plant communities are affected by climate and would respond accordingly. Vegetation communities are predicted to shift, although the exact manner in which the various habitats and species found on the refuge would respond to climate change is unknown. Although the refuge would not be able to prevent shifting habitat, the various management techniques outlined in the proposed action would help protect the vegetation communities found on the refuge and minimize loss of biological diversity.

Since most non-native and invasive species in Florida are of tropical or sub-tropical origin, as a group they are expected to expand their range northward as a result of global warming. Non-native plant species currently not found on the refuge, or which are found but in small numbers still, would likely colonize wider areas of the refuge more intensely. The development and implementation of a non-native and exotic species management plan called for in the proposed action would help minimize the adverse effects of non-native plants and animals on the refuge.

OTHER MANAGEMENT

All management activities that could affect the refuge's natural resources, including subsurface mineral reservations, utility lines and easements, soils, water and air, and historical and archaeological resources, would be managed to comply with all laws and regulations. In particular, any existing and future oil and gas exploration, extraction, and transport operations on the refuge would be managed identically under each of the alternatives. Thus, the impacts would be the same.

LAND ACQUISITION

Funding for land acquisition from willing sellers within the approved acquisition boundary or as part of the minor (less than 10 percent of approved acquisition boundary) expansion proposal provided for in this Draft CCP/EA for St. Johns NWR would come from the Land and Water Conservation Fund, the Migratory Bird Conservation Fund, Corps of Engineers mitigation programs, or donations from conservation and private organizations. Conservation easements and leases could be used to obtain the minimum interests necessary to satisfy refuge objectives if the staff could adequately manage uses of the areas for the benefit of wildlife. The Service could negotiate management agreements with local, state, and federal agencies, and accept conservation easements of lands within the approved acquisition boundary. Some tracts within the refuge acquisition boundary and the proposed boundary expansion may be owned by other public or private conservation organizations. The Service would work with interested organizations to identify additional areas needing protection and provide technical assistance if needed. The acquisition of private lands is entirely contingent on the landowners and their willingness to participate.

CULTURAL RESOURCES

All alternatives afford additional land protection and low levels of development, thereby producing little negative effect on the refuge's cultural and historical resources. Potentially negative effects could include logging, construction of new trails or facilities, and development of water impoundments. In most cases, these management actions would require review by the Service's regional archaeologist in consultation with the State of Florida Historic Preservation Office, as mandated by Section 106 of the National Historic Preservation Act. Therefore, the determination of whether a particular action within an alternative has the potential to affect cultural resources is an on-going process that would occur during the planning stages of every project.

Service acquisition of land with known or potential archaeological or historical sites provides two major types of protection for these resources: protection from damage by federal activity and protection from vandalism or theft. The National Historic Preservation Act requires that any actions by a federal agency which may affect archaeological or historical resources be reviewed by the State Historic Preservation Office, and that the identified effects must be avoided or mitigated. The Service's policy is to preserve these cultural, historic, and archaeological resources in the public trust, and avoid any adverse effects wherever possible.

Land acquisition, within the existing acquisition boundary, by the Service would provide some degree of protection to significant cultural and historic resources. If acquisition of private lands does not occur and these lands remain under private ownership, the landowner would be responsible for protecting and preserving cultural resources. Development of off-refuge lands has the potential to destroy archaeological artifacts and other historical resources, thereby decreasing opportunities for cultural resource interpretation and research.

REFUGE REVENUE-SHARING

Annual refuge revenue-sharing payments to Brevard County would continue at similar rates under each alternative. If lands are acquired and added to the refuge, the payments would increase accordingly.

OTHER EFFECTS

Each of the alternatives would have similar effects or minimal to negligible effects on soils, water quality and quantity, noise, transportation, human health and safety, children, hazardous materials, waste management, aesthetics and visual resources, and utilities and public services.

SUMMARY OF EFFECTS BY ALTERNATIVE

The following section describes the environmental consequences of adopting each refuge management alternative. Table 11 summarizes and addresses the likely outcomes for the specific issues, and is organized by broad issue categories.

ALTERNATIVE A - (CURRENT MANAGEMENT - NO ACTION)

Alternative A continues refuge management activities and programs at levels similar to recent management activities and levels. Wildlife and habitat management activities, for example, would continue at programs and levels comparable to management in the recent past.

Wildlife and Habitat Management

As noted a number of times above, the primary wildlife and habitat management technique used on the refuge is prescribed fire. Use of prescribed fire has widespread and profound consequences for both habitats and the wildlife that live in those habitats.

Rare, Threatened, and Endangered Species

Under Alternative A, there would be no net change in the quantity or quality of preferred habitats for marsh birds, northern crested caracara, wood stork, state-listed wading birds, and all other birds. Current populations would likely be maintained. For each of these species and suites of birds, the impact of implementing Alternative A, that is, of continuing current management direction, is anticipated to either be neutral or neutral to positive (beneficial). This represents recognition that the existence of the refuge (and the habitats it conserves) is generally beneficial to native wild bird populations, and that continuing to manage it as at present would continue to provide those baseline benefits but not likely offer additional benefits.

Similarly, implementing Alternative A would probably not lead to net changes in the quantity or quality of preferred habitats for the eastern indigo snake, gopher tortoise, or other reptiles and amphibians in general. Current populations of these cold-blooded vertebrates would likely be maintained. For each of these taxa, the impact of Alternative A would probably be either neutral or neutral to positive. The existence of the refuge and its managed habitats is generally beneficial to native herpetofauna. Continuing to manage it as at present would provide those baseline benefits but not furnish any additional benefits.

With regard to the CSSS, Alternative A would also be neutral. The CSSS does not now occur on the refuge and there are no historic records of it ever having existed here. Alternative A would neither contribute to nor detract from CSSS recovery efforts elsewhere in Florida.

Emulating Natural Hydrological Processes

Impacts of Alternative A related to refuge hydrology – including ground water, surface water, and water quality – are predicted to be negative to neutral. As noted elsewhere in this document, there are many features of local and regional hydrology about which we do not know. This unknown hydrologic setting limits the refuge's management capabilities. Open space and managed habitats would continue to buffer and filter the St. Johns River.

Controlling Exotic, Invasive, and Nuisance Species on the Refuge

Spot treatment of invasive plants would continue under Alternative A. Impacts of Alternative A related to invasive plant species are projected to be neutral, with little or no change in the extent of infestation and encroachment and effects on native flora and fauna.

Likewise, Alternative A's impacts on invasive and feral animal species are anticipated to be neutral. Periodic control of invasive and feral animals (hogs) would somewhat reduces damage they cause to native flora and fauna.

Natural Diversity of Fish, Wildlife, and Habitats

Emergent wetland communities (sawgrass marsh, cordgrass marsh) are likely to experience neutral to positive effects under Alternative A. Current acreages of these habitats are not expected to change because fire management (the prescribed fire regime) curtails encroachment of invasive woody species.

Impacts of this alternative on both forested wetland communities (hammocks) and upland communities (scrub and pine flatwoods) would be neutral. The current acreage of all these communities would remain unchanged.

The species diversity and abundance of mammals are unlikely to change from implementing this alternative, which is a neutral to positive impact.

With respect to climate change, Alternative A would be judged neutral to negative. Climate change may disrupt ecosystems and species on the refuge, and this alternative would do nothing to address or adapt to changing climatic and ecological conditions. Over the 15-year planning horizon of this CCP, any such changes are not likely to be substantial. Nevertheless, long-term changes in precipitation patterns (quantity and timing), hurricane frequency and intensity, fire regime and return interval, species composition, and invasive/weedy species do have the potential to profoundly alter the flora and fauna of the refuge, management options, and the feasibility of meeting goals and objectives.

Resource Protection

Working with Partners to Conserve Landscape of Upper St. Johns River Basin

With regard to pursuing functional refuge management, Alternative A's impact would be negative, in that it would continue to set a low priority on the problem of fragmented ownership of the Bee Line Unit Checkerboard. This in turn would continue to hinder effective resource management and protection in that area. Trespass and illegal activities would continue unabated and perhaps even worsen.

With regard to rights-of-way issues, this alternative would also be negative. Unresolved ROW issues and the uncertainty associated with them would continue to obstruct holistic refuge management.

Protecting Refuge Resources from Unpermitted Activities
Alternative A's impacts related to law enforcement would be negative. Substantial unpermitted activities would continue and perhaps even increase as the surrounding area develops and grows still more populous, due to the difficult logistics, long driving times, and minimal law enforcement presence. Trespassers and other law violators would continue to believe they can operate with near impunity.

Cultural resources impacts would probably be neutral to negative. Cultural resources would remain largely unknown, undiscovered and unsurveyed. Some damage or vandalism of exposed resources may continue to occur due to the minimal law enforcement presence and lack of deterrence.

Visitor Services

Public Understanding, Support, and Appreciation of Refuge

With regard to interpretation and environmental education, impacts from Alternative A are expected to be neutral to negative. Largely informal, small-scale efforts at interpretation on-site would continue, as would environmental education in local schools but not on-site. However, these limited efforts would not be enough to keep pace with the area's growing human population and its potential to negatively impact the refuge's wildlife and habitats in the near future. They are unlikely to enhance public understanding, support, and appreciation of the refuge sufficient to offset the likely negative effects on the refuge from increasing anthropogenic pressures around it. Relatively small-scale efforts at public outreach would continue; this is deemed to be a neutral impact of Alternative A.

Appropriate and Compatible Public Uses

Impacts related to wildlife observation and photography from Alternative A are expected to be neutral. Relatively small-scale wildlife observation and photography would continue on-site on a case-by-case basis. Impacts related to hunting would also be neutral, in that the hunting closure would continue. Fishing does not occur at present, and would not occur in the future under this alternative.

Refuge Administration Goal

Adequate Administrative Capacity

Staffing-related impacts from Alternative A would clearly be negative. The refuge would continue unstaffed. The lack of dedicated and on-site staffing would continue to stymie and severely limit effective refuge management.

Alternative A's impacts related to volunteers would be neutral. A limited number of volunteers would continue their contributions to environmental education and exotic plant control. This represents neither an improved nor a worsened situation.

Facilities impacts would also be neutral – facilities and infrastructure would be unchanged under Alternative A. However, equipment impacts would be negative. The Service would continue to have no dedicated equipment on-site to manage the refuge, and would continue to have to rely on utilizing Merritt Island NWR Complex's equipment.

ALTERNATIVE B - MANAGEMENT FOR RARE, THREATENED, AND ENDANGERED SPECIES

Alternative B, as its name suggests, more heavily emphasizes management for the benefit of rare, threatened, and endangered species.

Wildlife and Habitat Management

In general, the measures proposed as part of Alternative B would cause beneficial effects for wildlife and habitat at St. Johns NWR.

Rare, Threatened, and Endangered Species

The impact of Alternative B on marsh birds, northern crested caracara, and most other birds would be positive. If fully implemented, this alternative is anticipated to result in an increase in the quality of habitat for rails. This, in turn, would likely bring about a subsequent increase in the populations of rails and other marsh birds. Caracaras would likely experience a minor increase in the quantity and quality of their habitat and resulting minor and commensurate increase in their population on and near the refuge. There would also be a minor to moderate increase in the quality of habitat for rare, threatened, and endangered birds, with a minor to moderate increase in their subsequent populations.

Impacts on the eastern indigo snake, gopher tortoise, and other reptiles and amphibians are expected to be broadly beneficial. A minor to moderate increase in the quantity and quality of habitat for these species would result from implementing Alternative B. Minor to moderate increases in their populations is the expected result. Increased knowledge of the hydrologic setting would generally enhance the refuge's capability to mange for herpetofauna.

Alternative B's effects both on wood storks and other state-listed wading birds would probably be neutral to positive. There would be a minor increase in the quantity and quality of nesting habitat for the wood stork. A possible increase in subsequent wood stork reproductive success and population is the expected outcome. Increased information through implementation of monitoring would improve management for state-listed wading birds. Proposed wood stork management also enhances conditions for the suite of wading birds.

This alternative's impacts related to the CSSS would likely be positive. Increased information could be generated from CSSS-related investigations, including evaluation of habitat suitability, which may assist in CSSS recovery efforts. Alternative C would help determine the pros and cons of using the refuge at some point in the future to help expand the range and increase the number of populations of this endangered sub-species and relative of the now extinct dusky seaside sparrow.

Emulating Natural Hydrological Processes

Alternative B's impacts on hydrology, including ground water, surface water, and water quality would probably range from neutral to positive. Ground water, surface water and water quality would all remain unchanged; open space and managed habitats would continue to buffer and filter the St. Johns River, benefiting this watercourse and those who depend on it. Furthermore, increased information from the proposed hydrological study may result in improved water management and protection. In addition, hydrologic improvements would have a beneficial impact to a majority of refuge herpetofauna.

Controlling Exotic, Invasive, and Nuisance Species on the Refuge

Impacts on invasive plant species are expected to be positive from Alternative B. Not only would increased information be generated about the ecological threat these species pose, but active management should control invasive plants to a greater extent than at present, to the benefit of rare, threatened, and endangered species. Similarly, invasive/feral animal species would be subjected to increased control efforts, which would further reduce the damage to listed species caused by invasive species such as the feral hog.

Natural Diversity of Fish, Wildlife, and Habitats

Alternative B would yield positive impacts on emergent wetland communities such as sawgrass marsh and cord grass marsh. Increased information and management would maintain or expand emergent marsh communities for the benefit of secretive marsh birds.

Impacts of Alternative B on forested wetland communities (hammocks) and upland communities (scrub and pine flatwoods) would likely be neutral, the same as Alternative A. The current acreage of wetland and upland communities would be maintained.

Alternative B would be likely to benefit mammals on the refuge. It would maintain emergent marsh and open waters beneficial to the round-tailed muskrat. Conducting rare, threatened and endangered species surveys during the 15-year planning horizon would increase our base of knowledge and allow for improved management.

With respect to climate change, Alternative B's impacts are anticipated to be neutral to positive. Increased information gained under this alternative would promote adaptive management in the face of a changing climate and ecosystems, which may in turn safeguard refuge resources.

Resource Protection

Working with Partners to Conserve Landscape of Upper St. Johns River Basin

Alternative B would have neutral to positive effects concerning functional refuge management. Cooperation with our partners to improve refuge functionality and reduce fragmentation in the Bee Line Unit may contribute to better management of listed species. A refuge boundary survey would provide more information to address trespass issues. Neutral to positive effects are anticipated from a minor expansion of the refuge's approved acquisition boundary, providing additional opportunities to acquire lands from willing seller. Lands would provide perpetual connections for wildlife to migrate and move within the Upper St. Johns River Basin. Neutral to positive effects are also expected with regard to rights-of-way. Resolving ROW issues would reduce uncertainty and one hindrance to holistic refuge management. Public use could also benefit from improved access.

Protecting Refuge Resources from Unpermitted Activities

Law enforcement impacts from Alternative B would be positive. An increased law enforcement presence and patrols would be highly likely to reduce and deter the unpermitted activities including mud-bogging and other forms of ATV/ORV use that plague the refuge at present.

Alternative B's effects on cultural resources are anticipated to be neutral to positive. While most cultural resources would remain largely unknown and unsurveyed under this alternative, the increased law enforcement presence could reduce the potential for damage or vandalism to refuge cultural resources.

Visitor Services

Public Understanding, Support, and Appreciation of Refuge

Alternative B's impacts on interpretation at the refuge would be the same as Alternative A's: neutral to negative. Largely informal, small-scale efforts at interpretation on-site would continue. However, these limited efforts would probably be insufficient to keep up with the area's growing human population and its potential to negatively impact the refuge's wildlife and habitats in the near future.

Outreach impacts, however, would probably be neutral to positive, because the rare, threatened, and endangered species' focus would be expanded. Likewise, environmental education effects would be positive. Expanded on-site and off-site environmental education focused on climate change, threatened and endangered species and their habitats would benefit the refuge and public at large.

Appropriate and Compatible Public Uses

Impacts of Alternative B on wildlife observation and photography would be identical to Alternative A's: neutral. Relatively small-scale wildlife observation and photography would continue on-site on a case-by-case basis. Impacts on hunting would also be neutral, the same as Alternative A. This is because the hunting closure would continue under Alternative B, so there would be no change with respect to this particular public use.

Refuge Administration Goal

Adequate Administrative Capacity

Staffing impacts of Alternative B would be positive. Adding personnel totaling 2.0 FTE would substantially expand management potential at St. Johns NWR. Impacts with respect to volunteers would also be positive. Expanding the number of volunteers and their roles would effectively increase refuge managerial capacity.

Under Alternative B, there would be no change to refuge facilities, so that the impact would be neutral, same as Alternative A. Both facilities and infrastructure such as roads and dikes would remain unchanged. Impacts of this alternative on equipment, however, would be positive.
Equipment, particularly for fire management, would be augmented, thus increasing management capacity.

ALTERNATIVE C - ENHANCED WILDLIFE AND HABITAT DIVERSITY (PROPOSED ALTERNATIVE)

This alternative would focus on enhancing all native wildlife and habitat diversity on the refuge, not focusing exclusively or primarily on rare, threatened and endangered species, as Alternative B does.

Wildlife and Habitat Management

Rare, Threatened, and Endangered Species

Impacts of Alternative C on rare, threatened and endangered species would be positive. This alternative would increase the quality of habitat for marsh birds, which would probably bring about an increase in subsequent populations of these species. Another benefit of Alternative C is the increased information it would make available to managers.

Impacts of this alternative on other birds and including northern crested caracara would also be positive. A minor to moderate increase in the quality of habitat for a wide array of birds would likely ensue, with a corresponding minor to moderate increase in subsequent populations expected as a result. The crested caracara would likely experience a minor increase in the quantity and quality of suitable habitat, with a subsequent minor increase in its population.

Alternative C's impacts on the wood stork and other state-listed wading birds are anticipated to be neutral to positive, the same as for Alternative B. There would be a minor increase in the quantity and quality of nesting habitat for the wood stork and a possible increase in subsequent wood stork reproductive success and population. Proposed wood stork management enhances conditions for the suite of all wading birds. Increased information would be developed through the implementation of wading bird monitoring. Adaptive management would then apply this information on the ground for the benefit of waders.

Likely impacts on the CSSS and its changes for recovery, and the potential for use of St. Johns NWR to contribute to this recovery, would be neutral to positive. Increased information from proposed investigations may assist with CSSS recovery.

Alternative C's impacts on the eastern indigo snake and most reptiles and amphibians in general would be positive. We would expect a minor to moderate increase in the quantity and quality of habitat for the eastern indigo snake, as well as a minor to moderate increase in the subsequent eastern indigo snake population. Increased information, increased partnerships, and increased knowledge of its hydrologic setting would enhance the refuge's capability to mange for the suite of herpetofauna.

Impacts on the gopher tortoise are expected to be neutral, the same as for Alternative A. There would be no change in the acreage or quality of habitat acreage for the gopher tortoise. The current gopher tortoise population would most likely be maintained if this alternative were to be selected and implemented.

Emulating Natural Hydrological Processes

Impacts of Alternative C on refuge hydrology are expected to be neutral to positive. Ground water, surface water and water quality would all be unchanged. Open space and managed wildlife habitat would continue to buffer and filter the St. Johns River, benefitting that water body. Increased information about hydrology may result in improved water management and protection. In addition, hydrologic improvements would have a beneficial impact to a majority of refuge herpetofauna.

Controlling Exotic, Invasive, and Nuisance Species on the Refuge

The impact of Alternative C on invasive plant and animal species would be positive. Increased information would guide decision-making and control actions and options for both exotic plants and feral animals. Active management should control invasive plants and benefit rare, threatened, and endangered species. Increased control efforts would further reduce damage caused by invasive animals to listed species of fauna.

Natural Diversity of Fish, Wildlife, and Habitats

Emergent wetland communities (sawgrass marsh, cordgrass marsh) would probably experience positive impacts under Alternative C. Increased information and management efforts would maintain or expand emergent marsh communities to benefit wildlife and habitat diversity.

We also anticipate beneficial or positive impacts on both forested wetland communities (hammocks) and upland communities (scrub, and pine flatwoods). Increased management would enhance the value of both forested wetland communities and upland communities for a diversity of wildlife and plants.

Impacts of Alternative C on mammals are likely to be positive. This alternative would maintain emergent marsh and open waters for a diverse assemblage of mammals such as the white-tailed deer and the round-tailed muskrat. Alternative C would also conduct one or more mammal inventories during the 15-year planning horizon, thus improving our base of information and knowledge about the refuge's mammals and enhancing management potential.

Like Alternative B, Alternative C's effects on climate change would be neutral to positive. Increased information from proposed studies and long-term monitoring would be conducive to adaptive management in the face of a changing climate and ecosystems; it may well safeguard refuge resources in an uncertain future.

Resource Protection

Working with Partners to Conserve Landscape of Upper St. Johns River Basin

Alternative C would improve the prospects for more functional refuge management, with impacts on this objective expected to be neutral to positive. Cooperation with partners to improve refuge functionality and reduce fragmentation may contribute to improved habitat management and the creation of public use opportunities. A refuge boundary survey would provide more information to address trespass issues. Neutral to positive effects are anticipated from a proposed minor expansion of the refuge's approved acquisition boundary, providing additional opportunities to acquire lands from willing sellers and/or through other mechanisms to continue development of wildlife corridors and visitor service opportunities in the Upper St. Johns River Basin. Rights-of-way impacts would also be neutral to positive. Resolving right-of-way issues would reduce uncertainty and overcome one hindrance to holistic refuge management. Public use may benefit from improved access.

Protecting Refuge Resources from Unpermitted Activities

Law enforcement impacts from Alternative B would be positive.

As with Alternative B, Alternative C's law enforcement impacts would be positive. An increased law enforcement presence and patrols would be highly likely to reduce and deter the unpermitted activities including mud-bogging and other forms of ATV/ORV use that plague the refuge at present.

Cultural resources impacts would also be positive. Preparation and implementation of a CRMP may increase our information base and knowledge of cultural resources on the refuge. Also, an increased law enforcement presence could reduce the potential for damage or vandalism to refuge cultural resources.

Visitor Services

Public Understanding, Support, and Appreciation of Refuge

The impacts on interpretation, outreach, and environmental education would all be positive. The level of interpretation would increase, providing benefits alike for visitors and the public at large. Outreach with a wildlife and habitat diversity focus would be expanded, including messaging about ethical behavior. This expanded capacity would be even greater than Alternative B due to additional staffing and collaboration with partners. Expanded on-site and off-site environmental education (e.g., focused on climate change and wildlife and habitat) would benefit the refuge and neighboring public at large.

Appropriate and Compatible Public Uses

Impacts on wildlife observation and photography from Alternative C would be positive. On-site opportunities for wildlife observation and photography would increase under this alternative, allowing access to the existing network of levees and roads via hiking, walking and appropriate forms of bicycling. Commercial opportunities including photography and tours/guides would be provided on a case-by-case basis through the special use permit process.

With regard to hunting, impacts would be neutral to positive. Limited opportunities for appropriate and compatible hunting might become available if after evaluation hunting is found to be a compatible use on the refuge. The Draft CCP/EA does not propose opening the refuge to hunting but establishes that the Service would evaluate hunting as a visitor service opportunity. A future planning process and NEPA document would evaluate this use for the refuge.

Refuge Administration Goal

Adequate Administrative Capacity

Staffing effects of Alternative C would be positive: adding personnel totaling 2.5 FTE would substantially expand management potential at St. Johns NWR. The volunteer program would also experience a positive impact. Expanding the number of volunteers and their roles would increase and extend refuge managerial capacity.

With regard to refuge facilities and equipment, Alternative C would also have positive impacts. New kiosks, trails, parking, and access would both enhance refuge management and opportunities for prospective visitors. Equipment would be augmented, increasing management capacity.

Table 11. Summary of environmental effects by alternative for St. Johns NWR

KEY TOPICS (ISSUES)	Alternative A (Current Management – No Action Alternative)	Alternative B (Rare, Threatened, and Endangered Species)	Alternative C (Enhanced Wildlife and Habitat Diversity)
WILDLIFE AND HABITAT MANAGEMENT GOALS			
GOAL 1: Conserve, protect, and enhance populations of rare, threatened, and endangered species of plants and animals at existing or increased levels on the refuge and conserve, protect, manage, and restore the St. Johns River upper basin habitats occurring on the refuge to contribute to recovery goals.			
Marsh Birds (e.g., Black and King Rails, Wading Birds, Meadowlarks, Marsh Wren, Least Bittern, Virginia Rail, Snipe, Northern Harrier)	Neutral to positive. No change in habitat acreage for marsh birds. Current populations would likely be maintained.	Positive. Increase in quality of habitat for rails. Increase in subsequent populations.	Positive. Increase in quality of habitat for rails and an array of marsh birds. Increase in subsequent populations. Increased information.
Suite of Resident, Wintering, and Summering Birds including Common Night Hawk, Eastern Meadowlark, Loggerhead Shrike, Chuck Will's Widow, Florida Sandhill Crane, Southeastern American Kestrel)	Neutral to positive. No change in habitat acreage. Current populations would likely be maintained.	Positive. Minor to moderate increase in quality of habitat for rare, threatened, and endangered birds. Minor to moderate increase in subsequent populations.	Positive. Minor to moderate increase in quality of habitat for wide array of birds. Minor to moderate increase in subsequent populations. Increased information.

KEY TOPICS (ISSUES)	**Alternative A (Current Management – No Action Alternative)**	**Alternative B (Rare, Threatened, and Endangered Species)**	**Alternative C (Enhanced Wildlife and Habitat Diversity)**
Wood Stork and State-listed Wading Birds	Neutral. No active management. Prescribed fire provides foraging opportunities. Exotic plant control. No change in habitat acreage for wood stork.	Neutral to positive. Increased information through implementation of monitoring. Proposed wood stork management enhances conditions for suite of wading birds. Minor increase in quantity and quality of nesting habitat for the wood stork. Possible increase in subsequent wood stork reproductive success and population.	Same as Alternative B.
Northern Crested Caracara	Neutral to positive. No change in habitat acreage for Northern crested caracara. Current Caracara population would likely be maintained.	Positive. Minor increase in quantity and quality of habitat for northern crested caracara. Minor increase in subsequent Caracara population.	Same as Alternative B.
Cape Sable Seaside Sparrow (CSSS)	Neutral. Neither contributes to nor detracts from CSSS recovery efforts elsewhere in Florida.	Positive. Increased information that may assist CSSS recovery including evaluation of habitat suitability.	Neutral to Positive. Increased information that may assist CSSS recovery.

KEY TOPICS (ISSUES)	**Alternative A (Current Management – No Action Alternative)**	**Alternative B (Rare, Threatened, and Endangered Species)**	**Alternative C (Enhanced Wildlife and Habitat Diversity)**
Eastern Indigo Snake	Neutral to positive. No change in habitat acreage for eastern indigo snake. Current eastern indigo snake population would likely be maintained.	Positive. Minor to moderate increase in quantity and quality of habitat for the eastern indigo snake. Minor to moderate increase in subsequent eastern indigo snake population.	Same as Alternative B.
Gopher Tortoise	Neutral. No change in habitat acreage for gopher tortoise. Current gopher tortoise population would likely be maintained.	Positive. Minor to moderate increase in quantity and quality of foraging and nesting habitat for the gopher tortoise. Minor to moderate increase in subsequent gopher tortoise population.	Same as Alternative A.
Reptiles and Amphibians	Neutral. No change in habitat acreage for reptiles and amphibians. Reptile and amphibian populations would likely be maintained.	Positive. Increased knowledge of hydrologic setting enhances refuge capability to mange for suit of herpetofauna.	Positive. Increased information. Increased partnerships. Increased knowledge of hydrologic setting enhances refuge capability to mange for suit of herpetofauna.

KEY TOPICS (ISSUES)	**Alternative A (Current Management – No Action Alternative)**	**Alternative B (Rare, Threatened, and Endangered Species)**	**Alternative C (Enhanced Wildlife and Habitat Diversity)**
GOAL 2: Emulate natural hydrological processes on the refuge.			
Refuge Hydrology (Ground Water, Surface Water, Water Quality)	Negative to neutral. Unknown hydrologic setting limits refuge management capabilities. Open space and habitat management continue to buffer and filter the St. Johns River.	Neutral to positive. Open space and habitat management continue to buffer and filter the St. Johns River. Increased information may result in improved management and protection.	Same as Alternative B.
GOAL 3: Control and eliminate, where feasible, exotic, invasive, and nuisance species on the refuge to maintain and enhance the biological integrity of the refuge's native coastal and floodplain habitats along the St. Johns River.			
Invasive Plant Species	Neutral. Spot treatment of invasive plants.	Positive. Increased information. Active management should control invasive plants and benefit rare, threatened, and endangered species.	Positive. Increased information. Active management should eliminate or control invasive plants resulting in an increase in wildlife and habitat diversity.
Invasive/Feral Animal Species	Neutral. Periodic control of invasive and feral animals (hogs) somewhat reduces damage they cause to native flora and fauna.	Positive. Increased information. Increased control efforts would further reduce damage caused by invasives to listed species.	Positive. Increased information. Increased control efforts would further reduce damage caused by invasives to native flora and fauna.

KEY TOPICS (ISSUES)	**Alternative A (Current Management – No Action Alternative)**	**Alternative B (Rare, Threatened, and Endangered Species)**	**Alternative C (Enhanced Wildlife and Habitat Diversity)**
GOAL 4: Protect, manage, and enhance the natural diversity of fish, wildlife, and habitats and the important landscapes of the refuge within the Upper St. Johns River Basin system to ensure that refuge fish and wildlife populations are sustained in perpetuity.			
Emergent (palustrine) Wetland Communities (saw grass marsh, cord grass marsh)	Neutral to positive. Current acreages not expected to change because fire management (prescribed fire regime) curtails encroachment of invasive woody species.	Positive. Increased information. Increased management would maintain or expand emergent marsh communities for benefit of secretive marsh birds.	Positive. Increased information. Increased management efforts would maintain or expand emergent marsh communities to benefit wildlife and habitat diversity.
Forested Wetland Communities (hammocks)	Neutral. Current hammock acreage would be maintained.	Same as Alternative A.	Positive. Increased management would enhance value of hammocks for a diversity of wildlife and plants.
Upland Communities (oak scrub, pine/palmetto flatwoods)	Neutral. Current acreage of upland communities would be maintained.	Same as Alternative A.	Positive. Increased management would enhance value of upland communities for a diversity of wildlife and plants.
Mammals	Neutral to positive. Species diversity and abundance unlikely to change.	Positive. Maintain emergent marsh and open waters for round-tailed muskrat. Conduct rare, threatened and endangered species surveys during 15-year planning horizon.	Positive. Maintain emergent marsh and open waters for mammals such as deer and round-tailed muskrat. Conduct mammal inventory during 15-year planning horizon.

KEY TOPICS (ISSUES)	**Alternative A (Current Management – No Action Alternative)**	**Alternative B (Rare, Threatened, and Endangered Species)**	**Alternative C (Enhanced Wildlife and Habitat Diversity)**
Climate Change	Neutral to negative. Climate change may disrupt ecosystems and species Current acreage of upland communities would be maintained.	Neutral to positive. Increased information. Adaptive management in the face of a changing climate and ecosystems may safeguard refuge resources.	Same as Alternative B.
RESOURCE PROTECTION GOALS			
GOAL 5: Working with partners and neighbors, create functional refuge management areas to contribute to the protection and management of the conservation landscape of the Upper St. Johns River Basin.			
Functional Refuge Management Boundary	Negative. Fragmented ownership of checkerboard area of Bee Line Unit continues to hinder effective resource management and protection.	Neutral to Positive. Cooperation with partners to improve refuge functionality and reduce fragmentation may contribute to better management of listed species. Providing a refuge boundary survey	Neutral to Positive. Cooperation with partners to improve refuge functionality and reduce fragmentation may improve habitat management and create public use opportunities. Providing a refuge boundary survey
Minor Expansion Proposal (MEP) of Refuge's Approved Acquisition Boundary	Negative. Unresolved connectivity issues and management constraints	Neutral to positive. Expanding the existing approved acquisition boundary would increase wildlife corridor connections of the upper St. Johns River ecosystem.	Neutral to positive. Expanding the existing approved acquisition boundary would increase wildlife corridor connections of the upper St. Johns River ecosystem in addition to providing increased opportunities for visitors to enjoy a variety of wildlife dependent uses.

KEY TOPICS (ISSUES)	**Alternative A (Current Management – No Action Alternative)**	**Alternative B (Rare, Threatened, and Endangered Species)**	**Alternative C (Enhanced Wildlife and Habitat Diversity)**
Future Conservation Focus Areas	Neutral to negative. Refuge remains physically isolated from network of conservation lands in the area	Neutral to positive. Connecting refuge to network of publically managed lands in the area would provide additional movement and dispersal options for wildlife.	Neutral to positive. Connecting refuge to network of publically managed lands in the area would provide additional movement and dispersal options for wildlife. Public use may benefit from improved access.
Rights-of-Way (ROW)	Negative. Unresolved ROW issues continue to obstruct holistic refuge management.	Neutral to positive. Resolving ROW issues would reduce uncertainty and one hindrance to holistic refuge management.	Neutral to positive. Resolving ROW issues would reduce uncertainty and one hindrance to holistic refuge management. Public use may benefit from improved access.
GOAL 6: Work with partners and neighbors to protect refuge resources from illegal activities.			
Law Enforcement (LE)	Negative. Substantial unpermitted activities continue and perhaps even increase as surrounding area develops, due to difficult logistics and minimal LE presence.	Positive. Increased LE presence and patrols reduce unpermitted activities.	Same as Alternative B.

KEY TOPICS (ISSUES)	**Alternative A (Current Management – No Action Alternative)**	**Alternative B (Rare, Threatened, and Endangered Species)**	**Alternative C (Enhanced Wildlife and Habitat Diversity)**
Cultural Resources	Neutral to negative. Cultural resources remain largely unknown and unsurveyed. Some damage or vandalism may continue to occur due to minimal LE presence.	Neutral to positive. Cultural resources remain largely unknown and unsurveyed. Increased LE presence could reduce potential for damage or vandalism to refuge cultural resources.	Positive. Preparation and implementation of a CRMP may increase information base and knowledge of cultural resources on the Refuge. Increased LE presence could reduce potential for damage or vandalism to refuge cultural resources.
VISITOR SERVICES GOALS			
GOAL 7: The public will understand, support, and appreciate the purposes of the refuge and its wildlife and habitat values.			
Opening the Refuge	Neutral. Refuge would remain closed to all but supervised uses.	Same as Alternative A.	Positive. Strategic locations of the Refuge would be open to appropriate and compatible forms of wildlife-dependent recreation.
Welcome and Orient Visitors	Neutral. Refuge remains closed to all by supervised uses.	Same as Alternative A.	Positive. A suite of information deliverables would be produced including tear sheets, trail maps, kiosk panels, and routinely provided website updates to welcome and orient visitors.

KEY TOPICS (ISSUES)	**Alternative A (Current Management – No Action Alternative)**	**Alternative B (Rare, Threatened, and Endangered Species)**	**Alternative C (Enhanced Wildlife and Habitat Diversity)**
Environmental Education (EE)	Neutral to negative. Relatively small-scale EE would continue in local schools but none on-site.	Positive. Expanded on-site and off-site EE focused on climate change, T&E species and their habitat would benefit refuge and public at large.	Positive. Portions of the refuge would be open to environmental education opportunities Expanded on-site and off-site EE focused on climate change, species and habitat relationships, ethical behavior, and refuge hydrology. Wildlife and habitat would benefit from increased awareness and understanding of the public at large.
Environmental Interpretation	Neutral to negative. Largely informal, small-scale efforts at interpretation continue.	Same as Alternative A.	Positive. Portions of the refuge would be open to environmental interpretation opportunities. Level of interpretation would increase, providing benefits for visitors and public at large.
Wildlife Observation and Photography	Neutral. Relatively small-scale wildlife observation and photography would continue on-site on a case-by-case basis.	Same as Alternative A.	Positive. Portions of the refuge would be open to wildlife observation and photography opportunities. On-site opportunities for wildlife observation and photography would increase.

KEY TOPICS (ISSUES)	**Alternative A (Current Management – No Action Alternative)**	**Alternative B (Rare, Threatened, and Endangered Species)**	**Alternative C (Enhanced Wildlife and Habitat Diversity)**
Outreach	Neutral. Relatively small-scale outreach efforts would continue.	Neutral to Positive. Outreach with a rare and T&E species focus would be expanded.	Positive. Outreach with a wildlife and habitat diversity focus would be expanded. Ethical behavior messaging would increase awareness and appreciation for refuge resources. Expanded capacity for outreach would be even greater than Alternative B due to staffing and collaboration with partners.
GOAL 8: Evaluate additional forms of public use - evaluate the possibility of opening the sjnwr to appropriate and compatible wildlife-dependent public use.			
Hunting	Neutral. Hunting closure would continue.	Same as Alternative A.	Neutral to Positive. Evaluation of white-tailed deer and feral hog population would be implemented. Limited opportunities for appropriate and compatible hunting might become available.
Additional Uses or Areas	Neutral. Refuge remains closed to all by supervised uses.	Same as Alternative A.	Positive. Opportunities to enhance the public use experience would be evaluated on a case-by case basis.

KEY TOPICS (ISSUES)	**Alternative A (Current Management – No Action Alternative)**	**Alternative B (Rare, Threatened, and Endangered Species)**	**Alternative C (Enhanced Wildlife and Habitat Diversity)**
REFUGE ADMINISTRATION GOAL			
GOAL 9: Provide sufficient staff, volunteers, facilities, and equipment to manage and protect the natural and cultural resources of the refuge.			
Staffing	Negative. Lack of dedicated and on-site staffing stymies effective refuge management.	Positive. Adding personnel totaling 2.0 FTE would substantially expand management potential.	Positive. Adding personnel totaling 2.5 FTE would substantially expand management potential.
Volunteers	Neutral. Limited number of volunteers continue their contributions to EE and exotic plant control.	Positive. Expanding number of volunteers and their roles would increase refuge managerial capacity.	Same as Alternative B.
Facilities	Neutral. Facilities and infrastructure unchanged.	Same as Alternative A.	Positive. New kiosks, trails, parking, and access would enhance management and visitor opportunities.
Equipment	Negative. Equipment unchanged – the refuge has no dedicated equipment to manage refuge. Utilizing Merritt Island NWR Complex's equipment.	Positive. Equipment would be augmented, increasing management capacity.	Same as Alternative B.

UNAVOIDABLE IMPACTS AND MITIGATION MEASURES

Under Alternative A – the no-action alternative – there are numerous unavoidable impacts, including law enforcement that is not adequate for protecting any significant visitor use; continued degradation of the biological functions of native plant communities and wildlife habitat due to the invasion of exotic plants and nuisance feral animals; and continued lower levels of biodiversity than would be the case with more active management. Ongoing trespassing and unpermitted activities could only be partially controlled due to staffing shortages and logical difficulties, and a dysfunctional refuge boundary in the Bee Line Unit would continue to thwart management and protection. Meanwhile, legitimate, appropriate and compatible public uses would continue to be largely excluded from the refuge, reducing its value to the public. Over time, if these issues are not addressed, they will continue to compromise and diminish refuge resources.

The action alternatives (B and C) also have some unavoidable impacts. These impacts are expected to be minor and/or short-term in duration. However, the refuge will attempt to minimize these impacts whenever possible. The following sections describe the measures the refuge will employ to mitigate and minimize the potential impacts that would result from implementation of the proposed action.

WATER QUALITY FROM SOIL DISTURBANCE AND USE OF HERBICIDES

Soil disturbance and siltation due to water management activities; ditch, canal, road, and levee maintenance; fire management activities (prescribed fire and fire suppression); and the construction of trails and parking lots are expected to be negligible to minor and of short duration. To further reduce potential impacts, the refuge would use best management practices to minimize the erosion of soils into water bodies.

Foot traffic along new foot trails is expected to have a negligible impact on soil erosion. To minimize the impacts from public use, the refuge would include informational signs that request trail users to remain on the trails, in order to avoid causing potential erosion problems.

Long-term herbicide use for exotic plant control could result in a slight decrease in water quality in areas prone to exotic plant infestation. Through the proper application of herbicides, however, this is expected to have a minor impact on the environment, with the benefit of reducing or eliminating invasive and exotic plant infestations.

WILDLIFE DISTURBANCE

Disturbance to wildlife is an unavoidable consequence of any public use program, regardless of the activity involved. While some activities such as wildlife observation may be less disturbing than others, all of the public use activities proposed under the proposed action would be planned to avoid unacceptable levels of impact.

The known and anticipated levels of disturbance from the proposed alternative are not considered to be significant. Nevertheless, the refuge would manage public use activities to reduce impacts. If allowed, hunting would be managed with restrictions that ensure minimal impact on other resources and impacts would be addressed further in a step-down plan. General wildlife observation and photography may result in minimal disturbance to wildlife. If the refuge determines that impacts from the expected additional visitor uses are above the levels that are anticipated, those uses would be discontinued, restricted, or rerouted to other less sensitive areas.

VEGETATION DISTURBANCE

Negative impacts could result from the creation, extension, and maintenance of trails that require the clearing of vegetation along their lengths either as maintenance of established roads or through the preparation of existing trails and trail infrastructure (e.g. parking areas) for visitor use. Trail maintenance is expected to have a minor, short-term, and discrete impact on refuge resources. Parking areas, if necessary, would be located in already disturbed areas and/or adjacent to major infrastructure to reduce impact while still providing safe access opportunities.

Increased visitor use may increase the potential for the introduction of new exotic species into new areas from the inadvertent spread of seeds and plant material adhered to foot ware. Refuge staff and knowledgeable volunteers would pay particular attention to possible infestations of exotic plants along foot paths so that they may be controlled before the problem grows severe. The refuge would minimize this impact by enforcing the regulations for access to the refuge through informational signs that request users to stay on trails.

USER GROUP CONFLICTS

As public use increases, unanticipated conflicts between different user groups could occur. If this should happen, the refuge would adjust its programs, as needed, to eliminate or minimize any public use issues. The refuge would use methods that have proven to be effective in reducing or eliminating public use conflicts. These methods would include establishing separate use areas, different use periods, and limits on the numbers of users in order to provide safe, quality, appropriate, and compatible wildlife-dependent recreational opportunities.

EFFECTS ON ADJACENT LANDOWNERS

Implementation of the proposed alternative is not expected to negatively affect the owners of private lands adjacent to the refuge. Positive impacts that would be expected include higher property values, less intrusion of invasive exotic plants, and increased opportunities for viewing more diverse wildlife.

Moreover, negative impacts associated with the current level and frequency of mechanized trespass onto the refuge through adjacent private lands, and the concomitant noise, litter, and potential for violence, injury or mayhem, should be reduced under the proposed action, because of stepped-up law enforcement. The refuge would provide informational signs that clearly mark refuge boundaries; install and maintain fencing and gates; use law enforcement; provide increased educational efforts and outreach; and partner with neighbors, landowners, and local law enforcement to reduce the scale of illegal trespass and activities.

The proposed expansion accounts for less than 10 percent of the refuge's total approved acquisition boundary and is strategically located to connect refuge interests to the network of publicly protected lands in the region for the benefit of connecting habitats for wildlife and possibly providing additional visitor service opportunities. The acquisition boundary expansion proposed by this Draft CCP/EA is expected to positively impact landowners as it increases acquisition options for private landowners whose lands are located within the newly proposed boundary. The mechanism provides the landowner the option of entering into land acquisition strategies with the Service based on a willing-seller approach where prior to the expansion, this opportunity was not available.

LAND OWNERSHIP AND SITE DEVELOPMENT

Land acquisition efforts by the Service could lead to changes in land use and recreational use patterns. However, most of the non-Service-owned lands within the refuge's approved acquisition boundary (Figures 3, 4, and 5) and within the SR 50 Unit's proposed minor boundary expansion (Figure 14) are currently undeveloped. If these lands are eventually acquired as additions to the refuge, they would be maintained in a natural state, managed for native wildlife populations, and potentially opened to wildlife-compatible public uses, where feasible.

Potential development of the refuge's trails, parking lots, and other improvements could lead to negligible to minor short-term negative impacts on plants, soils, and some wildlife species. All construction activities would comply with the requirements of Section 404 of the Clean Water Act; the National Historic Preservation Act; Executive Order 11988, the National Environmental Policy Act (NEPA); Floodplain Management; and other applicable regulatory requirements.

CUMULATIVE IMPACTS

A cumulative impact is defined as an impact on the natural or human environment, which results from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions regardless of which agency (federal or non-federal) or person undertakes such other actions (40 Code of Federal Regulations, 1508.7).

Cumulative impacts are the overall, net effects on a resource that arise from multiple actions. Impacts can "accumulate" spatially, when different actions affect different areas of the same resource. They can also accumulate over the course of time, from actions in the past, the present, and the future. Occasionally, different actions counterbalance one another, partially canceling out each other's effect on a resource. But more typically, multiple effects add up, with each additional action contributing an incremental impact on the resource. In addition, sometimes the overall effect is greater than merely the sum of the individual effects, such as when one more reduction in a population crosses a threshold of reproductive sustainability, and threatens to extinguish the population.

A thorough analysis of impacts always considers their cumulative aspects, because actions do not take place in a vacuum: there are virtually always some other actions that have affected that resource in some way in the past, or are affecting it in the present, or will affect it in the reasonably foreseeable future. So any assessment of a specific action's effects must in fact be made with consideration of what else has happened to that resource, what else is happening, or what else will likely happen to it.

The refuge is not aware of any past, present, or future planned actions that would result in a significant cumulative impact when added to the refuge's proposed actions, as outlined in the proposed alternative. Hunting evaluations; increased visitation; herbicide use for non-native, invasive, exotic, and nuisance plant species; and prescribed burning are anticipated to have negligible cumulative impacts.

- The Draft CCP/EA identifies assessing the viability of white-tailed deer hunting on the refuge. The evaluation would identify whether deer hunting would have any long-term or far-reaching effects on the regional population of this species, since the home range of deer limit them primarily to the refuge and immediate vicinity. Hunting season would be identified and would not coincide with breeding and nesting seasons of migratory birds, so cumulative effects caused by hunting-induced disturbance would be negligible to minimal. Any hunt determined appropriate and compatible after evaluation would be planned to minimize negative effects to other wildlife, including listed species. Conflicts between hunters and other consumptive and non-consumptive

users would be addressed. Experience has proven that time and space zoning (e.g., separate use areas and use periods) are effective tools in eliminating conflicts between user groups.

- The cumulative impacts of increased visitation by wildlife watchers and photographers would be minimal. Allowing access to the existing network of levees and roads via hiking, walking, and appropriate forms of bicycling would be provided. Commercial opportunities including photography and tours/guides would be provided on a case-by-case basis through the special use permit process. Although non-consumptive users can still impact wildlife through disturbance, the seasonal closure of vulnerable areas (e.g., where wildlife are foraging or nesting) and use of natural screens (e.g., vegetation barriers) would minimize these adverse effects.

- Proposed exotic plant control activities are not expected to have significant adverse cumulative impacts. These activities could involve mechanical removal, application of approved herbicides, and release of biological control agents and/or a combination of the above mechanisms. Herbicides used for exotic plant control target specific plants or infestations, are approved for use in natural areas to control exotic plants, and generally do not have long-lasting residual effects to the environment as their chemical nature provides for relatively quick breakdown upon application. Further, use of herbicides is inherently limited based on label rates and approved application practices on refuge lands and natural areas in the State of Florida.

- Adverse, cumulative effects of prescribed burning would be minimal. The use of relatively small, prescribed burns timed with favorable winds would maintain air pollution at acceptable levels. These managed burns would reduce fuel loads and help prevent or manage catastrophic wildfires that have the potential to cause serious air quality problems in the short term.

DIRECT AND INDIRECT EFFECTS OR IMPACTS

Direct effects are caused by an action and occur at the same time as the action. Indirect effects are caused by an action but are manifested later in time or further removed in distance, but are still reasonably foreseeable.

The actions proposed for implementation under the proposed alternative include minor facility and infrastructure development and maintenance, wildlife and population management, resource protection, public use, and administrative programs. These actions would result in both direct and indirect effects. Facility development, for example, would most likely lead to increased public use, a direct effect; and it, in turn, would lead to indirect effects such as increased littering, noise, vehicular traffic, and traffic safety issues.

Direct effects from fire management activities include changing or preventing the change (through wildlife suppression) of vegetation composition and structure and smoke generation. Indirect effects include changes to wildlife diversity by favoring those species more adapted to or dependent on more open habitat and vigorous young growth.

A direct effect of intensified law enforcement would be deterring prospective trespassers and ATV/ORV drivers from using refuge lands. A possible indirect effect would be similar problems emerging on private or public lands elsewhere as these recreationists seek other sites at which to pursue their pastime.

Other indirect effects that may result from implementing the proposed action include minor impacts from siltation due to the disturbance of soils and vegetation while maintaining or plugging canals and ditches, as well as creating new foot trails and parking lots.

SHORT-TERM USES VERSUS LONG-TERM PRODUCTIVITY

The habitat protection and management actions proposed under the proposed alternative are dedicated to maintaining the long-term productivity of refuge habitats. The benefits of this plan for long-term productivity far outweigh any impacts from short-term actions, such as the construction of new trails, fighting wildfires or setting prescribed fires. While these activities would cause short-term negative impacts, the educational values and associated public support gained from the improved visitor experience would produce long-term benefits for the refuge's entire ecosystem.

The key to protecting and ensuring the refuge's long-term productivity is to find the threshold where public uses do not degrade or interfere with the refuge's natural resources. The activities and programs outlined under the proposed action have been carefully conceived to achieve that threshold. Therefore, implementing the proposed action would lead to long-term benefits for wildlife protection and land conservation that far outweigh any short-term impacts.

V. Consultation and Coordination

OVERVIEW

This chapter summarizes the consultation and coordination that has occurred to date in identifying the issues, alternatives, and proposed alternative, which are presented in this Draft CCP/EA. It lists the meetings that have been held with the various agencies and organizations, and the individuals who were consulted in the preparation of this Draft CCP/EA.

The CCP process involved a wide variety of participants including federal, state, and local governments, and private not-for profit groups, as well as a wide variety of local residents, local businesses, concerned citizens, and state and national organizations. The list of participants beyond these individual and organizations providing comments during the public scoping process includes the Wildlife and Habitat Management Review and Visitor Services Review Team, the Wilderness Review Team, the Intergovernmental Coordination Planning Team, and the CCP Core Team.

WILDLIFE AND HABITAT MANAGEMENT REVIEW AND VISITOR SERVICES REVIEW TEAM

Pre-planning took place prior to developing the CCP itself. A Visitor Services Review and a Wildlife and Habitat Management Review were conducted jointly for the refuge in 2005. These combined discussions provided each participant with an overview of current and desired refuge programs, State and Water Management District programs, and a discussion of desired future conditions and considerations for St. Johns NWR. Participants assessed the status of the refuge's resources and prospects, constraints, and opportunities for management, including opportunities for public use.

- Fred Adrian, Refuge Forester, MINWR Complex
- Billy Brooks, Regional Biologist, USFWS North Florida Ecological Services FO
- Steve Earsom, Regional Refuge Ecologist, USFWS Southeastern RO
- Cheri Ehrhardt, Natural Resource Planner, MINWR Complex
- Marc Epstein, Supervisory Refuge Biologist MINWR Complex
- Peter Henn, Land Manager, SJRWMD
- Ron Hight, Project Leader, MINWR Complex
- Deborah Jerome, Visitor Services & Wilderness Specialist, USFWS Southeastern RO
- Jim Lyon, Biological Technician, MINWR Complex
- Kristina Sorensen, Refuge Biologist, Lake Woodruff NWR
- Glen Stratton, Refuge Fire Management Officer, MINWR Complex
- David Turner, Wildlife Biologist, FWC
- Dorn Whitmore, Refuge Operations Specialist, MINWR Complex

WILDERNESS REVIEW TEAM

The Wilderness Review Team involved the refuge manager, refuge forester, and natural resources planner. The review was completed in 2006.

U.S. Fish and Wildlife Service

- Fred Adrian, Refuge Forester, MINWR Complex
- Cheri Ehrhardt, AICP, Natural Resources Planner, Southeastern RO
- Ron Hight, Project Leader, MINWR Complex

INTERGOVERNMENTAL COORDINATION PLANNING TEAM

A letter inviting FWC participation to the CCP planning process was sent to the FWC director on November 17, 2009. Additional letters were also sent to the Muscogee (Creek) Nation of Oklahoma, United South and Eastern Tribes, Inc., Seminole Nation of Oklahoma, and the Seminole Tribe of Florida, announcing the planned development of the CCP and requesting involvement. In addition, letters were written requesting participation of local and regional agency natural resource management representatives to join refuge staff in an agency workshop held on the morning and afternoon of January 21, 2010. This Intergovernmental Coordination Planning Team included representatives from the USFWS, FWC, SJRWMD, USDA NRCS, Brevard County, and the city of Titusville (agency representatives are listed below) The workshop was attended by 23 local, state, and federal agencies including refuge staff involved with local and regional resource management to discuss and capture refuge issues and existing and future management opportunities.

U.S. Fish and Wildlife Service

- Eddie Brannon, Zone Officer, USFWS Southeastern Region
- Billy Brooks, Wildlife Biologist, North Florida Ecological Services Field Office
- Cheri Ehrhardt, AICP, Natural Resources Planner, USFWS Southeastern Region
- Layne Hamilton, Project Leader, MINWR Complex
- Mike Legare, Senior Refuge Biologist, MINWR Complex
- Ralph Lloyd, Deputy Project Leader, MINWR Complex
- Bill Miller, Wildlife Biologist, Natural Resource Planner
- Candice Stevenson, Refuge Operations Specialist, MINWR Complex
- Dorn Whitmore, Senior Refuge Ranger, MINWR Complex
- Jane Whaley, Law Enforcement Officer, MINWR Complex

Contractor for the U.S. Fish and Wildlife Service

- Leon Kolankiewicz, Mangi Environmental

Florida Fish and Wildlife Conservation Commission

- Travis Franklin, Law Enforcement Officer
- Tim Towles, Scientific Services Biologist with the Division of Habitat and Species Conservation

St. Johns River Water Management District

- Dianne Hall, Environmental Scientist V - Ecologist
- J.B. Miller, Senior Land Resources Planner
- Joseph Stewart, Engineer Scientist

Brevard County

- Xavier deSeguin des Hons, North Region Land Manger, Brevard County Environmentally Endangered Lands Program
- Sue Gosselin, Environmental Scientist, Brevard County Natural Resources Management
- Keith Grosse, Law Enforcement Officer, Brevard County Sheriff's Office Robbyn Spratt, Stormwater Engineer, Brevard County Natural Resources Management

U.S. Department of Agriculture Natural Resources Conservation Service
- David Millard, District Conservationist

City of Titusville
- Aphidalin Fancon, Senior Planner

PUBLIC SCOPING MEETINGS

Once the concurrent CCP and NEPA processes were underway, the Service prepared a press release on January 13, 2010, announcing the meeting date, time, location and meeting purpose to local papers including the Orlando Sentinel and the Daytona News-Journal that published articles on the meeting January 19, 2010 and January 21, 2010 respectively. Scoping meeting details were also announced on the refuge's webpage (http://www.fws.gov/stjohns/) on December 22, 2010 and in the Merritt Island Wildlife Association Habi-Chat Winter 2009 newsletter (Volume 15, Number 4). Refuge staff held the public scoping meeting on the evening of January 21, 2010, after the team's scoping meeting. Thirty-five members of the public attended the evening scoping meeting held at the Merritt Island NWR Complex visitor center. We also received 19 electronically mailed and 3 phoned comments in addition to the inputs received during our public scoping meeting.

CCP CORE TEAM

In the months following the scoping meetings, natural resource planner Bill Miller and consultant Leon Kolankiewicz (Mangi Environmental Group) facilitated a series of workshops for the core planning team at Merritt Island NWR to develop a vision, goals, objectives, and strategies for the St. Johns CCP, in addition to alternatives for the associated EA. Refuge staff attending these workshops and contributing to the CCP included:

- Layne Hamilton, Project Leader, MINWR Complex
- Mike Legare, Senior Wildlife Biologist, MINWR Complex
- Ralph Lloyd, Deputy Project Leader, MINWR Complex
- Candice Stevenson, Wildlife Refuge Specialist, MINWR Complex
- Tim Towles, Biological Scientist IV, Division of Habitat and Species Conservation, Florida Fish and Wildlife Conservation Commission
- Billy Brooks, Fish and Wildlife Biologist, North Florida Ecological Services Field Office
- Dorn Whitmore, Senior Refuge Ranger, MINWR Complex
- Leon Kolankiewicz, Mangi Environmental (Contractor)

Appendix A. Glossary

Adaptive Management: Refers to a process in which policy decisions are implemented within a framework of scientifically driven experiments to test predictions and assumptions inherent in a management plan. Analysis of results helps managers determine whether current management should continue as is or whether it should be modified to achieve desired conditions.

Alluvial: Sediment transported and deposited in a delta or riverbed by flowing water.

Alternative: 1. A reasonable way to fix the identified problem or satisfy the stated need (40 CFR 1500.2). 2. Alternatives are different sets of objectives and strategies or means of achieving refuge purposes and goals, helping fulfill the Refuge System mission, and resolving issues (Service Manual 602 FW 1.6B).

Anadromous: Migratory fishes that spend most of their lives in the sea and migrate to fresh water to breed.

Biological Diversity: The variety of life and its processes, including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur (Service Manual 052 FW 1. 12B). The System's focus is on indigenous species, biotic communities, and ecological processes. Also referred to as biodiversity.

Carrying Capacity: The maximum population of a species able to be supported by a habitat or area.

Categorical Exclusion: A category of actions that does not individually or cumulatively have a significant effect on the human environment and have been found to have no such effect in procedures adopted by a federal agency pursuant to the National Environmental Policy Act (40 CFR 1508.4).

CFR: Code of Federal Regulations.

Compatible Use: A proposed or existing wildlife-dependent recreational use or any other use of a national wildlife refuge that, based on sound professional judgment, will not materially interfere with or detract from the fulfillment of the National Wildlife Refuge System mission or the purpose(s) of the national wildlife refuge [50 CFR 25.12 (a)]. A compatibility determination supports the selection of compatible uses and identifies stipulations or limits necessary to ensure compatibility.

Comprehensive Conservation Plan:	A document that describes the desired future conditions of a refuge or planning unit and provides long-range guidance and management direction to achieve the purposes of the refuge; helps fulfill the mission of the Refuge System; maintains and, where appropriate, restores the ecological integrity of each refuge and the Refuge System; helps achieve the goals of the National Wilderness Preservation System; and meets other mandates (Service Manual 602 FW 1.6 E).
Concern:	See Issue
Cover Type:	The present vegetation of an area.
Cultural Resource Inventory:	A professionally conducted study designed to locate and evaluate evidence of cultural resources present within a defined geographic area. Inventories may involve various levels, including background literature search, comprehensive field examination to identify all exposed physical manifestations of cultural resources, or sample inventory to project site distribution and density over a larger area. Evaluation of identified cultural resources to determine eligibility for the National Register follows the criteria found in 36 CFR 60.4 (Service Manual 614 FW 1.7).
Cultural Resource Overview:	A comprehensive document prepared for a field office that discusses, among other things, its prehistory and cultural history, the nature and extent of known cultural resources, previous research, management objectives, resource management conflicts or issues, and a general statement on how program objectives should be met and conflicts resolved. An overview should reference or incorporate information from a field office's background or literature search described in Section VIII of the Cultural Resource Management Handbook (Service Manual 614 FW 1.7).
Cultural Resources:	The remains of sites, structures, or objects used by people in the past.
Designated Wilderness Area:	An area designated by the U.S. Congress to be managed as part of the National Wilderness Preservation System (Draft Service Manual 610 FW 1.5).
Disturbance:	Significant alteration of habitat structure or composition. May be natural (e.g., fire) or human-caused events (e.g., aircraft overflight).
Ecosystem:	A dynamic and interrelating complex of plant and animal communities and their associated non-living environment.
Ecosystem Management:	Management of natural resources using system-wide concepts to ensure that all plants and animals in ecosystems are maintained at viable levels in native habitats and basic ecosystem processes are perpetuated indefinitely.

Endangered Species (Federal):	A plant or animal species listed under the Endangered Species Act that is in danger of extinction throughout all or a significant portion of its range.
Endangered Species (State):	A plant or animal species in danger of becoming extinct or extirpated in the state within the near future if factors contributing to its decline continue. Populations of these species are at critically low levels or their habitats have been degraded or depleted to a significant degree.
Environmental Assessment (EA):	A concise public document, prepared in compliance with the National Environmental Policy Act, that briefly discusses the purpose and need for an action, alternatives to such action, and provides sufficient evidence and analysis of impacts to determine whether to prepare an environmental impact statement or finding of no significant impact (40 CFR 1508.9).
Environmental Impact Statement (EIS):	A detailed written statement required by section 102(2)(C) of the National Environmental Policy Act, analyzing the environmental impacts of a proposed action, adverse effects of the project that cannot be avoided, alternative courses of action, short-term uses of the environment versus the maintenance and enhancement of long-term productivity, and any irreversible and irretrievable commitment of resources (40 CFR 1508.11).
Estuary:	The wide lower course of a river into which the tides flow. The area where the tide meets a river current.
Finding of No Significant Impact (FONSI):	A document prepared in compliance with the National Environmental Policy Act, supported by an environmental assessment, that briefly presents why a federal action will have no significant effect on the human environment and for which an environmental impact statement, therefore, will not be prepared (40 CFR 1508.13).
Goal:	Descriptive, open-ended, and often broad statement of desired future conditions that conveys a purpose but does not define measurable units (Service Manual 620 FW 1.6J).
Habitat:	Suite of existing environmental conditions required by an organism for survival and reproduction. The place where an organism typically lives.
Habitat Restoration:	Management emphasis designed to move ecosystems to desired conditions and processes, and/or to healthy ecosystems.
Habitat Type:	See Vegetation Type.
Improvement Act:	The National Wildlife Refuge System Improvement Act of 1997.
Informed Consent:	The grudging willingness of opponents to “go along” with a course of action that they actually oppose (Bleiker).

Issue:	Any unsettled matter that requires a management decision [e.g., an initiative, opportunity, resource management problem, threat to the resources of the unit, conflict in uses, public concern, or other presence of an undesirable resource condition (Service Manual 602 FW 1.6K)].
Maintenance Control:	Control of an invasive species so that its population can be maintained at the lowest feasible level (USACOE 2010)
Management Alternative:	See Alternative
Management Concern:	See Issue
Management Opportunity:	See Issue
Migration:	The seasonal movement from one area to another and back.
Mission Statement:	Succinct statement of the unit's purpose and reason for being.
Monitoring:	The process of collecting information to track changes of selected parameters over time.
National Environmental Policy Act of 1969 (NEPA):	Requires all 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 NEPA with other planning requirements, and prepare appropriate NEPA documents to facilitate better environmental decision-making (40 CFR 1500).
National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57):	Under the Refuge Improvement Act, the Fish and Wildlife Service is required to develop 15-year comprehensive conservation plans for all national wildlife refuges outside Alaska. The Act also describes the six public uses given priority status within the Refuge System (i.e., hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation).
National Wildlife Refuge System Mission:	The mission 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.

National Wildlife Refuge System:	Various categories of areas administered by the Secretary of the Interior for the conservation of fish and wildlife, including species threatened with extinction; all lands, waters, and interests therein administered by the Secretary as 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.
National Wildlife Refuge:	A designated area of land, water, or an interest in land or water within the Refuge System.
Native Species:	Species that normally live and thrive in a particular ecosystem.
Noxious Weed:	A plant species designated by federal or state law as generally possessing one or more of the following characteristics: aggressive or difficult to manage; parasitic; a carrier or host of serious insect or disease; or non-native, new, or not common to the United States. According to the Federal Noxious Weed Act (P.L. 93-639), a noxious weed is one that causes disease or had adverse effects on man or his environment and therefore is detrimental to the agriculture and commerce of the United States and to the public health.
Objective:	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. Making objectives attainable, time-specific, and measurable (Service Manual 602 FW 1.6N).
Plant Association:	A classification of plant communities based on the similarity in dominants of all layers of vascular species in a climax community.
Plant Community:	An assemblage of plant species unique in its composition; occurs in particular locations under particular influences; a reflection or integration of the environmental influences on the site such as soils, temperature, elevation, solar radiation, slope, aspect, and rainfall; denotes a general kind of climax plant community.
Preferred Alternative:	This is the alternative determined (by the decision-maker) to best achieve the refuge purpose, vision, and goals; contributes to the Refuge System mission, addresses the significant issues; and is consistent with principles of sound fish and wildlife management.
Prescribed Fire:	The application of fire to wildland fuels to achieve identified land use objectives (Service Manual 621 FW 1.7). May occur from natural ignition or intentional ignition.

Priority Species: Fish and wildlife species that require protective measures and/or management guidelines to ensure their perpetuation. Priority species include the following: (1) State-listed and candidate species; (2) species or groups of animals susceptible to significant population declines within a specific area or statewide by virtue of their inclination to aggregate (e.g., seabird colonies); and (3) species of recreation, commercial, and/or tribal importance.

Public Involvement Plan: Broad long-term guidance for involving the public in the comprehensive conservation planning process.

Public Involvement: A process that offers impacted and interested individuals and organizations an opportunity to become informed about, and to express their opinions on Service actions and policies. In the process, these views are studied thoroughly and thoughtful consideration of public views is given in shaping decisions for refuge management.

Public: Individuals, organizations, and groups; officials of federal, state, and local government agencies; Indian tribes; and foreign nations. It may include anyone outside the core planning team. It includes those who may or may not have indicated an interest in service issues and those who do or do not realize that Service decisions may affect them.

Purposes of the Refuge: "The purposes specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge sub-unit." For refuges that encompass congressionally designated wilderness, the purposes of the Wilderness Act are additional purposes of the refuge
(Service Manual 602 FW 106 S).

Recommended Wilderness: Areas studied and found suitable for wilderness designation by both the Director of the Fish and Wildlife Service and the Secretary of the Department of the Interior, and recommended for designation by the President to Congress. These areas await only legislative action by Congress in order to become part of the Wilderness System. Such areas are also referred to as "pending in Congress"
(Draft Service Manual 610 FW 1.5).

Record of Decision (ROD): A concise public record of decision prepared by the federal agency, pursuant to NEPA, that contains a statement of the decision, identification of all alternatives considered, identification of the environmentally preferable alternative, a statement as to whether all practical means to avoid or minimize environmental harm from the alternative selected have been adopted (and if not, why they were not), and a summary of monitoring and enforcement where applicable for any mitigation (40 CFR 1505.2).

Refuge Goal: See Goal

Refuge Purposes:	See Purposes of the Refuge
Songbirds: (Also Passerines)	A category of birds that is medium to small, perching landbirds. Most are territorial singers and migratory.
Step-down Management Plan:	A plan that provides specific guidance on management subjects (e.g., habitat, public use, fire, and safety) or groups of related subjects. It describes strategies and implementation schedules for meeting CCP goals and objectives (Service Manual 602 FW 1.6 U).
Strategy:	A specific action, tool, technique, or combination of actions, tools, and techniques used to meet unit objectives (Service Manual 602 FW 1.6 U).
Study Area:	The area reviewed in detail for wildlife, habitat, and public use potential. For purposes of this CCP, the study area includes the lands within the currently approved refuge boundary and potential refuge expansion areas.
Threatened Species (Federal):	Species listed under the Endangered Species Act that are likely to become endangered within the foreseeable future throughout all or a significant portion of their range.
Threatened Species (State):	A plant or animal species likely to become endangered in the state within the near future if factors contributing to population decline or habitat degradation or loss continue.
Tiering:	The coverage of general matters in broader environmental impact statements with subsequent narrower statements of environmental analysis, incorporating by reference, the general discussions and concentrating on specific issues (40 CFR 1508.28).
U.S. Fish and Wildlife Service Mission:	The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish and wildlife and their habitats for the continuing benefit of the American people.
Unit Objective:	See Objective
Vegetation Type, Habitat Type, Forest Cover Type:	A land classification system based upon the concept of distinct plant associations.
Vision Statement:	A concise statement of what the planning unit should be, or what we hope to do, based primarily upon the Refuge System mission and specific refuge purposes, and other mandates. We will tie the vision statement for the refuge to the mission of the Refuge System; the purpose(s) of the refuge; the maintenance or restoration of the ecological integrity of each refuge and the Refuge System; and other mandates (Service Manual 602 FW 1.6 Z).

Wilderness Study Areas: Lands and waters identified through inventory as meeting the definition of wilderness and undergoing evaluation for recommendation for inclusion in the Wilderness System. A study area must meet the following criteria:

- Generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable;
- Has outstanding opportunities for solitude or a primitive and unconfined type of recreation; and
- Has at least 5,000 contiguous roadless acres or is sufficient in size as to make practicable its preservation and use in an unimpaired condition (Draft Service Manual 610 FW 1.5).

Wilderness: See Designated Wilderness

Wildfire: A free-burning fire requiring a suppression response; all fire other than prescribed fire that occurs on wildlands (Service Manual 621 FW 1.7).

Wildland Fire: Every wildland fire is either a wildfire or a prescribed fire (Service Manual 621 FW 1.3

ACRONYMS AND ABBREVIATIONS

BCC	Birds of Conservation Concern
BCR	Bird Conservation Region
BRT	Biological Review Team
CARL	(Florida) Conservation and Recreation Lands Program
CCP	Comprehensive Conservation Plan
CERP	Comprehensive Everglades Restoration Plan
CFR	Code of Federal Regulations
cfs	cubic feet per second
CISMA	Cooperative Invasive Species Management Area
CRMP	Cultural Resources Management Plan
CSSS	Cape Sable Seaside Sparrow
DCCP	Draft Comprehensive Conservation Plan
DOI	Department of the Interior
DU	Ducks Unlimited
EA	Environmental Assessment
EE	environmental education
EIS	Environmental Impact Statement
EEL	Environmentally Endangered Lands
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FCWCS	Florida Comprehensive Wildlife Conservation Strategy
FDEP	Florida Department of Environmental Protection
FDOF	Florida Division of Forestry
FLEPPC	Florida Exotic Pest Plant Council
FNAI	Florida Natural Areas Inventory
FO	Field Office
FR	Federal Register
FTE	full-time equivalent
FWC	Florida Fish and Wildlife Conservation Commission
FWS	U.S. Fish and Wildlife Service (also Service)
FY	Fiscal Year
GIS	Geographic Information System
ICPT	Interagency Coordination Planning Team
LCC	Landscape Conservation Cooperative
mg/l	milligrams per liter
MFLs	Minimum Flow and Levels
MINWR	Merritt Island National Wildlife Refuge
MOU	Memorandum of Understanding
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NRHP	National Register of Historic Places
NWR	National Wildlife Refuge
NWRS	National Wildlife Refuge System
NFESFO	North Florida Ecological Services Field Office
OFW	Outstanding Florida Water
PFLCC	Peninsular Florida Landscape Conservation Cooperative
PFT	Permanent Full Time
PPT	Parts Per Thousand

PUNA	Public Use Natural Area
RH	relative humidity
RM	Refuge Manual
RNA	Research Natural Area
RO	Regional Office
ROD	Record of Decision
RONS	Refuge Operating Needs System
ROW	Right Of Way
RRP	Refuge Roads Program
SFESFO	South Florida Ecological Services Field Office
SHC	Strategic Habitat Conservation
SEI	Sustainable Ecosystems Institute
SJNWR	St. Johns National Wildlife Refuge
SJRWMD	St. Johns River Water Management District
SLF	Shuttle Landing Facility
SWIM	Surface Water Improvement and Management
TDS	Total Dissolved Solids
TFT	Temporary Full Time
USC	United States Code

Appendix B. References and Literature Citations

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Appendix C. Relevant Legal Mandates and Executive Orders

STATUTE	DESCRIPTION
Administrative Procedures Act (1946)	Outlines administrative procedures to be followed by federal agencies with respect to identification of information to be made public; publication of material in the Federal Register; maintenance of records; attendance and notification requirements for specific meetings and hearings; issuance of licenses; and review of agency actions.
American Antiquities Act of 1906	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. The Act authorizes the President to designate as national monuments objects or areas of historic or scientific interest on lands owned or controlled by the Unites States.
American Indian Religious Freedom Act of 1978	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.
Americans With Disabilities Act of 1990	Intended to prevent discrimination of and make American society more accessible to people with disabilities. The Act requires reasonable accommodations to be made in employment, public services, public accommodations, and telecommunications for persons with disabilities.
Anadromous Fish Conservation Act of 1965, as amended	Authorizes the Secretaries of 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.
Archaeological Resources Protection Act of 1979, as amended.	This Act strengthens and expands the protective provisions of the Antiquities Act of 1906 regarding archaeological resources. It also revised the permitting process for archaeological research.
Architectural Barriers Act of 1968	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.
Bald and Golden Eagle Protection Act of 1940, as amended	Prohibits the possession, sale or transport of any bald or golden eagle, alive or dead, or part, nest, or egg except as permitted by the Secretary of the Interior for scientific or exhibition purposes, or for the religious purposes of Indians.

STATUTE	DESCRIPTION
Bankhead-Jones Farm Tenant Act of 1937	Directs the Secretary of Agriculture to develop a program of land conservation and utilization in order to correct maladjustments in land use and thus assist in such things as control of soil erosion, reforestation, conservation of natural resources and protection of fish and wildlife. Some early refuges and hatcheries were established under authority of this Act.
Cave Resources Protection Act of 1988	Established requirements for the management and protection of caves and their resources on federal lands, including allowing the land managing agencies to withhold the location of caves from the public, and requiring permits for any removal or collecting activities in caves on federal lands.
Clean Air Act of 1970	Regulates air emissions from area, 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 land under their control. These values include fish, wildlife, and their habitats.
Clean Water Act of 1974, 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.
Coastal Barrier Resources Act of 1982 (CBRA)	Identifies 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 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.
Coastal Barrier Improvement Act of 1990	Reauthorized the Coastal Barrier Resources Act (CBRA), expanded the CBRS to include undeveloped coastal barriers along the Great Lakes and in the Caribbean, and established "Otherwise Protected Areas (OPAs)." The Service is responsible for maintaining official maps, consulting with federal agencies that propose spending federal funds within the CBRS and OPAs, and making recommendations to Congress about proposed boundary revisions.
Coastal Wetlands Planning, Protection, and Restoration (1990)	Authorizes the Director of the Fish and Wildlife Service to participate in the development of a Louisiana coastal wetlands restoration program, participate in the development and oversight of a coastal wetlands conservation program, and lead in the implementation and administration of a national coastal wetlands grant program.

STATUTE	DESCRIPTION
Coastal Zone Management Act of 1972, as amended	Established a voluntary national program within the Department of Commerce to encourage coastal states to develop and implement coastal zone management plans and requires that "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. The law includes an Enhancement Grants Program for protecting, restoring, or enhancing existing coastal wetlands or creating new coastal wetlands. It also established the National Estuarine Research Reserve System, guidelines for estuarine research, and financial assistance for land acquisition.
Emergency Wetlands Resources Act of 1986	This Act authorized the purchase of wetlands from Land and Water Conservation Fund moneys, removing a prior prohibition on such acquisitions. The Act requires the Secretary to establish a National Wetlands Priority Conservation Plan, required the states to include wetlands in their Comprehensive Outdoor Recreation Plans, and transfers to the Migratory Bird Conservation Fund amounts equal to import duties on arms and ammunition. It also established entrance fees at national wildlife refuges.
Endangered Species Act of 1973, as amended	Provides for the conservation of threatened and endangered species of fish, wildlife, and plants by federal action and by encouraging the establishment of state programs. It provides for the determination and listing of threatened and endangered species and the designation of critical habitats. Section 7 requires refuge managers to perform internal consultation before initiating projects that affect or may affect endangered species.
Environmental Education Act of 1990	This Act established the Office of Environmental Education within the U.S. 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.
Estuary Protection Act of 1968	Authorized the Secretary of the Interior, in cooperation with other federal agencies and the states, to study and inventory estuaries of the United States, including land and water of the Great Lakes, and to determine whether such areas should be acquired for protection. The Secretary is also required to encourage state and local governments to consider the importance of estuaries in their planning activities relative to federal natural resource grants. In approving any state grants for acquisition of estuaries, the Secretary was required to establish conditions to ensure the permanent protection of estuaries.

STATUTE	DESCRIPTION
Estuaries and Clean Waters Act of 2000	This law creates a federal interagency council that includes the Director of the Fish and Wildlife Service, the Secretary of the Army for Civil Works, the Secretary of Agriculture, the Administrator of the Environmental Protection Agency and the Administrator for the National Oceanic and Atmospheric Administration. The council is charged with developing a national estuary habitat restoration strategy and providing grants to entities to restore and protect estuary habitat to promote the strategy.
Food Security Act of 1985, as amended (Farm Bill)	The Act contains several provisions that contribute to wetland conservation. The Swampbuster provisions state that farmers who convert wetlands for the purpose of planting after enactment of the law are ineligible for most farmer program subsidies. It also established the Wetland Reserve Program to restore and protect wetlands through easements and restoration of the functions and values of wetlands on such easement areas.
Farmland Protection Policy Act of 1981, as amended	The purpose of this law is to minimize 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.
Federal Advisory Committee Act (1972), as amended	Governs the establishment of and procedures for committees that provide advice to the federal government. Advisory committees may be established only if they will serve a necessary, nonduplicative function. Committees must be strictly advisory unless otherwise specified and meetings must be open to the public.
Federal Coal Leasing Amendment Act of 1976	Provided that nothing in the Mining Act, the Mineral Leasing Act, or the Mineral Leasing Act for Acquired Lands authorized mining coal on refuges.
Federal-Aid Highways Act of 1968	Established requirements for approval of federal highways through national wildlife refuges and other designated areas to preserve the natural beauty of such areas. The Secretary of Transportation is directed to consult with the Secretary of the Interior and other federal agencies before approving any program or project requiring the use of land under their jurisdiction.
Federal Noxious Weed Act of 1990, as amended	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, including the Fish and Wildlife Service, to designate an office or person to coordinate a program to control such plants on the agency's land and implement cooperative agreements with the states, including integrated management systems to control undesirable plants.

STATUTE	DESCRIPTION
Fish and Wildlife Act of 1956	Establishes a comprehensive national fish, shellfish, and wildlife resources policy with emphasis on the commercial fishing industry but also includes 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. Among other things, it authorizes the Secretary of the Interior to take such steps as may be required for the development, advancement, management, conservation, and protection of fish and wildlife resources including, but not limited to, research, development of existing facilities, and acquisition by purchase or exchange of land and water or interests therein.
Fish and Wildlife Conservation Act of 1980, as amended	Requires the Service to monitor non-gamebird species, identify species of management concern, and implement conservation measures to preclude the need for listing under the Endangered Species Act.
Fish and Wildlife Coordination Act of 1958	Promotes equal consideration and coordination of wildlife conservation with other water resource development programs by requiring consultation with the Fish and Wildlife Service and the state fish and wildlife agencies where the "waters of a stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted…or otherwise controlled or modified" by any agency under federal permit or license.
Improvement Act of 1978	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 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.
Fishery (Magnuson) Conservation and Management Act of 1976	Established Regional Fishery Management Councils comprised of federal and state officials, including the Fish and Wildlife Service. It provides for regulation of foreign fishing and vessel fishing permits.
Freedom of Information Act, 1966	Requires all federal agencies to make available to the public for inspection and copying administrative staff manuals and staff instructions; official, published and unpublished policy statements; final orders deciding case adjudication; and other documents. Special exemptions have been reserved for nine categories of privileged material. The Act requires the party seeking the information to pay reasonable search and duplication costs.
Geothermal Steam Act of 1970, as amended	Authorizes and governs the lease of geothermal steam and related resources on public lands. Section 15 c of the Act prohibits issuing geothermal leases on virtually all Service-administrative lands.

STATUTE	DESCRIPTION
Lacey Act of 1900, as amended	Originally designed to help states protect their native game animals and to safeguard U.S. crop production from harmful foreign species, this Act prohibits interstate and international transport and commerce of fish, wildlife or plants taken in violation of domestic or foreign laws. It regulates the introduction to America of foreign species.
Land and Water Conservation Fund Act of 1948	This 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 for 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.
Marine Mammal Protection Act of 1972, as amended	The 1972 Marine Mammal Protection Act established a federal responsibility to conserve marine mammals with management vested in the Department of the Interior for sea otter, walrus, polar bear, dugong, and manatee. The Department of Commerce is responsible for cetaceans and pinnipeds, other than the walrus. With certain specified exceptions, the Act establishes a moratorium on the taking and importation of marine mammals, as well as products taken from them.
Migratory Bird Conservation Act of 1929	Established a Migratory Bird Conservation Commission to approve areas recommended by the Secretary of the Interior for acquisition with Migratory Bird Conservation Funds. The role of the commission was expanded by the North American Wetland Conservation Act to include approving wetlands acquisition, restoration, and enhancement proposals recommended by the North American Wetlands Conservation Council.
Migratory Bird Hunting and Conservation Stamp Act of 1934	Also commonly referred to as the “Duck Stamp Act,” requires waterfowl hunters 16 years of age or older to possess a valid federal hunting stamp. Receipts from the sale of the stamp are deposited into the Migratory Bird Conservation Fund for the acquisition of migratory bird refuges.
Migratory Bird Treaty Act of 1918, as amended	This Act implements various treaties and conventions between the United States and Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Except as allowed by special regulations, this Act makes it unlawful to pursue, hunt, kill, capture, possess, buy, sell, purchase, barter, export or import any migratory bird, part, nest, egg, or product.
Mineral Leasing Act for Acquired Lands (1947), as amended	Authorizes and governs mineral leasing on acquired public lands.

STATUTE	DESCRIPTION
Minerals Leasing Act of 1920, as amended	Authorizes and governs leasing of public lands for development of deposits of coal, oil, gas, and other hydrocarbons; sulphur; phosphate; potassium; and sodium. Section 185 of this title contains provisions relating to granting rights-of-way over federal lands for pipelines.
Mining Act of 1872, as amended	Authorizes and governs prospecting and mining for the so-called "hardrock" minerals (i.e., gold and silver) on public lands.
National and Community Service Act of 1990	Authorizes several programs to engage citizens of the U.S. in full- and/or part-time projects designed to combat illiteracy and poverty, provide job skills, enhance educational skills, and fulfill environmental needs. Among other things, this law establishes the American Conservation and Youth Service Corps to engage young adults in approved human and natural resource projects, which will benefit the public or are carried out on federal or Indian lands.
National Environmental Policy Act of 1969	Requires analysis, public comment, and reporting for environmental impacts of federal actions. It stipulates the factors to be considered in environmental impact statements, and requires that federal agencies employ an interdisciplinary approach in related decision-making and develop means to ensure that unqualified environmental values are given appropriate consideration, along with economic and technical considerations.
National Historic Preservation Act of 1966, as amended	It establishes a National Register of Historic Places and a program of matching grants for preservation of significant historical features. Federal agencies are directed to take into account the effects of their actions on items or sites listed or eligible for listing in the National Register.
National Trails System Act (1968), as amended	Established the National Trails System to protect the recreational, scenic, and historic values of some important trails. National recreation trails may be established by the Secretaries of Interior or Agriculture on land wholly or partly within their jurisdiction, with the consent of the involved state(s), and other land managing agencies, if any. National scenic and national historic trails may only be designated by Congress. Several national trails cross units of the National Wildlife Refuge System.
National Wildlife Refuge System Administration Act of 1966	Prior to 1966, there was no single federal law that governed the administration of the various national wildlife refuges that had been established. This Act defines the National Wildlife Refuge System and authorizes the Secretary of the Interior to permit any use of a refuge provided such use is compatible with the major purposes(s) for which the refuge was established.

STATUTE	DESCRIPTION
National Wildlife Refuge System Improvement Act of 1997	This Act amends the National Wildlife Refuge System Administration Act of 1966. This Act defines the mission of the National Wildlife Refuge System, establishes the legitimacy and appropriateness of six priority wildlife-dependent public uses, establishes a formal process for determining compatible uses of Refuge System lands, identifies the Secretary of the Interior as responsible for managing and protecting the Refuge System, and requires the development of a comprehensive conservation plan for all refuges outside of Alaska.
Native American Graves Protection and Repatriation Act of 1990	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 addresses the repatriation of cultural items inadvertently discovered by construction activities on lands managed by the agency.
Neotropical Migratory Bird Conservation Act of 2000	Establishes a matching grant program to fund projects that promote the conservation of neotropical migratory birds in the united States, Latin America, and the Caribbean.
North American Wetlands Conservation Act of 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. The North American Wetlands Conservation Council was created to recommend projects to be funded under the Act to the Migratory Bird Conservation Commission. Available funds may be expended for up to 50 percent of the United States' share cost of wetlands conservation projects in Canada, Mexico, or the United States (or 100 percent of the cost of projects on federal lands).
Refuge Recreation Act of 1962, as amended	This 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.
Partnerships for Wildlife Act of 1992	Establishes a Wildlife Conservation and Appreciation Fund to receive appropriated funds and donations from the National Fish and Wildlife Foundation and other private sources to assist the state fish and game agencies in carrying out their responsibilities for conservation of non-game species. The funding formula is no more than 1/3 federal funds, at least 1/3 foundation funds, and at least 1/3 state funds.

STATUTE	DESCRIPTION
Refuge Revenue Sharing Act of 1935, as amended	Provided for payments to counties in lieu of taxes from areas administered by the Fish and Wildlife Service. Counties are required to pass payments along to other units of local government within the county, which suffer losses in tax revenues due to the establishment of Service areas.
Rehabilitation Act of 1973	Requires nondiscrimination in the employment practices of federal agencies of the executive branch and contractors. It also requires all federally assisted programs, services, and activities to be available to people with disabilities.
Rivers and Harbors Appropriations Act of 1899, as amended	Requires the authorization by the U.S. Army Corps of Engineers prior to any work in, on, over, or under a navigable water of the United States. The Fish and Wildlife Coordination Act provides authority for the Service to review and comment on the effects on fish and wildlife activities proposed to be undertaken or permitted by the Corps of Engineers. Service concerns include contaminated sediments associated with dredge or fill projects in navigable waters.
Sikes Act (1960), as amended	Provides for the cooperation by the Departments of Interior and Defense with state agencies in planning, development, and maintenance of fish and wildlife resources and outdoor recreation facilities on military reservations throughout the United States. It requires the Secretary of each military department to use trained professionals to manage the wildlife and fishery resource under his jurisdiction, and requires that federal and state fish and wildlife agencies be given priority in management of fish and wildlife activities on military reservations.
Transfer of Certain Real Property for Wildlife Conservation Purposes Act of 1948	This Act provides that upon determination by the Administrator of the General Services Administration, real property no longer needed by a federal agency can be transferred, without reimbursement, to the Secretary of the Interior if the land has particular value for migratory birds, or to a state agency for other wildlife conservation purposes.
Transportation Equity Act for the 21st Century (1998)	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.
Uniform Relocation and Assistance and Real Property Acquisition Policies Act (1970), as amended	Provides for uniform and equitable treatment of persons who sell their homes, businesses, or farms to the Service. The Act requires that any purchase offer be no less than the fair market value of the property.

STATUTE	DESCRIPTION
Water Resources Planning Act of 1965	Established Water Resources Council to be composed of Cabinet representatives including the Secretary of the Interior. The Council reviews river basin plans with respect to agricultural, urban, energy, industrial, recreational and fish and wildlife needs. The act also established a grant program to assist States in participating in the development of related comprehensive water and land use plans.
Wild and Scenic Rivers Act of 1968, as amended	This Act selects certain rivers of the nation possessing remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values; preserves them in a free-flowing condition; and protects their local environments.
Wilderness Act of 1964, as amended	This Act directs the Secretary of the Interior to review 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 refuge managers to use the least intrusive methods, equipment, and facilities necessary for administering the areas.
Youth Conservation Corps Act of 1970	Established a permanent Youth Conservation Corps (YCC) program within the Departments of Interior and Agriculture. Within the Service, YCC participants perform many tasks on refuges, fish hatcheries, and research stations.

EXECUTIVE ORDERS	DESCRIPTIONS
EO 11593, Protection and Enhancement of the Cultural Environment (1971)	States that if the Service proposes any development activities that may affect the archaeological or historic 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.
EO 11644, Use of Off-road Vehicles on Public Land (1972)	Established policies and procedures to ensure that the use of off-road vehicles on public lands will be controlled and directed so as to protect the resources of those lands, to promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands.
EO 11988, Floodplain Management (1977)	The purpose of this Executive Order is to prevent 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."
EO 11989 (1977), Amends Section 2 of EO 11644	Directs agencies to close areas negatively impacted by off-road vehicles.
EO 11990, Protection of Wetlands (1977)	Federal agencies are directed to provide leadership and take action to minimize the destruction, loss of degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands.
EO 12372, Intergovernmental Review of Federal Programs (1982)	Seeks to foster intergovernmental partnerships by requiring federal agencies to use the state process to determine and address concerns of state and local elected officials with proposed federal assistance and development programs.
EO 12898, Environmental Justice (1994)	Requires federal agencies to identify and address disproportionately high and adverse effects of its programs, policies, and activities on minority and low-income populations.

EXECUTIVE ORDERS	DESCRIPTIONS
EO 12906, Coordinating Geographical Data Acquisition and Access (1994), Amended by EO 13286 (2003). Amendment of EOs and other actions in connection with transfer of certain functions to Secretary of DHS.	Recommended that the executive branch develop, in cooperation with state, local, and tribal governments, and the private sector, a coordinated National Spatial Data Infrastructure to support public and private sector applications of geospatial data. Of particular importance to comprehensive conservation planning is the National Vegetation Classification System (NVCS), which is the adopted standard for vegetation mapping. Using NVCS facilitates the compilation of regional and national summaries, which in turn, can provide an ecosystem context for individual refuges.
EO 12962, Recreational Fisheries (1995)	Federal agencies are directed to improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities in cooperation with states and tribes.
EO 13007, Native American Religious Practices (1996)	Provides for access to, and ceremonial use of, Indian sacred sites on federal lands used by Indian religious practitioners and direction to avoid adversely affecting the physical integrity of such sites.
EO 13061, Federal Support of Community Efforts Along American Heritage Rivers (1997)	Established the American Heritage Rivers initiative for the purpose of natural resource and environmental protection, economic revitalization, and historic and cultural preservation. The Act directs Federal agencies to preserve, protect, and restore rivers and their associated resources important to our history, culture, and natural heritage.
EO 13084, Consultation and Coordination With Indian Tribal Governments (2000)	Provides a mechanism for establishing regular and meaningful consultation and collaboration with tribal officials in the development of federal policies that have tribal implications.
EO 13112, Invasive Species (1999)	Federal agencies are directed 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. This EO replaces and rescinds EO 11987, Exotic Organisms (1977).

EXECUTIVE ORDERS	DESCRIPTIONS
EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds. (2001)	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.
EO 13443, Facilitation of Hunting Heritage and Wildlife Conservation (2007)	Directs federal agencies to facilitate the expansion and enhancement of hunting opportunities and the management of game species and their habitats.

Appendix D. Public Involvement

SUMMARY OF PUBLIC SCOPING COMMENTS

The Intergovernmental Coordination Team which included representative from the City of Titusville, Brevard County, Florida Fish and Wildlife Conservation Commission, St. Johns River Water Management District, and the USDA National Resources Conservation Service identified the top priority issues and opportunities for the refuge to address over the 15-year life of the CCP:

- Lack of hydrological understanding for the refuge and the surrounding area.
- Maintain open habitat condition on the refuge for bird use.
- Maintain and where possible expand relict, low salt leach habitats.
- Determine fire frequency of pyrogenic habitats.
- Lack of overall information on status of migratory and resident bird populations.
- Establish quarterly or semi-annual working group to coordinate regional water-related issues.
- Limit occurrence, invasion, and spread of exotic, invasive, and nuisance species
- Lack of contiguous boundary, especially at Bee Line Unit.
- Inability to control illegal access and use of refuge.
- Provide a cultural resource survey
- Investigate opening the refuge to public use
- Evaluate opening the refuge to deer and feral hog hunting.
- Provide environmental education and interpretation opportunities.
- Develop staff commensurate with refuge goals, objectives, and strategies including staff appropriate to manage an open refuge.

A public scoping meeting was conducted on January 21, 2010, at the Merritt Island NWR Complex Visitor Center where 35 people attended, representing the general public, neighboring landowners, and local conservation organizations. The meeting attendees submitted comments on a wide variety of issues, concerns, and ideas for future management of the refuge. Additionally, 22 written comments were submitted by comment form at the meeting and through email. The issues, ideas, concerns and comments raised by the public addressed a wide range of topics, as summarized.

Wildlife and Habitat Management - work with partners to develop a hydrologic study of the refuge to serve refuge management needs and priorities; listed species needs should dictate water management; black rails should be top management priority; control of invasive plants should be high priority; continue to promote prescribed fire to help decrease risk of catastrophic wild fire; the CCP must consider and analyze the impacts of climate change and address non-climate stressors including habitat fragmentation; evaluate allowing cattle to graze on the refuge.

Resource Protection - increase protection of refuge habitats from illicit uses including ORVs; mechanized uses a problem in checkerboard area; evaluate options to remove illegal ORV use; work with various stakeholders to identify site for ORV's outside of refuge; acquire remaining inholdings and evaluate alternative options to acquire inholdings.

Visitor Services - find a way to keep the Beeline closed and control access; keep refuge closed relative to staff availability because any opening will also encourage destructive, illegal uses; open the refuge to passive and non-consumptive public uses including hiking, nature observation/photography, and bird

watching; there should be no hunting on the refuge; provide educational opportunities for the public on the importance of the refuge to threatened and endangered species.

Refuge Administration - improve efforts to work with stakeholders; consider developing a separate friends group; general concern regarding funding for refuge efforts; need law enforcement staff presence; need funding and management if opening the refuge to public uses; if can't maintain then don't open the refuge.

Appendix E. Appropriate Use Determinations

St. Johns National Wildlife Refuge Appropriate Use Determinations

An appropriate use determination is the initial decision process a refuge manager follows when first considering whether or not to allow a proposed use on a refuge. The refuge manager must find that a use is appropriate before undertaking a compatibility review of the use. This process clarifies and expands on the compatibility determination process by describing when refuge managers should deny a proposed use without determining compatibility. If a proposed use is not appropriate, it will not be allowed and a compatibility determination will not be undertaken.

Except for the uses noted below, the refuge manager must decide if a new or existing use is an appropriate refuge use. If an existing use is not appropriate, the refuge manager will eliminate or modify the use as expeditiously as practicable. If a new use is not appropriate, the refuge manager will deny the use without determining compatibility. Uses that have been administratively determined to be appropriate are:

- Six wildlife-dependent recreational uses - As defined by the National Wildlife Refuge System Improvement Act of 1997, the six wildlife-dependent recreational uses (hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation) are determined to be appropriate. However, the refuge manager must still determine if these uses are compatible.

- Take of fish and wildlife under state regulations - States have regulations concerning take of wildlife that includes hunting, fishing, and trapping. The Service considers take of wildlife under such regulations appropriate. However, the refuge manager must determine if the activity is compatible before allowing it on a refuge.

Statutory Authorities for this policy:

National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, 16 U.S.C. 668dd-668ee. This law provides the authority for establishing policies and regulations governing refuge uses, including the authority to prohibit certain harmful activities. The Act does not authorize any particular use, but rather authorizes the Secretary of the Interior to allow uses only when they are compatible and "under such regulations as he may prescribe." This law specifically identifies certain public uses that, when compatible, are legitimate and appropriate uses within the Refuge System. The law states ". . . it is the policy of the United States that . . .compatible wildlife-dependent recreation is a legitimate and appropriate general public use of the System . . .compatible wildlife-dependent recreational uses are the priority general public uses of the System and shall receive priority consideration in refuge planning and management; and . . . when the Secretary determines that a proposed wildlife-dependent recreational use is a compatible use within a refuge, that activity should be facilitated . . . the Secretary shall . . . ensure that priority general public uses of the System receive enhanced consideration over other general public uses in planning and management within the System . . . ." The law also states "in administering the System, the Secretary is authorized to take the following actions: . . . issue regulations to carry out this Act." This policy implements the standards set in the Act by providing enhanced consideration of priority general public uses and ensuring other public uses do not interfere with our ability to provide quality, wildlife-dependent recreational uses.

Refuge Recreation Act of 1962, 16 U.S.C. 460k. The 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.

Other Statutes that Establish Refuges, including the Alaska National Interest Lands Conservation Act of 1980 (ANILCA) (16 U.S.C. 410hh - 410hh-5, 460 mm - 460mm-4, 539-539e, and 3101 - 3233; 43 U.S.C. 1631 et seq.).

Executive Orders. The Service must comply with Executive Order 11644 when allowing use of off-highway vehicles on refuges. This order requires the Service to designate areas as open or closed to off-highway vehicles in order to protect refuge resources, promote safety, and minimize conflict among the various refuge users; monitor the effects of these uses once they are allowed; and amend or rescind any area designation as necessary based on the information gathered. Furthermore, Executive Order 11989 requires the Service to close areas to off-highway vehicles when it is determined that the use causes or will cause considerable adverse effects on the soil, vegetation, wildlife, habitat, or cultural or historic resources. Statutes, such as ANILCA, take precedence over executive orders.

Definitions:

Appropriate Use
A proposed or existing use on a refuge that meets at least one of the following four conditions.

1) The use is a wildlife-dependent recreational use as identified in the Improvement Act.
2) The use contributes to fulfilling the refuge purpose(s), the Refuge System mission, or goals or objectives described in a refuge management plan approved after October 9, 1997, the date the Improvement Act was signed into law.
3) The use involves the take of fish and wildlife under state regulations.
4) The use has been found to be appropriate as specified in section 1.11.

*Native American***.** American Indians in the conterminous United States and Alaska Natives (including Aleuts, Eskimos, and Indians) who are members of federally recognized tribes.

Priority General Public Use. A compatible wildlife-dependent recreational use of a refuge involving hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation.

Quality. The criteria used to determine a quality recreational experience include:

- Promotes safety of participants, other visitors, and facilities.
- Promotes compliance with applicable laws and regulations and responsible behavior.
- Minimizes or eliminates conflicts with fish and wildlife population or habitat goals or objectives in a plan approved after 1997.
- Minimizes or eliminates conflicts with other compatible wildlife-dependent recreation.
- Minimizes conflicts with neighboring landowners.

- Promotes accessibility and availability to a broad spectrum of the American people.
- Promotes resource stewardship and conservation.
- Promotes public understanding and increases public appreciation of America's natural resources and the Service's role in managing and protecting these resources.
- Provides reliable/reasonable opportunities to experience wildlife.
- Uses facilities that are accessible and blend into the natural setting.
- Uses visitor satisfaction to help define and evaluate programs.

*Wildlife-Dependent Recreational Use***.** As defined by the Improvement Act, a use of a refuge involving hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: St. Johns National Wildlife Refuge

Use: _Research

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the Refuge Manager has consulted with State fish and wildlife agencies. **Yes** _**X**_ **No** ___

When the Refuge Manager finds the use appropriate based on sound professional judgment, the Refuge Manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** __X__

Refuge Manager: __Layne Hamilton_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: St. Johns National Wildlife Refuge

Use: Bicycling to support wildlife observation and photography and environmental education and interpretation

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the Refuge Manager has consulted with State fish and wildlife agencies. **Yes** _**X**_ **No** ___

When the Refuge Manager finds the use appropriate based on sound professional judgment, the Refuge Manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** __X__

Refuge Manager: __Layne Hamilton_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: St. Johns National Wildlife Refuge

Use: Hiking and walking to support wildlife observation and photography and environmental education and interpretation.

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the Refuge Manager has consulted with State fish and wildlife agencies. **Yes** _X_ **No** ___

When the Refuge Manager finds the use appropriate based on sound professional judgment, the Refuge Manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** __X__

Refuge Manager: __Layne Hamilton_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: St. Johns National Wildlife Refuge

Use: Commercial Photography

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the Refuge Manager has consulted with State fish and wildlife agencies. **Yes** _**X**_ **No** ___

When the Refuge Manager finds the use appropriate based on sound professional judgment, the Refuge Manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** __X__

Refuge Manager: __Layne Hamilton_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: St. Johns National Wildlife Refuge

Use: _Commercial Tours and Guiding

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the Refuge Manager has consulted with State fish and wildlife agencies. **Yes** _X_ **No** ___

When the Refuge Manager finds the use appropriate based on sound professional judgment, the Refuge Manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ___ **Appropriate** _X__

Refuge Manager: __Layne Hamilton_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: St. Johns National Wildlife Refuge

Use: _Horseback Riding

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable executive orders and Department and Service policies?		X
(d) Is the use consistent with public safety?		X
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		X
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?		X
(g) Is the use manageable within available budget and staff?		X
(h) Will this be manageable in the future within existing resources?		X
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		X
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		X

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the Refuge Manager has consulted with State fish and wildlife agencies. **Yes** _**X**_ **No** ___

When the Refuge Manager finds the use appropriate based on sound professional judgment, the Refuge Manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate __X__ **Appropriate** ____

Refuge Manager: __Layne Hamilton_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: St. Johns National Wildlife Refuge

Use: _All Terrain Vehicle (ATV)_Use

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable executive orders and Department and Service policies?		X
(d) Is the use consistent with public safety?		X
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		X
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?		X
(h) Will this be manageable in the future within existing resources?		X
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		X
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		X

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the Refuge Manager has consulted with State fish and wildlife agencies. **Yes** _X_ **No** ___

When the Refuge Manager finds the use appropriate based on sound professional judgment, the Refuge Manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate __X___ **Appropriate** ____

Refuge Manager: __Layne Hamilton_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: St. Johns National Wildlife Refuge

Use: Off-Road Vehicle (ORV) Use

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable executive orders and Department and Service policies?		X
(d) Is the use consistent with public safety?		X
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		X
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?		X
(h) Will this be manageable in the future within existing resources?		X
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		X
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		X

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the Refuge Manager has consulted with State fish and wildlife agencies. **Yes** X **No** ___

When the Refuge Manager finds the use appropriate based on sound professional judgment, the Refuge Manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate X **Appropriate** ___

Refuge Manager: Layne Hamilton Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: St. Johns National Wildlife Refuge

Use: _Commercial Plant or Plant Material Harvesting

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable executive orders and Department and Service policies?		X
(d) Is the use consistent with public safety?		X
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		X
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?		X
(g) Is the use manageable within available budget and staff?		X
(h) Will this be manageable in the future within existing resources?		X
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		X
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		X

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the Refuge Manager has consulted with State fish and wildlife agencies. **Yes** _**X**_ **No** ___

When the Refuge Manager finds the use appropriate based on sound professional judgment, the Refuge Manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate __X__ **Appropriate** ____

Refuge Manager: __Layne Hamilton_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: St. Johns National Wildlife Refuge

Use: Camping

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		X
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?		X
(h) Will this be manageable in the future within existing resources?		X
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		X
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		X

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the Refuge Manager has consulted with State fish and wildlife agencies. **Yes** _**X**_ **No** ___

When the Refuge Manager finds the use appropriate based on sound professional judgment, the Refuge Manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate X **Appropriate** ____

Refuge Manager: Layne Hamilton Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: St. Johns National Wildlife Refuge

Use: _Boating including the use of all non-motorized and motorized vessels

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		X
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?		X
(g) Is the use manageable within available budget and staff?		X
(h) Will this be manageable in the future within existing resources?		X
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		X
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		X

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the Refuge Manager has consulted with State fish and wildlife agencies. **Yes** _**X**_ **No** ___

When the Refuge Manager finds the use appropriate based on sound professional judgment, the Refuge Manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate X **Appropriate** _____

Refuge Manager: Layne Hamilton Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

Appendix F. Compatibility Determinations

St. Johns National Wildlife Refuge Compatibility Determination

Uses: The following uses were found to be appropriate and evaluated to determine their compatibility with the mission of the Refuge System and the purposes of the refuge.

1. Research
2. Environmental Education and Interpretation
3. Wildlife Observation and Photography
4. Bicycling
5. Commercial Photography
6. Commercial Tours and Guiding

Refuge Name: St. Johns National Wildlife Refuge.

Date Established: August 16, 1971.

Establishing and Acquisition Authorities: The refuge was administratively approved on April 15, 1970 and established on August 17, 1971, with the acquisition of 9.74 acres of land in Brevard County, Florida. Lands were added to the refuge under the Endangered Species Act and National Wildlife Refuge System Improvement Act through the Land and Water Conservation Fund and donation.

Refuge Purpose: The primary purpose of the refuge relates to threatened and endangered species and applies to all lands and waters managed as part of St. Johns NWR: "…to conserve (A) fish or wildlife which are listed as endangered species or threatened species…or (B) plants…" (16 USC 1534, Endangered Species Act).

A secondary purpose focuses more on native diversity and also applies to a few tracts of the refuge: "…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 USC 668dd(a)(2), National Wildlife Refuge System Administration Act.

National Wildlife Refuge System Mission:
The mission of the 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.*

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)

Criminal Code Provisions of 1940 (18 U.S.C. 41)
Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d; 54 Stat. 250)
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 (16 U.S.C. 1131; 78 Stat. 890)
Land and Water Conservation Fund Act of 1965
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)
National Wildlife Refuge Regulations for the Most Recent Fiscal Year (50 CFR
Subchapter C; 43 CFR 3101.3-3)
Emergency Wetlands Resources Act of 1986 (S.B. 740)
North American Wetlands Conservation Act of 1990
Food Security Act (Farm Bill) of 1990 as amended (HR 2100)
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
Title 50, Code of Federal Regulations, Parts 25-33
Archaeological Resources Protection Act of 1979
Native American Graves Protection and Repatriation Act of 1990

Compatibility determinations for each description listed were considered separately. Although for brevity, the preceding sections from “Uses” through “Other Applicable Laws, Regulations and Policies” and the succeeding sections, “Literature Cited,” “Public Review,” and the “Approval of Compatibility Determinations” are only written once, they are part of each descriptive use and become part of that compatibility determination if considered outside of the comprehensive conservation plan.

Public Review and Comment: The compatibility determinations for St. Johns NWR will be available for public review as part of the Draft CCP/EA review, scheduled during 2011. The public will be notified via a notice of availability in the *Federal Register*, the refuge’s website, postings, and newspaper articles.

Description of Use:
Research

Research is the planned, organized, and systematic gathering of data to discover or verify facts. In principle, research conducted on the Refuge by universities, co-op units, non-profit organizations, and other research entities furthers refuge management and serves the purposes, vision, and goals of the refuge. The refuge hosts research from a variety of research institutions, including various universities and private research groups. All research activities, whether conducted by governmental agencies, universities, public research entities, private research groups, or any other entity shall be required to obtain special use permits from the refuge. Approved refuge special use permits will contain conditions under which researchers must operate to help minimize negative impacts to refuge resources. All research activities will be overseen by the refuge biologist and refuge manager. Projects that are fish and wildlife management oriented, which will provide needed information to refuge operation and management, will receive priority consideration and will even be solicited.

Availability of Resources: Other than the administration of associate special use permits, no refuge resources are generally required for this use.

Anticipated Impacts of the Use: Generally, adverse impacts from research are minimal. Occasionally, slight or temporary wildlife or habitat disturbances may occur (e.g., minor trampling of vegetation may occur when researchers access monitoring plots). However, these impacts are neither significant nor permanent. Also, a small number of individual plants or animals might be collected for further scientific study but the collections are anticipated to have minimal impact on the populations from which they came. All collections will adhere to the Service's specimen collection policy (Director's Order 109, dated March 28, 2005).

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: All research conducted on the refuge must further the purposes of the refuge and the mission of the National Wildlife Refuge System. All research will adhere to established refuge policy on research and policy on collecting specimens (Director's Order Number 109). To ensure that research activities are compatible, the refuge requires that a special use permit be obtained before any research activity may occur. Research proposals and/or research special use permit applications must be submitted in advance of the activity to allow for review by refuge staff to ensure minimal impacts to the resource, staff, and programs of the refuge. Each special use permit may contain conditions under which the research will be conducted. Each special use permit holder will submit annual reports or updates to the refuge on research activities, progress, findings, and other information. Further, each special use permit holder will provide copies of findings, final reports, publications, and/or other documentation at the end of each report. The refuge will deny permits for research proposals that are determined to no serve the purposes of the refuge and the mission of the National Wildlife Refuge System. The refuge will also deny permits for research proposals that are determined to negatively impact resources or that materially interfere with or detract from the purposes of the refuge. All research activities are subject to the conditions of their permits. All conditions of special use permits must be met. A special use permit may be revoked for failure to comply with the conditions or for repeat violations of refuge regulations.

Justification: Research activities provide important benefits to the refuge and to the natural resources supported by the refuge. Supporting management, research conduct ted on the refuge can lead to new discoveries, new facts, verified information, and increased knowledge and understanding of resource management, as well as track current trends in fish and wildlife habitat and populations to enable better management decisions. Research had the potential to further the purposes and goals of the refuge and the mission of the National Wildlife Refuge System.

NEPA Compliance for Refuge Use Description:

_____ Categorical Exclusion without Environmental Action Statement
_____ Categorical Exclusion and Environmental Action Statement
__X__ Environmental Assessment and Finding of No Significant Impact
_____ Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

Description of Use:
Environmental Education and Interpretation

The refuge has been closed to unguided visitor service opportunities including those associated with environmental education and interpretation since its establishment in 1971. Under the CCP, portions of the refuge, based on the discretion of the refuge manager, shall be open to unguided visitation including environmental education and interpretation opportunities. The purpose of the refuge's environmental education and interpretation programs would be to increase the public's knowledge, understanding, and appreciation of wildlife, habitats, and conservation programs. Approved forms of access for wildlife viewing and photography include walking and hiking, which are intrinsic to the use, and bicycling. Activities include traditional on-site programs (either led by staff, trained volunteers, or teachers), off-site programs in classrooms, nature study, workshops, and interpretive literature, displays, and support facilities such as trails, displays, and signs.

Availability of Resources: Annual refuge operation and maintenance funds for Merritt Island NWR Complex help support the Visitor Service program activities on St. Johns NWR. With new programs envisioned, supported through the goals, objectives, and strategies of this CCP, costs for improvements would typically come from grants or endowments and refuge budget increases. Volunteers and the Merritt Island Wildlife Association (MIWA) typically support the existing suite of limited environmental education and interpretation programs on the St. Johns NWR as needed or requested by the community. Expanding the program to foster additional community based environmental education and interpretation opportunities including developing and updating a school- based curriculum would require additional staff and volunteers. A shared refuge ranger position is proposed in the CCP to support these programs. In addition, the CCP identifies the need to increase the volunteer base from the present small but effective cadre of volunteers to assist with program support.

Anticipated Impacts of the Use: Environmental education and interpretation activities on the refuge primarily would occur at the Merritt Island NWR Visitor Center or at partner organization facilities and newly established primary public use areas. The expansion of the program, as proposed, would increase disturbance in several new sites; however, impacts would be considered short-term and discrete due to the low anticipated frequency of use and the ability to move sites to new areas or close sites if habitat and wildlife show signs of impacts. Vegetation trampling, altering structure and

species composition, and temporal wildlife impacts to species would be anticipated to occur at a minimal level. The unavoidable impact associated with running the environmental education program is anticipated to be minimal and acceptable. Impacts associated with interpretive activities generally occur at developed facilities, such as the trails or other improved facilities. Adding new interpretive sites would have some wildlife or habitat impacts. The new proposed trails would utilize existing levees and road features and only minimal clearing to maintain these existing features would be necessary. The development of a parking area may be necessary at the SR 50 Unit trailhead feature, which may include grading, gravel, and project design. Any impacts associated with a safe means for visitors to park and access the refuge would require additional, site-specific evaluation for environmental impacts prior to construction.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: While impacts are anticipated to be minimal, stipulations are required to ensure that wildlife resources are adequately protected. The environmental education and interpretation program activities would avoid sensitive sites and sensitive wildlife populations. Built into all curriculums would be a section on wildlife etiquette. Environmental education and interpretation programs and activities would be held at or near new facilities to concentrate impacts from visitor uses to a few locations around the refuge. Evaluations of sites and programs should be conducted annually to assess if objectives are being met and that the natural resources are not being adversely impacted. Impacts associated with interpretive programs are also anticipated to be minimal. One overarching aspect of the interpretive program is to build understanding and appreciation for the refuge and its natural resources. As use increases, wildlife disturbances are unavoidable, but through interpretive material (e.g., brochures, signs, and kiosk panels) proper wildlife etiquette will be stressed.

Education is critical for making visitors aware that their actions can have negative impacts on wildlife. Wildlife impacts in areas potentially affected by new programs would be carefully monitored. If impacts are detected, adaptive strategies would be developed to assess if objectives are being met and that the natural resources are not being adversely affected. The refuge would modify or eliminate nay use that results in unacceptable impacts. The visitors services plan may contain additional restrictions to minimize impacts to wildlife and habitats.

Justification: Environmental education and interpretation represents two priority wildlife-dependent recreational activities listed under the Improvement Act. Environmental education and interpretation are used to encourage all citizens to act responsibly in protecting natural resources. They are tools the refuge can use to build understanding, appreciation, and support for the refuge and the Refuge System. Resources required to run the programs are minimal and built into the refuge operation and budget. As long as stipulations to ensure compatibility are followed, the programs should remain compatible with the purposes of the refuge. At such time that the monitoring program identifies that unacceptable wildlife impacts are occurring, the refuge would modify the activity to minimize or eliminate the impacts. Both programs allow the education of the public regarding the refuge's purposes and the mission of the Service and Refuge System. They highlight the areas which are most in line with the refuge's management philosophy proposed und the CCP. Considering the minimal anticipated impacts through implementation of the environmental education and interpretation programs and the benefits that should arise through public education, participation, and involvement, the programs are deemed compatible.

NEPA Compliance for Refuge Use Description:

_____ Categorical Exclusion without Environmental Action Statement
_____ Categorical Exclusion and Environmental Action Statement
__X__ Environmental Assessment and Finding of No Significant Impact
_____ Environmental Impact Statement and Record of Decision

Mandatory 15-year Re-evaluation Date:

Description of Use:
Wildlife Observation and Photography

Wildlife observation and photography are considered simultaneously in this compatibility determination. Wildlife observation and photography have been identified in the National Wildlife Refuge System Improvement Act of 1997 as priority wildlife-dependent recreational uses. This compatibility determination applies only to personal photography. Commercial photography or videography would be covered under the Commercial Photography Compatibility Determination and would require a special use permit issued by the refuge with specific restrictions. Wildlife observation and photography may occur during daylight hours throughout all open areas of the refuge. Wildlife viewing and photography improvements would be made along hiking trails and at other locations to provide exposure to different refuge habitat types and diverse flora and fauna. These viewing and photographic points of interest would be open year-round or seasonally to provide different opportunities for the public to enjoy refuge habitats and wildlife. Approved forms of access for wildlife viewing and photography include walking and hiking which are intrinsic to the use, and bicycling. Refuge brochures describing the trail locations and interesting wildlife and habitat features of the refuge would be produced to help inform, orient, and educate visitors.

Availability of Resources: Operation and maintenance funds to support wildlife viewing and photography would be necessary. The refuge is presently closed to all but refuge lead or refuge approved lead guided events. The CCP proposes opening key areas to specific uses including wildlife observation and photography in locations identified by the refuge manager and identifies budget needs specific to implementing the goals and objectives of the CCP. Presently, refuge staff guided tours for wildlife viewing and photography are provided on an as needed basis through the special use permit process administered through the Merritt Island NWR Complex. The CCP identifies staff specific to St. Johns NWR that would carry out necessary planning, operations, and maintenance of the proposed unguided array of wildlife observation and photography. Maintenance tasks and assignments such as trail maintenance, kiosk construction, sign repair, mow, grade, road and trail repair among others would be provided and coordinated through a shared maintenance worker, while interpretive and orientation materials, guided tours and additional coordination would be provided by the shared refuge ranger and biological technician identified in the CCP. Additionally, administering law enforcement would be provided by the CCP's proposed shared law enforcement officer.

Anticipated Impacts of the Use: Offering unguided access to the refuge in designated areas has the potential to impact wildlife and habitats, but the focus is to minimize impacts to within acceptable limits while providing access to instill a greater appreciation for the refuge and its natural resources.

Short-Term Impacts: Wildlife observation trials have the potential to disturb wildlife species. Among wetland habitats, approaches can reduce time spent foraging and can cause winter birds to avoid foraging habitats adjacent to areas of disturbance (Klein 1993). Walking on wildlife observation trails tends to displace birds and can cause localized declines in the richness and abundance of wildlife species (Riffell et al. 1996). Bicycling and people walking causes more disturbances to waterfowl than vehicles (Pease et al., 2005). Wildlife photographers tend to have the largest disturbance impacts (Klein 1993, Morton 1995, Dobb 1998). While wildlife observers frequently stop to view wildlife, wildlife photographers are much more likely to approach wildlife (Klein 1993). Even slow approaches by wildlife photographers are much more likely to have behavioral consequences for wildlife (Klein 1993). Other impacts include the potential for some photographers with low power lenses to get much closer to their subjects than other activities would require (Morton 1995).

Long Term Impacts: Considering the high level of use and variety of activities occurring at the refuge, appropriate solutions to minimize impacts need to be developed and monitored. For example, during the fall migration and overwintering season, wildlife observation and photography and environmental education and interpretation are occurring simultaneously at the highest levels of the year. Techniques to limit disturbance must be evaluated, implemented, and monitored. This stems from the hypothesis that prolonged and extensive disturbance may cause migratory birds to abandon the wetlands most disturbed by humans and winter elsewhere. Anticipated public use could result in seasonal shifts in migratory bird use of the refuge's wetland habitats.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: By design, wildlife observation and photography should have minimal wildlife and habitat impacts. However, as use increases, wildlife impacts are more likely to occur. Evaluation of the sites and programs would be conducted annually to assess if objectives are being met, if habitat impacts are minimized, and if wildlife populations are not being adversely affected. If evidence of unacceptable impacts begin to appear, it will be necessary to change the activity or program, move the activity or program, or eliminate the program. Stipulations that may be employed include those listed. The updated visitor services plan may contain additional restrictions to minimize impacts to wildlife and habitats.

- Establishing buffer zones that minimize disturbance around sensitive areas and establishing additional no-entry zones.
- Vegetation that effectively conceals visitors and provides cover for birds can help minimize impacts of people in busy areas, such as dikes and levees.
- Impacts from wildlife viewing can be reduced by providing observation blinds.
- Re-routing, modifying, or eliminating activities which have demonstrated direct wildlife impacts should be employed.
- Education is critical for making visitors aware that their actions can have negative impacts on birds.
- Establishing well-marked trails where human use is more predictable will lessen wildlife impacts.

Justification: Wildlife observation and photography are priority public uses of the National Wildlife Refuge System. Providing quality, appropriate, and compatible opportunities for these activities contributes toward fulfilling provisions of the National Wildlife Refuge System Improvement Act. Wildlife observation and photography would provide excellent forums for promoting increased awareness, understanding, and support for refuge resources and programs and the Service. The stipulations outlined above should minimize potential impacts relative to wildlife/human interactions. Identified improvements would not be developed until adequate staff and budget are available to develop and operate them. At the anticipated levels of visitation, these wildlife-dependent uses would not conflict with the national policy to maintain the biological diversity, integrity, and environmental health of the refuge.

NEPA Compliance for Refuge Use Description:

_____ Categorical Exclusion without Environmental Action Statement
_____ Categorical Exclusion and Environmental Action Statement
__X__ Environmental Assessment and Finding of No Significant Impact
_____ Environmental Impact Statement and Record of Decision

Mandatory 15-year Re-evaluation Date:

Description of Use:
Bicycling

While not one of the six priority wildlife dependent uses listed in the National Wildlife Refuge System Improvement Act, bicycling is a mode of transportation currently used to facilitate wildlife observation and photography. This compatibility determination provides additional guidance on this use. As proposed, bicycling riding would occur only on designated roads or trails and would occur year-round.

Availability of Resources: Throughout its existence, the refuge has been closed to public use except for refuge guided or refuge approved guided events approved through the special use permit process. Maintenance, operations, and staff participation in approved use administration and management have been funded through the Merritt Island NWR. The CCP proposes opening key areas to specific uses in locations identified by the refuge manager including bicycling, and identifies budget needs specific to implementing the goals and objectives of the CCP.

The CCP identifies staff specific to St. Johns NWR that would carry out necessary planning, operations, and maintenance of the proposed unguided array of approved uses including bicycling. Maintenance tasks and assignments such as trail maintenance; kiosk construction; sign repair; mowing, grading, and road and trail repair, among others, would be provided and coordinated through a shared maintenance worker, while interpretive and orientation materials, and additional coordination would be provided by the shared refuge ranger and biological technician identified in the CCP. Additionally, administering law enforcement would be provided by the CCP's proposed shared law enforcement officer.

Anticipated Impacts of the Use: A critical and objective evaluation of the potential effects that bicycles could have on the wildlife, habitat, and other public use activities is based on available information and best professional judgment. Although bicycling has the potential to have impacts, the focus is to minimize impacts. This is based on the impacts at the existing and projected level of use.

Bicycle riding takes several forms. For example, mountain biking, according to the International Mountain Bicycling Association (IMBA) is the sport of riding bicycles off paved roads. It requires endurance and bike handling skills and is performed on dirt roads, fire breaks, access roads, and public trails. Mountain biking tends to be an activity of a more extreme nature, with the emphasis on speed and difficulty. According to the IMBA, the sport is broken down into several categories: cross county, downhill, street, dirt jumping, and free riding. Although wildlife viewing may be an incidental aspect of the mountain bike activity, it is not considered the main purpose or intent. While mountain bikers and ATV riders may enjoy the outdoor settings found on the refuge, these activities tend to conflict with other wildlife-dependent recreation activities, may disturb migratory birds, and are not specifically aimed at viewing wildlife. Therefore, mountain biking, along with other similar sport activities, such as ATV use, is not appropriate for the refuge. Other forms of bike riding may be appropriate.

Short-term impacts: Wildlife disturbance relative to bicycle riding has been poorly studied with most references using other activities, such as walking, hiking, and operating vehicles and their impacts on wildlife; therefore, bicycling impacts are inferred (unless noted). A study conducted at the Back Bay National Wildlife Refuge indicated that jogging and bike riding on an open habitat, such as marshes where the activity is highly visible to wading birds, shorebirds, and waterfowl, are disruptive (Pease et al., 2005). As a result, marshbirds in open areas flee from joggers and bike riders (Laskowski 1999). Wildlife may receive different cues from different modes of transportation since wildlife do not flee as readily from cars, perhaps because the person is hidden in the vehicle and not perceived as a threat (Klein 1983). Pease et al. 2005 compared five different human activities (e.g., motorized tram, slow-moving truck, fast-moving truck, bicyclist, and pedestrian) in relation to waterfowl disturbance. The study found that people walking and biking disturbed waterfowl more than vehicles.

Long-term impacts: Considering the newly expanded uses and visitor service activities proposed through the CCP, appropriate solutions to minimize impacts need to be developed. For example, during the fall migration and over-wintering season, wildlife observation and photography and environmental education and interpretation are all occurring simultaneously and would be presumed at the highest levels of the year. Techniques to limit disturbance must be evaluated, implemented and monitored. This stems from the hypothesis that prolonged and extensive disturbance may cause migratory birds to abandon the wetlands most disturbed by humans and winter elsewhere. Anticipated increases in visitor use could result in seasonal shifts in migratory bird use of the refuge wetland habitat. Bicycling would add to the level of disturbance, especially in wetland habitats, and strategies would need to be implemented to limit wildlife impacts.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: All forms of wildlife observation and photography should have minimal wildlife and habitat impacts. However, bicycling can cause wildlife impacts in open wetland areas, can increase wildlife impacts, and can disrupt other individuals viewing wildlife. Evaluation of bike riding will be conducted annually to assess if objectives are being met, if habitat impacts are within a tolerable range, and if wildlife populations are not being adversely affected. If evidence of unacceptable impacts begins to appear, it may be necessary to change the activity or the program, move the activity or program, or eliminate the program. Stipulations that might be employed are listed.

- Establishing buffer zones that minimize disturbance around sensitive areas and establishing additional no-entry zones.

- Vegetation that effectively conceals visitors and provides cover for birds can help minimize impacts of people.
- Impacts from wildlife viewing can be reduced by providing observation blinds.
- Techniques specific to bicycling will include re-routing, modifying, or eliminating bicycle riding activities which have demonstrated direct wildlife impacts or present safety concerns for other visitors.
- Education is critical for making bicycle riders aware that their actions can have negative impacts on birds.
- Posting signs where the use is allowed and contained (e.g., dikes, levees, and existing unimproved road infrastructure).
- Establish signs at the trailhead kiosk which clearly describes mountain biking activity and prohibits this type of use on the refuge.
- A regulation will be established that prohibits mountain biking. If bicycle riding that exhibits excessive speed, jumping, erratic bicycle handling, racing, endurance, off-trail use, or other extreme bicycle riding behavior typically associated with mountain biking is observed, the individual(s) may be cited. If mountain biking activity cannot be controlled, bike riding will no longer be compatible with other trail use and will be eliminated.

Justification: Bicycling to observe wildlife facilitates priority public uses of the National Wildlife Refuge System. Providing quality, appropriate, and compatible opportunities for these activities contributes toward fulfilling provisions of the National Wildlife Refuge System Improvement Act. Wildlife observation from bicycles in areas where there are few impacts to wildlife would provide an appropriate mode of transportation for promoting increased awareness, understanding, and support of refuge resources and programs. The stipulations outlined above should minimize potential impacts relative to wildlife/human interactions. Identified improvements would not be developed until adequate staff and budget are available to develop and operate them. At the anticipated levels of visitation, bicycling does not seem to conflict with the national policy to maintain the biological diversity, integrity, and environmental health of the refuge.

NEPA Compliance for Refuge Use Description:

_____ Categorical Exclusion without Environmental Action Statement
_____ Categorical Exclusion and Environmental Action Statement
__X__ Environmental Assessment and Finding of No Significant Impact
_____ Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

Description of Use:
Commercial Photography

Commercial photography includes still photography and filming and is often difficult to distinguish from recreational photography. While recreational photography is a priority public use under the National Wildlife Refuge System Improvement Act, commercial photography is not. Commercial photography is where an individual or company takes photographs or films for commercial gain. Photography classes, television news crews, and photographic production shoots are examples of commercial photography.

These activities are varied in their scopes and impacts, ranging from a single individual in a single vehicle to numerous people and associated support vehicles (e.g., trucks with aerials).

Availability of Resources: Operation and maintenance funds to support commercial photography would be taken from the refuge's proposed annual budget. Funds are needed to mow, grade, and fix roads and trails open to the public and paint, repair, and replace signs. Further, staff time is required to review, process, and monitor special use permits issued for these activities, including monitoring specific activities to ensure that impacts are minimized and to ensure adherence to conditions of the permits. Staff to administer this use includes the proposed shared park rangers, law enforcement officer, maintenance worker, and full-time biological technician. Salaries for these positions would come from the refuge's operating budget.

Anticipated Impacts of the Use: Commercial photography activities would occur along existing trails. Potential impacts include minor trampling of vegetation and disturbance of nesting, foraging, and resting waterbirds.

Since these activities generally occur outside of vehicles, they tend to have a greater impact. In general, activities that occur outside of vehicles tend to increase the potential for disturbance for most wildlife species (Klein 1993; Gabrielson and Smith 1995; Burger 1981; Pease et al. 2005). Among wetland habitats, out-of-vehicle approaches can reduce time spent foraging and can cause waterbirds to avoid foraging habitats adjacent to the out-of-vehicle disturbance (Klein 1993). One possible reason for this result is that vehicle activity is usually brief, while walking requires a longer period of time to cover the same distance. Similarly, walking on wildlife observation trails tends to displace birds and can cause localized declines in the richness and abundance of wildlife species (Riffell et al. 1996). Bicycling and people walking causes more disturbances to waterfowl than vehicles (Pease et al. 2005).

Wildlife photographers tend to have the largest disturbance impacts (Klein 1989, 1993; Morton 1995; Dobb 1998). While wildlife observers frequently stop their vehicles to view wildlife, wildlife photographers are much more likely to leave their vehicles and approach wildlife on foot (Klein 1993). Even a slow approach by wildlife photographers tends to have behavioral consequences to wildlife (Klein 1993). Other impacts include the potential for some photographers to remain close to wildlife for extended periods of time (Dobb 1998) and the tendency of casual photographers with low-power lenses to get much closer to their subject than other activities would require (Morton 1995).

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with the Listed Stipulations

Stipulations Necessary to Ensure Compatibility: Commercial photography approved on the Refuge must have a primary focus on education and information related to the refuge's primary purposes, the resources protected by the refuge, and/or the National Wildlife Refuge System mission. Where the refuge manager can identify commercial photography activities, they can be regulated and monitored through special use permits. These permits will contain conditions under which the activities are allowed to operate. Special use permits for commercial photography will be issued on a per event basis, often limited to a single day's or a week's activities. Further, the refuge will develop mandatory orientation materials for commercial photographers as part of the conditions of the special use permit to help limit wildlife and habitat impacts, to help limit conflicts with other visitors, and to help increase the ethical behavior of commercial photographers on the refuge.

Conditions under which commercial photography could occur are listed.

- Requests are considered if they demonstrate a means to enhance education, appreciation, and/or understanding of the National Wildlife Refuge System.
- Commercial photographers would be managed under special use permits stipulating dates, times, and general locations that can be photographed. In many cases, the photographer is limited to the same areas in which the general public is allowed to go, but this can evaluated on a case-by-case basis.
- Commercial photographers should ensure proper credit is given to the refuge and the Service.

The refuge will modify or eliminate any use that results in unacceptable impacts.

Justification: Under certain circumstances, commercial photography can support priority public uses of the refuge, including environmental education and interpretation, as well as vicarious wildlife observation. Commercial photography can help the refuge and the National Wildlife Refuge System increase awareness, understanding, and support for the refuge and its management, natural resources, the National Wildlife Refuge System, and the Service. Conditions imposed in required special use permits will help ensure that these activities minimize impacts.

NEPA Compliance for Refuge Use Description:

_____ Categorical Exclusion without Environmental Action Statement
_____ Categorical Exclusion and Environmental Action Statement
__X__ Environmental Assessment and Finding of No Significant Impact
_____ Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

Description of Use:
Commercial Tours and Guiding

While not one of the six priority wildlife-dependent recreational uses named in the National Wildlife Refuge System Improvement Act, commercial tours and guiding on the refuge would support wildlife observation and photography and environmental education and interpretation which are priority public uses. Further, commercial tours and guiding assist the refuge in providing quality wildlife-dependent recreational activities. The refuge would authorize commercial services through the issuance of special use permits. For the purpose of this document, the term “commercial” is defined as an entity that charges a client a fee for a program or service to generate a profit. This does not include individuals who perform these services for no fee, not-for-profit groups, schools, colleges, or other governmental agencies.

This activity provides recreational and educational opportunities for the public who desire a quality wildlife-dependent experience, but who may lack the necessary equipment, skills, knowledge, ability, or resources to obtain it themselves. Commercial tours and guiding events have occurred on the refuge on a case-by-case basis through special use permit including the annually held Space Coast Birding and Wildlife Festival. The named activities covered by this compatibility determination are similar to the activities covered by the wildlife observation and photography and environmental education and interpretation compatibility determinations, but provides additional guidance specific to

commercial tours and guiding. Most commercial services would be permitted in the proposed open areas of the refuge under a special use permit. Interpretive training and further guidelines may be developed and required in the future.

Availability of Resources: Costs to refuge operations to administer commercial services include, but are not limited to: development and review of policy and procedure; administration of annual permits (e.g., addressing inquiries, screening applicants, checking on insurance, and issuing permits); and enforcement and monitoring of permit holders. Existing facilities, such as levee and road infrastructure, are adequate to accommodate this use. Staff to administer this use would include proposed shared park ranger, law enforcement officer, maintenance worker, and full-time biological technician. Salaries for these positions come from the refuge's operating budget and as proposed would be adequate to sustain these activities.

Anticipated Impacts of the Use: Guided tour activities have the potential to disturb wildlife and habitat, more so than an individual user, due to the increase in the number of people involved in the activity. And, guided tour activities have the potential to conflict with other refuge visitors. For example, commercial tours will use the same areas as other visitors engaged in wildlife observation and photography. Unregulated, commercial operations could adversely affect the safety of other visitors and the quality of their experience, and could contribute to wildlife disturbance. However, each commercial services activity is required to obtain a refuge special use permit and that permit will contain conditions to help minimize impacts and ensure compatibility.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with the Listed Stipulations

Stipulations Necessary to Ensure Compatibility: Commercial operators shall be permitted only in the areas open to the public. Seasonal or permanent closures in certain areas may be imposed on commercial operators if the level of use becomes excessive, conflicts occur with other users engaged in priority wildlife-dependent recreation, or wildlife impacts occur. In the future, interpretive training and other stipulations may be required of commercial operators to help the refuge achieve its outreach and educational objectives. Further, permits for guides will contain stipulations addressing ethical behavior and messages delivered to clients.

Commercial service providers follow all refuge regulations along with additional special conditions stipulated in their permits. The special conditions listed below are common to many commercial service providers.

- The permittee will provide proof of general liability insurance in the amount of $300,000.
- The provider will supply the refuge with his/her fee schedule charged per client.
- The provider will supply the refuge with the number of trips provided per year (this will include the number of clients).

All conditions of special use permits must be met. A special use permit may be revoked for failure to comply with the conditions or for repeat violations of applicable regulations.

The refuge will modify or eliminate any use that results in unacceptable impacts.

Justification: Commercial tours and guiding support wildlife observation and photography and environmental education and interpretation. They provide recreational and educational opportunities for the general public that desires a quality wildlife-dependent experience but may lack the necessary

equipment, skills, knowledge, ability, or resources. Providing opportunities for these activities would contribute toward fulfilling provisions of the National Wildlife Refuge System Improvement Act. The stipulations outlined above should minimize potential impacts relative to wildlife/human interactions. Commercial tours and guiding would not conflict with the national policy to maintain the biological diversity, integrity, and environmental health of the refuge.

NEPA Compliance for Refuge Use Description:

_____ Categorical Exclusion without Environmental Action Statement
_____ Categorical Exclusion and Environmental Action Statement
__X__ Environmental Assessment and Finding of No Significant Impact
_____ Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

Literature Cited:

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Pease, M.L., R.K. Rose and M.J. Butler. 2005. Effects of Human Disturbances on the Behavior of Wintering Ducks. Wildlife Society Bulletin 33(1): 103-112.

Riffell, S.K., J. Gutzwiller, and S.H. Anderson. 1996. Does repeated human disturbance cause cumulative declines in avian richness and abundance? Ecological Applications 6(2): 492-505.

Approval of Compatibility Determinations

The signature of approval is for all compatibility determinations considered within the Comprehensive Conservation Plan for St. Johns National Wildlife Refuge. If one of the descriptive uses is considered for compatibility outside of the comprehensive conservation plan, the approval signature becomes part of that determination.

Refuge Manager: _____
(Signature/Date)

Regional Compatibility Coordinator: _____
(Signature/Date)

Refuge Supervisor: _____
(Signature/Date)

Regional Chief, National Wildlife Refuge System, Southeast Region: _____
(Signature/Date)

Appendix G. Intra-Service Section 7 Biological Evaluation

Originating Person: Layne Hamilton, Project Leader, Merritt Island NWR Complex
Telephone Number: 321-861-2278
E-Mail: Layne_Hamilton@fws.gov
Date: October 29, 2010

PROJECT NAME:

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
_X_ Refuges/Wildlife

II. State/Agency: Florida/U.S. Fish and Wildlife Service

III. Station Name: St. Johns National Wildlife Refuge

IV. Description of Proposed Action: The St. Johns National Wildlife Refuge (Refuge) is in the process of preparing a Comprehensive Conservation Plan (CCP) that will provide strategic management direction over the next 15 years, by

- providing a clear statement of desired future conditions for habitat, wildlife , visitor services, and facilities;
- providing refuge neighbors, visitors, and partners with a clear understanding of the reasons for management actions;
- ensuring that refuge management reflects the policies and goals of the System and legal mandates;
- ensuring the compatibility of current and future public use, and
- providing long-term continuity and direction for refuge management.

The purpose of developing a CCP for the refuge is to meet the requirement of the Refuge Improvement Act for all national wildlife refuges to have a CCP in place by 2012, to help fulfill the mission of the Refuge System. Also, this refuge lacks a master plan that clearly establishes priorities and ensures consistent, integrated management directives.

V. Pertinent Species and Habitat:

A. Refuge Location and Habitats: Refuge location and land cover maps are provided in the CCP for refuge-managed lands. General species occurrence maps are included in the South Florida Multi-Species Recovery Plan (Service 1999) and referenced in associated 5-year reviews.

B. Federally Listed Species:

SPECIES/CRITICAL HABITAT	STATUS[1]
American alligator (*Alligator mississippiensis*)	T (S/A)
Eastern indigo snake (*Drymarchon corais couperi*)	T
Northern crested caracara (*Caracara cheriway*)	T
Wood stork (*Mycteria americana*)	E

[1]STATUS: 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 (See map section of CCP)

A. Ecoregion Number and Name: North Florida Ecosystem

B. County and State: Brevard, Florida

C. Section, township, and range (or latitude and longitude): The Refuge manages two distinct units:

State Road 50 Unit: Latitude 28.5611°; Longitude -80.8809°
Bee Line Unit: Latitude 28.4526°; Longitude -80.8528°

D. Distance (miles) and direction to nearest town: Refuge Headquarters is located at the Merritt Island NWR Complex, Titusville, Florida; 5 miles east of Titusville on the Max Brewer Memorial Parkway (SR406/402).

E. Species/habitat occurrence:

1. American alligator. American alligators are relatively common on the Refuge, and nesting is known to occur. No estimate of alligator abundance has been developed for the refuge.

2. Eastern indigo snake: Occasional sightings of the eastern indigo snake have been reported over the years since the creation of the refuge in 1971. Two individuals were radio-tagged on the refuge as part of a larger study in Brevard County from 1998-2001 (Breininger et al 2004). These two individuals used both the wetlands and uplands of the refuge. Both individuals were observed foraging in the *Spartina* wetlands and used the dike roads, and tree hammocks for refugia. However, beyond this limited anecdotal information, little is known about the status of this species on the refuge.

3. Northern crested caracara. Observations of caracara on the adjacent Blue Heron Water Treatment Facility south of State Route 50 (SR50) are considered uncommon. However, sightings of the caracara in other areas adjacent to refuge are not uncommon, and relatively recently (October 2005) a road-killed caracara (attended by its mate) was discovered on SR50, approximately ½ mile east of the refuge's Hacienda Road entrance. No record exists of nesting by caracara on the St. Johns NWR, although appropriate habitat (open *Spartina* marshes, scattered cabbage palms, and palm hammocks) exists, and it is quite possible that nesting territories could be established in the future. Also, a pair was recently observed on the Bee Line Unit (Ehrhardt and Earsom 2006).

4. Wood stork: Wood storks are regular visitors to the St. Johns NWR, where they take advantage of foraging opportunities provided by natural open water areas, drainage ditches, and borrow pits. Wood storks can be observed periodically throughout the year on and around the SR 50 Unit, specifically utilizing artificial spoil islands and adjacent marshlands of the SR 50 Unit's borrow pit setting located at latitude 28.5499, longitude -80.8938. No known records exist of wood storks nesting on the refuge and the number of wood storks currently utilizing the refuge is unknown, since this may vary from year to year and few formal surveys of the refuge have been performed.

VII. Determination of Effects: The impacts to listed species occurring on the refuge (listed in Table V.B) are anticipated to be beneficial over the long-term. The Draft CCP/EA for the refuge includes a table that summarizes the environmental consequences of plan implementation

A. Explanation of effects of the action on species and critical habitats in item V. B:

SPECIES/ CRITICAL HABITAT	IMPACTS TO SPECIES/CRITICAL HABITAT
American alligator	Positive: Baseline metrics would be established for the refuge population of American alligator. Prioritization of management goals, objectives and strategies for marsh bird management provides both direct and indirect benefits for American alligators, including benefits to marsh habitat from hydrologic restoration, exotic species control, and through the application of prescribed fire at frequencies targeting marsh maintenance.
Eastern indigo snake	Positive. Minor to moderate increase in quantity and quality of habitat for existing and subsequent eastern indigo snake populations. Increased knowledge of hydrologic setting enhances refuge capability to mange for suit of herpetofauna.
Northern crested caracara	Positive. Minor increase in quantity and quality of habitat for northern crested caracara from exotic plant control and application of prescribed fire. Minor increase in subsequent caracara population.
Wood stork	Neutral to positive. Minor increase in quantity and quality of nesting habitat for the wood stork. Possible increase in subsequent wood stork reproductive success and population.

B. Explanation of actions to be implemented to reduce adverse effects: The implementation of the goals, objectives, and strategies outlined in the CCP will follow the refuge's best management practices and will pursue avoidance and minimization of impacts to federally threatened and endangered species, to the extent possible and practicable. Whenever and wherever prudent, the avoidance and minimization measures outlined in Table VII.B will be incorporated into the implementation of the CCP to minimize impacts to federally threatened or endangered species.

SPECIES/ CRITICAL HABITAT	ACTIONS TO MITIGATE/MINIMIZE IMPACTS
All federally threatened and endangered species on the refuge.	**Fire Management Activities** Fire management is a tool employed for the benefit of wildlife, including improving habitat, controlling unwanted wildland fires, and controlling or removing exotic plants. The refuge will make all efforts possible and practicable to limit long-term wildlife impacts of management activities. Measures employed to limit wildlife impacts related to fire management activities include scheduling fire preparation and burns around nesting seasons and other periods of increased wildlife activity. In addition, basing the location, timing and frequency of prescribed fire events on biological indicators such as woody cover and use/utility of priority wildlife guilds such as secretive marsh birds limits potential impacts to existing populations while promoting habitats necessary for subsequent populations.
	Exotic Plant Control and Removal Activities The refuge provides orientation information regarding federally threatened and endangered species found on the refuge to al new employees, volunteers, and contractors involved in controlling and removing exotic plants. All pesticides and herbicides are approved through the Service's Pesticide Use Proposal process and applied in accordance with label directions. The refuge will make all efforts possible and practicable to limit long-term wildlife impacts from management activities. Measures to limit wildlife impact during the control and removal of exotic plant include preliminary assessments by qualified individuals to avoid burrows, nests and other obvious signs of wildlife activity.

SPECIES/ CRITICAL HABITAT	ACTIONS TO MITIGATE/MINIMIZE IMPACTS
	Visitor Services Opportunities Visitors would be authorized access to the refuge via a network of select, existing roads and paths on the SR 50 and Bee Line units. Visitor use will be limited to passive recreation including environmental education and interpretation and wildlife observation and photography. Facilities would be added in support of visitor service opportunities including potential parking areas, kiosks, sings, and boundary posting. The refuge will make all efforts possible and practicable to limit long-term wildlife impacts from visitor use activities. Visitors would be permitted access via existing infrastructure (roads and levees, e.g.) requiring routine management including mowing, and exotic pest plant control. Routine road/levee repair as well as new facilities, including possible parking areas, kiosks, signage, would also be necessary. Measures to limit wildlife impacts include closing or rerouting trails to accommodate wildlife activity, planning levee and road maintenance projects to avoid burrows, nests, and other obvious signs of wildlife activity, planning and developing facilities in already disturbed areas such as exiting rights-of way or roads/levees that limit disturbance to species and habitats, increased law enforcement presence, and the establishment of informational signage to educate and orient visitors to the National Wildlife Refuge System and the species and unique habitats of the St. Johns NWR
	Research Activities All research on the refuge must obtain all applicable permits, including a refuge special use permit before the commencement of research activities on the refuge. During the application for permits, conditions may be imposed to eliminate or minimize any impacts that may be anticipated from a research proposal. The refuge provides orientation information regarding federally threatened and endangered species found on the refuge to all researchers.

SPECIES/ CRITICAL HABITAT	ACTIONS TO MITIGATE/MINIMIZE IMPACTS
	Construction Projects A section 7 review will be completed for all construction projects prior to commencement. New construction activities to improve visitor use, experience, and safety including but not limited to areas to park, gates and fences would include measures to minimize wildlife impacts.

VIII. Effect Determination and Response Requested:

SPECIES/CRITICAL HABITAT	DETERMINATION[1]			REQUESTED
	NE	NA	AA	
American alligator (*Alligator mississippiensis*)		X		Concurrence
Eastern indigo snake (*Drymarchon corais couperi*)		X		Concurrence
Northern crested caracara (*Caracara cheriway*)		X		Concurrence
Wood stork (*Mycteria americana*		X		Concurrence

[1]*DETERMINATION/ 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".

Signature (originating station) **Date**

Title

IX. Literature Cited:

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USFWS. 1999. Audubon's Crested Caracara *Polyborus plancus audubonii,* pp. 4-219 to 4-235 in *South Florida Multi-Species Recovery Plan*.

X. Reviewing Ecological Services Office Evaluation:

A. Concurrence _____ Nonconcurrence _____

B. Formal consultation required _____

C. Conference required _____

D. Informal conference required _____

E. Remarks (attach additional pages as needed):

_____ _____

Signature **Date**

_____ _____

Title **Office**

Appendix H. Wilderness Review

The Wilderness Act of 1964 defines a wilderness area as an area of federal land that retains its primeval character and influence without permanent improvements or human inhabitation, and is managed so as to preserve its natural condition and which:

1. Generally appears to have been influenced 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 types of recreation;

3. Has at least 5,000 contiguous roadless acres or is of sufficient size to make practicable its preservation and uses in an unimpeded condition; or is a roadless island regardless of size;

4. Does not substantially exhibit the effects of logging, farming, grazing, or other extensive development or alternation of the landscape, or its wilderness character could be restored through appropriate management at the time or review; and

5. May contain ecological, geological, or other features of scientific, educational, scenic, or historic value.

No units of the refuge meet the minimum Wilderness Area size criteria of 5,000 acres. Although the SR 50 Unit is nearly 4,300 acres in size, it is fragmented by internal dikes, ditches, a power line, and roadways and it is bounded by State Road 50 and Interstate 95. In 2004, near the SR 50 Unit, average daily traffic on SR 50 near Interstate 95 was 28,000 vehicles, while average daily traffic on Interstate 95 near SR 50 was 37,000 vehicles (Florida Department of Transportation 2005b). The Bee Line Unit is ±1,991 acres, where much of the southern portion of this unit is not contiguous. The Bee Line Unit is also fragmented by internal dikes, ditches, and roadways and is surrounded by SR 528, SR 407, and nearby Interstate 95. Brevard County maintains a prominent ditch through the Bee Line Unit that drains Port St. John. And, in 2004 near the Bee Line Unit, average daily traffic on SR 528 at 2.3 miles east of the St. Johns River (just west of the refuge) was 29,500 (Florida Department of Transportation 2005b). Further, commercial and residential developments continue along and near the refuge's boundaries.

In review of the federally owned lands and waters within the boundary of St. Johns NWR, no areas were found suitable for designation as Wilderness. The lands and waters of the refuge:

- do not meet the wilderness minimum size requirement of 5,000 contiguous roadless acres;
- do not contain any units of sufficient size for preservation as wilderness;
- have been altered by historic and ongoing human activities;
- do not include outstanding opportunities for solitude or for primitive recreation; and
- are fragmented by dikes, ditches, a power line, roadways, and human development.

Therefore, no units of St. Johns NWR are suitable for designation as Wilderness at this time.

Appendix I. Refuge Biota

The lists of flora and fauna of the St. Johns NWR are based on either direct observation or from internal reports, annual refuge narratives, information from refuge volunteers, and available literature (Davis 1978, Holder et al. 1980, Hill 1994, Legare 1996a, and Legare 1996b). The lists are not comprehensive, since formal species inventories have not been performed for most taxa. The lists are based on present knowledge of species richness.

Scientific name	**Common Name**
Flora	
Acer rubrum	Red maple
Acrostichum danaeifolium	Giant Leather fern
Agalinus spp.	False foxglove
Amaranthus australis	Water hemp
Ambrosia artemisiifolia	Common ragweed
Ampelopsis arborea	Pepper vine
Andropogon glomeratus	Bushy bluestem
Andropogon virginicus	Broomsedge bluestem
Aster spp.	Aster
Baccharis angustifolia	False willow
Baccharis halimifolia	Groundsel
Bacopa monnieri	Herb-of-grace
Batis maritima	Saltwort
Bidens alba	White Beggarticks
Borrichia frutescens	Sea ox-eye
Buchnera americana	American blue hearts
Callicarpa americana	American beautyberry

Scientific name	Common Name
Carex spp.	Sedges
Carphephorus odoratissimus	Vanilla leaf
Celtis laevigata	Sugarberry
Centella asiatica	Spade leaf
Chamaecrista fasciculata	Partridge pea
Chamaesyce sp.	Sandmat
*Chenopodium ambrosioides**	Mexican tea
Chrysopsis sp.	Golden aster
Cirsium harridulum	Purple thistle
Cirsium spp.	Thistle
Cladium jamaicense	Sawgrass
Cenchrus sp.	Sandbur
Conyza canadensis	Horseweed
Cornus foemina	Swamp dogwood
Coreopsis leavenworthii	Leavenworth’s tickseed
Crinum americanum	String lily
Crotalaria sp	Rattlebox
Croton sp.	Croton
Cynanchum palustre	Fragrant swallowwort
Cyperus spp.	Flatsedges
Desmodium spp.	Tick trefoil
Diodia sp.	Buttonweed
Distichlis spicata	Saltgrass

Scientific name	Common Name
Dichanthelium aciculare	Needleleaf witchgrass
Dichanthelium boscii	Bosc’s witchgrass
Drosera leucantha	Dwarf sundew
Eleocharis atropurpurea	Purple spikerush
Eleocharis parvula	Dwarf spikerush
Erechtites hieraciifolius	American burnweed
Erigeron quercifolia	Oakleaf fleabane
Eryngium baldwinii	Baldwin’s eryngo
Eryngium yuccifolium	Rattlesnake master
Eupatorium capillifolium	Dog fennel
Eupatorium compositifolium	Dog fennel, Yankeeweed
Eupatorium mikaniodes	Semaphore thoroughweed
Eupatorium mohrii	Mohr's thoroughwort
Eupatorium rotundifolium	False horehound
Eustachys sp.	Fingergrass
Eustoma exaltatum	Seaside gentian
Euthamia caroliniana	Flat-top goldenrod
Fimbristylis cymosa	Hurricane grass
Fimbristylis spadicea	Marsh fymbristylis
Flaveria linearis	Yellowtops
Fraxinus spp.	Ash
Gamochaeta sp.	Everlasting
Gaura angustifolia	Southern bee blossom

Scientific name	Common Name
Gordonia lasianthus	Loblolly bay
Helianthus agrestis	Southeastern sunflower
Hydrocotyle umbellata	Marsh pennywort
Hymenocallis crassifolia	Coastal plain spider lily
Hypericum fasciculatum	Sandweed
Hypericum tetrapterum	St. Peterswort
Hyptis alata	Musky mint
Ilex cassine	Dahoon holly
Ilex ambigua	Carolina holly
Ilex glabra	Gallberry
*Imperata cylindrica**	Cogongrass
*Indigofera hirsuta**	Hairy indigo
*Ipomoea aquatica**	Water spinach
Ipomoea cordatotriloba	Tie vine
Ipomoea sagittata	Saltmarsh morning glory
Iva sp.	Marshelder
Juncus marginatus	Shore rush
Juncus roemerianus	Black needle-rush
Juniperus virginica	Red cedar
Kosteletzkya virginica	Virginia saltmarsh mallow
Lycium carolinianum	Christmas berry
Lyonia spp.	Staggerbush
Mikania scandens	Climbing hempweed

Scientific name	Common Name
Muhlenbergia capillaris	Hairawn muhly
Morus rubra	Red mulberry
Myrica cerifera	Wax myrtle
Packera glabella	Butterweed
*Panicum repens**	Torpedo grass
Paspalum notatum+	Bahia grass
Paspalum spp.	Paspalum
Phlebodium aureum	Golden polypody
Phyla nodiflora	Cape weed
Physalis heterophylla	Ground cherry
Pinus clausa	Sand pine
Pinus elliottii	Slash pine
Pinus serotina	Pond pine
Piriqueta cistoides	Pitted stripe seed
Pluchea rosea	Rosy camphorweed
Poinsettia cyathophora	Pointedleaf
Polygala rugelii	Yellow milkwort
Polygonum spp.	Smartweed
Polypremum procumbens	Rustweed
Pontederia cordata	Pickerel weed
Pseudognaphalium obtusifolium	Rabbit tobacco
Pteridium aquilinum	Bracken fern
Pterocaulon pycnostachyum	Blackroot

Scientific name	Common Name
Quercus chapmanii	Chapman’s oak
Quercus geminata	Sand live oak
Quercus laurifolia	Laurel oak
Quercus myrtifolia	Myrtle oak
Quercus virginiana	Live oak
Rhexia nuttallii	Nuttall's meadowbeauty
Rhus copallinum	Winged sumac
Rhynchospora globularis	Globe beaksedge
Rhynchospora microcarpa	Southern beaksedge
Rhynchospora colorata	Whitetop starrush
Rhynchospora latifolia	Giant whitetop
Rubus sp.	Blackberry
Rubus trivialis	Southern dewberry
Rudbeckia hirta	Blackeyed susan
Sabal palmetto	Sabal palm
Sabatia bartramii	Marsh pink
Sabatia grandiflora	Largeflower rose gentian
Sagittaria lancifolia	Bulltongue arrowhead
Salicornia virginica	Glasswort
Salix caroliniana	Willow
Salvia lyrata	Lyreleaf Sage
Sambucus nigra	Elderberry
Samolus spp.	Water pimpernel

Scientific name	Common Name
Schinus terebinthifolius+	Brazilian pepper
Schizachyrium scoparium	Little bluestem
Scirpus spp.	Bullrush
Scoparia dulcis	Sweetroom hyssop
Sesbania vesicaria	Bladderpod
Serenoa repens	Saw palmetto
Sesuvium portulacastrum	Sea purslane
Setaria parviflora	Yellow bristlegrass
Sida sp.	Fanpetals
Sisyrinchium angustifolium	Blue-eyed grass
Solidago leavenworthii	Leavenworth goldenrod
Smilax spp.	Greenbrier
Solidago fistulosa	Pine barren goldenrod
Solidago sempervirens	Seaside goldenrod
Spartina bakerii	Sand cordgrass
Spermacoce sp.	False buttonweed
*Sphagneticola trilobata**	Creeping oxeye
Spiranthes sp.	Ladiestresses orchid
Sporobolus virginicus	Seashore dropseed
Symphyotrichum subulatum	Saltmarsh aster
Tephrosia sp.	Hoarypea
Thelypteris palustris	Marsh fern
Toxicodendron radicans	Poison ivy

Scientific name	Common Name
Tradescantia ohiensis	Ohio spiderwort
Typha latifolia	Broadleaf cattail
Urena lobata +	Caesarweed
Utricularia inflata	Floating bladderwort
Vaccinium myrsinites	Shiny blueberry
Verbena sp.	Vervain
Vigna luteola	Cowpea
Vitis rotundifolia	Muscadine grape
Vittaria lineata	Shoestring fern
Vicia ssp.	Vetch
Woodwardia areolata	Netted chain fern
Wolffia sp.	Watermeal
Ximenia americana	Tallow wood
Xyris spp.	Yellow-eyed Grass
Zanthoxylum clava-herculis	Hercules club

**Non-native plant species* *+Invasive exotic plant species*

FAUNA IDENTIFED ON THE ST. JOHNS NWR

Common Name	Scientific Name
BIRDS	
American bittern	*Botaurus lentiginosus*
American coot	*Fulica Americana*
American kestrel (S-T)	*Falco sparverius*
American robin	*Turdus migratorius*
American wigeon	*Anas americana*
American woodcock	*Scolopax minor*
Anhinga	*Anhinga anhinga*
Arctic peregrine falcon (S-E)	*Falco peregrinus*
Bald eagle (F-T)	*Haliaeetus leucocephalus*
Barn owl (F-BCC)	*Tyto alba*
Barn swallow	*Hirundo rustica*
Barred owl	*Strix varia*
Belted kingfisher	*Ceryle alcyon*
Black-bellied Whistling-Duck	*Dendrocygna autumnalis*
Black-necked stilt	*Himantopus mexicanus*
Black rail (F-SMC)	*Laterallus jamaicensis*
Black-and-white warbler	*Mniotilta varia*
Black-crowned night heron	*Nycticorax nycticorax*
Black vulture	*Coragyps atratus*
Blue jay	*Cyanocitta cristata*
Blue-gray gnatcatcher	*Polioptila caerulea*

Common Name	Scientific Name
Blue-winged teal	*Anas discors*
Boat-tailed grackle	*Quiscalus major*
Brown thrasher	*Toxostoma rufum*
Cardinal	*Cardinalis cardinalis*
Carolina wren	*Thryothorus ludovicianus*
Cattle egret	*Bubulcus ibis*
Common crow	*Corvus brachyrhynchos*
Common grackle	*Quiscalus quiscula*
Common ground dove	*Columbina passerina*
Common moorhen	*Gallinula chloropus*
Common snipe	*Gallinago gallinago*
Common yellowthroat	*Geothlypis trichas*
Coopers hawk	*Accipiter cooperii*
Northern crested caracara (F-T)	*Caracara cheriway*
Double-crested cormorant	*Phalacrocorax auritus*
Downy woodpecker	*Picoides pubescens*
Eastern bluebird	*Sialia sialis*
Eastern meadowlark (F-BCC)	*Sturnella magna*
Eastern wild turkey	*Meleagris gallopavo*
Eastern screech owl	*Otus asio*
Eastern towhee	*Pipilo erythrophthalmus*
Fish crow	*Corvus ossifragus*
Florida sandhill crane (S-T)	*Grus cacadensis pratensis*

Common Name	Scientific Name
Gadwall	*Anas strepera*
Glossy Ibis	*Plegadis falcinellus*
Great blue heron	*Ardea herodias*
Great egret	*Ardea alba*
Greater yellowlegs	*Tringa melanolueca*
Great–crested flycatcher	*Myiarchus crinitus*
Great-horned owl	*Bubo virginianus*
Green-backed heron	*Butorides virescens*
Green-winged teal	*Anas crecca*
Gray catbird	*Dumetella carolinensis*
Hooded merganser	*Lophodytes cucullatus*
Killdeer	*Charadrius vociferus*
King rail	*Rallus elegans*
Laughing gull	*Larus atricilla*
Least bittern (F-BCC)	*Ixobrychus exilis*
Little blue heron (S-SSC)	*Egretta caerulea*
Loggerhead shrike (F-BCC)	*Lanius ludovicianus*
Marsh wren	*Cistothorus palustris*
Mottled duck	*Anas fulvigula*
Mourning dove	*Zinaida macroura*
Northern bobwhite quail	*Colinus virginianus*
Northern mockingbird	*Mimus polyglottos*
Northern flicker (F-BCC)	*Colaptes auratus*

Common Name	Scientific Name
Northern harrier	*Circus cyaneus*
Northern parula	*Parula americana*
Northern pintail	*Anas acuta*
Osprey (S-SSC)	*Pandion haliaetus*
Pied-billed grebe	*Podilymbus podiceps*
Pileated woodpecker	*Dryocopus pileatus*
Prairie warbler	*Dendroica discolor*
Purple gallinule	*Porphyrio martinica*
Red-bellied woodpecker	*Melanerpes carolinus*
Red-shouldered hawk	*Buteo lineatus*
Red-tailed hawk	*Bueto jamaicensis*
Red-winged blackbird	*Agelaius phoeniceus*
Ring-necked duck	*Aythya americana*
Savannah sparrow	*Passerculus sandwichensis*
Sedge wren (F-BCC)	*Cistothorus platensis*
Sharp-shinned hawk	*Accipiter striatus*
Snowy egret (S-SSC)	*Egretta thula*
Solitary sandpiper	*Tringa solitaria*
Song sparrow	*Melospiza melodia*
Sora rail	*Porzana carolina*
Swamp sparrow	*Melospiza georgiana*
Tree swallow	*Tachycineta bicolor*
Tri-colored heron (S-SSC)	*Egretta tricolor*

Common Name	Scientific Name
Tufted titmouse	*Baeopholus bicolor*
Turkey vulture	*Cathartes aura*
Virginia rail	*Rallus longirostris*
White-eyed vireo	*Vireo griseus*
White ibis (S-SSC)	*Eudocimus albus*
White pelican	*Pelicanus erythorhynchos*
Willet	*Catoptrophorus semipalmatus*
Wood duck	*Aix sponsa*
Wood stork (F-E)	*Mycteria americana*
Yellow-bellied sapsucker	*Sphyrapicus varius*
Yellow rail	*Coturnicops noveboracensis*
Yellow-rumped warbler	*Dendroica coronata*
MAMMALS	
Bobcat	*Lynx rufus*
Cotton rat	*Sigmodon hispidus*
Eastern cottontail rabbit	*Sylvilagus floridanus*
Eastern gray squirrel	*Sciurus carolinensis*
Eastern mole	*Scalopus aquaticus*
Feral hog+	*Sus scrofa*
Florida round-tailed muskrat	*Neofiber alleni*
Gray fox	*Urocyon cinereoargenteus*
Nine-banded armadillo	*Dasypus novemcinctus*
Marsh rabbit	*Sylvilagus bachmani*

Common Name	Scientific Name
Opossum	*Didelphis marsupialis*
Raccoon	*Procyon lotor*
Rice rat	*Oryzomys palustris*
River otter	*Lutra canadensis*
Striped skunk	*Mephitis mephitis*
White-tailed deer	*Odocoileus virginianus*
REPTILES AND AMPHIBIANS	
American alligator (F-T)	*Alligator mississippiensis*
Black racer	*Coluber constrictor*
Brown anole +	*Anolis sageri*
Cuban tree frog	*Osteopilus septentrionalis*
Cricket frog	*Acris gryllus*
Eastern coachwhip	*Masticophis flagellum flagellum*
Eastern diamondback rattlesnake	*Crotalus adamanteus*
Eastern indigo snake (F-T)	*Drymarchon corais couperi*
Florida box turtle	*Terrapene carolina bauri*
Florida cottonmouth	*Agkistrodon piscivorus conanti*
Florida mud turtle	*Kinosternon subrubrum steindachneri*
Florida water snake	*Nerodia fasciata*
Florida softshell turtle	*Trionyx ferox*
Gopher tortoise (S-SSC)*	*Gopherus polyphemus*
Green treefrog	*Hyla cinerea*
Pig frog	*Rana grylio*

Common Name	Scientific Name
Southern leopard frog	*Rana sphenocephala*
FISH	
American shad	*Alosa sapidissima*
Armored catfish +	*Callichthys callichthys*
Black crappie	*Pomoxis nigromaculatus*
Bluegill	*Lepomis macrochirus*
Bowfin	*Amia calva*
Florida gar	*Lepisosteus platyrhincus*
Florida largemouth bass	*Micropterus salmoides floridanus*
Hickory shad	*Alosa mediocris*
Mullet	*Mugil spp.*
Redear	*Lepomis microlophus*
Warmouth	*Lepomis gulosus*
Striped bass	*Morone saxatilis*

F-E Federally listed as endangered

F-T Federally listed as threatened

F-BCC Federal bird species of conservation concern

S-E State of Florida endangered species

S-T State of Florid threatened species

S-SSC State of Florida species of special concern

+ Nuisance exotic

**The gopher tortoise is under review for listing in Florida by the Service under the Endangered Species Act and is listed by the State of Florida as a Threatened species (FWC 2009d).*

Appendix J. Minor Expansion Proposal - Land Protection Plan

INTRODUCTION

Acquisition boundaries are administrative lines delineating areas in which the Service may consider negotiations with willing owners for acquisition of an interest in land. Lands within a refuge acquisition boundary do not become part of the refuge unless and until a legal interest is acquired through a management agreement, easement, lease, donation, or purchase. Lands within an acquisition boundary are not subject to any refuge regulations or jurisdiction unless and until an interest is acquired. Land interests are acquired from willing sellers/owners only. Any landowner that is within an approved acquisition boundary, even though the surrounding parcels may have been purchased by the Service, retains all the rights, privileges, and responsibilities of private land ownership. This includes, but is not limited to, the right to access, hunting, vehicle use, control of trespass; the right to sell the property to any other party; and the responsibility to pay local real estate or property taxes.

Currently, St. Johns NWR is proposing to expand its refuge boundary to include lands adjacent to the SR 50 Unit to connect the unit to the Fox Lake tract and a series of public lands managed by Brevard County and the SJRWMD.

Acquiring these lands would increase the ability to manage the Fox Lake tract through and as a connected part of the SR 50 Unit, increase potential public use opportunities, and provide additional habitat for native wildlife.

BACKGROUND

The St. Johns NWR is located within Brevard County, Florida, and is part of the Upper St. Johns River Basin (Figure 2). The current refuge acquisition boundary is 6,757 acres and approximately 1,010 acres within this boundary are privately owned. The refuge actually owns and manages 6,257 acres of which 681 acres (based on GIS analysis) occur outside of the approved acquisition boundary. Much of the land acquired outside of the approved acquisition boundary (Fox Lake Tract and the SR 50 Unit 'T' are examples) appear to have been acquired as portions of larger land acquisition projects occurring within the approved acquisition boundary, but this could not be completely confirmed. The approved acquisition boundary includes two focus areas for acquisition: the SR 50 Unit which includes the Fox Lake tract and the Bee Line Unit (Figure 2). The two units were established based on their natural resource values and specifically for the management of threatened and endangered species including the now extinct dusky seaside sparrow. Today, these units offer habitat for four federally listed species, seven species of management concern, and numerous state listed plants and animals.

Refuge units exhibit habitat features now rarely found on protected lands in Florida including an extensive array of cordgrass marshlands and relic salt marsh systems once connected to tide and are now predominantly influenced by freshwater hydrology. The refuge offers great wildlife and habitat management value for migratory and resident bird guilds including secretive marsh birds and an array of wading and migratory birds that utilize habitats found on the refuge for all life needs. Management opportunities include hydrologic restoration, management for wildlife diversity, and the use of prescribed fire to manage and maintain marsh structure and function.

The refuge plans to expanded partnerships and visitor service opportunities through this CCP. Existing refuge lands are proximal and in places adjacent to a network of publicly owned county and state lands that occur throughout the Upper St. Johns River Basin (Figure 8). The refuge would seek to integrate management direction with partners. Additionally, the refuge proposes opening strategic locations to non-consumptive public uses, and would evaluate the compatibility of additional forms of public use including deer and feral hog hunting. Opening the refuge to appropriate and compatible forms of public use opportunities would bolster partnerships and increase levels of communication, coordination, and collaboration.

MINOR EXPANSION PROPOSAL

The proposed 459-acre expansion includes 443 acres of privately held lands adjacent to the SR 50 Unit and Fox Lake tract (Fig. 14). The proposed expansion areas are adjacent to the existing refuge acquisition boundary. Approximately 16 acres of the proposed expansion exist as easements, rights-of-way and gaps as a result of poor quality GIS data caused by misaligned data, shifted data, and/or digitizing errors in county parcel records. We chose to include these areas in the MEP to: (1) Highlight potential acquisition opportunities where available; and (2) as a way to provide the most current depiction of the composite of lands and features within the overall MEP boundary, evaluated with the latest aerial and parcel data available at the time. Parcel analysis on a case-by-case basis would be required to further rectify and update maps, provide specific rationale to explain ownership of these gap areas, and edit any gaps not part of the parcel record.

The SR 50 Unit is characterized by a mosaic of habitats that include cordgrass marsh and mixed shrub wetlands. Additionally, rights of way, levees, and old roads crisscross the unit's interior landscape. The 459 acres of privately held lands outlined within the scope of the expansion is currently a mix of habitats including pine flatwoods, cordgrass marsh, and mixed shrub wetlands. These lands would provide perpetual movement corridors of similar habitat types to the network of publicly managed lands for species facing restricted migration options as a result of historic and potential land use changes in the region.

CULTURAL RESOURCES

To date, one cultural resource survey has been conducted on the refuge. This survey was not extensive but found no archaeological or historical sites of significance. Section 106 of the National Historic Preservation Act of 1966, as amended, and Section 14 of the Archaeological Resources Protection Act require the Service to evaluate the effects of any of its actions on cultural resources (e.g., historic, architectural, and archaeological) that are listed or eligible for listing in the National Register of Historic Places. In accordance with these regulations, the Service would coordinate the review of this proposal with the Florida State Historic Preservation Office.

The Service believes that the proposed acquisition of lands will have no adverse effect on any known or yet-to-be identified National Register of Historic Places-eligible cultural resources. However, in the future, if the Service plans or permits any actions that might affect eligible cultural resources, it will carry out appropriate site identifications, evaluations, and protection measures as specified in the regulations and in Service directives and manuals.

All tracts acquired by the Service in fee title would be removed from local real estate tax rolls because Federal Government agencies are not required to pay state or local taxes. However, the Service makes annual payments to local governments in lieu of real estate taxes, as required by the Refuge Revenue Sharing Act (Public Law 95-469). Payment for acquired land is computed on whichever of the following formulas is greatest: (1) Three-fourths of 1 percent of the fair market value of the lands

acquired in fee title; (2) 25 percent of the net refuge receipts collected; or (3) 75 cents per acre of the lands acquired in fee title. .

No actions would be taken that would lead to a violation of federal, state, or local laws imposed for the protection of the environment.

PROPOSED ACTION

The Service proposes to acquire, protect, and manage through fee title purchases, leases, conservation easements, and/or cooperative agreements from willing sellers. All lands and waters acquired would be managed by the Service as the St. Johns NWR. The objectives of the proposed expansion would be to: (1) Provide habitat for native species consistent with the goals and objectives of the CCP; (2) provide species movement corridors; (3) provide habitat and protection for threatened and endangered species; (4) manage cordgrass and shrub wetlands and provide habitat for natural wildlife diversity; (5) connect the SR 50 Unit to its Fox Lake tract to increase management options and integrate refuge lands with the network of conservation lands in the Upper St. Johns River Basin; and (6) create additional public access opportunities.

It is anticipated that funding for this proposal would be provided through the Land and Water Conservation Fund. The authority for the use of this fund for land acquisition is the Land and Water Conservation Act.

FISH AND WILDLIFE SERVICE LAND ACQUISITION POLICY

The Service acquires lands and interests in lands, such as easements, and management rights in lands through leases or cooperative agreements, consistent with legislation or other congressional guidelines and executive orders, for the conservation of fish and wildlife and to provide wildlife-dependent public use for recreational and educational purposes. These lands include national wildlife refuges, national fish hatcheries, research stations, and other areas.

The Service's policy is to acquire land from willing sellers, and only when other protective means, such as local zoning restrictions or regulations, are not appropriate, available, or effective. When land is needed to achieve fish and wildlife conservation objectives, the Service seeks to acquire the minimum interest necessary to reach those objectives. If fee title is required, the Service gives full consideration to extended use reservations, exchanges, or other alternatives that will lessen the impact on the owner and the community. Donations of desired lands or interests are encouraged.

The Service, like all federal agencies, has the power of eminent domain, which allows the use of condemnation to acquire lands and interest in lands for the public good. This power, however, requires congressional approval and is seldom used. The Service usually acquires lands from willing sellers. In all fee title acquisition cases, the Service is required by law to offer 100 percent of the property's appraised market value, as set out in an approved appraisal that meets professional standards and federal requirements. The acquisition methods that could be used by the Service under this alternative are described as follows:

1. Leases and Cooperative Agreements

Potentially, the Service can protect and manage habitats through leases and cooperative agreements. Management control on privately owned lands could be obtained by entering into long-term renewable leases or cooperative agreements with the landowners. Short-term leases could be used to protect or manage habitat until a more secure land protection method could be negotiated.

2. Conservation Easements

Conservation easements give the Service the opportunity to manage lands for their fish and wildlife habitat values. Such management precludes all other uses that are incompatible with the Service's management objectives. Only land uses that would have minimal or no conflicts with the management objectives are retained by the landowner. In effect, the landowner transfers certain development rights to the Service for management purposes as specified in the easement.

Easements would likely be useful when: (1) Most, but not all, of a private landowner's uses are compatible with the Service's management objectives, and (2) the current owner desires to retain ownership of the land and continue compatible uses under the terms set by the Service in the easement. Land uses that are normally restricted under the terms of a conservation easement include, but are not limited to:

- Development rights (e.g., agricultural and residential);
- Alteration of the area's natural topography;
- Uses adversely affecting the area's floral and faunal communities;
- Private hunting and fishing leases;
- Excessive public access and use; and
- Alteration of the natural water regime.

3. Fee Title Acquisition

A fee title interest is normally acquired when (1) the area's fish and wildlife resources require permanent protection not otherwise assured; (2) land is needed for visitor use development; (3) a pending land use could adversely impact the area's resources, or (4) it is the most practical and economical way to assemble small tracts into a manageable unit.

Fee title acquisition conveys all ownership rights to the Federal Government and provides the best assurance of permanent resource protection. A fee title interest may be acquired by donation, exchange, transfer, or purchase.

The Service’s proposed alternative, Alternative C, would result in the acquisition of up to 459 acres of wildlife habitat as an expansion of St. Johns NWR. This would be accomplished through a combination of fee title purchases from willing sellers and less-than-fee interests (e.g., conservation easements and cooperative agreements) from willing sellers. The Service believes these are the minimum interests necessary to conserve and protect the fish and wildlife resources in the proposed area.

The private property has been prioritized for acquisition using the following criteria:

- Biological significance;
- Existing and potential threats; and
- Significance of the area to refuge management and administration.

Two categories of land acquisition have been established, with the highest priority being the Priority I lands. A description of the lands within each of the three priority groups is given below. Table 12 summarizes the Service's land protection priorities and proposed methods of acquisition while Figure 18 identifies opportunities by priority.

Priority Group I: The 242 acres of privately held lands that would connect refuge interests

Priority Group II: The 201 acres of privately held lands that connect refuge interests to the network of publicly owned lands including Fox Lake Sanctuary and SJRWMD lands.

Table 12. Protection priorities for the proposed expansion and recommended methods of acquisition

Priority Group	Units/Parcels	Number of Landowners	Approx. Acreage	Type of Acquisition (minimum interest)
I	11	5	242	Fee Title
II	8	3	201	Fee Title

Interim Recreation Act Funding Analysis

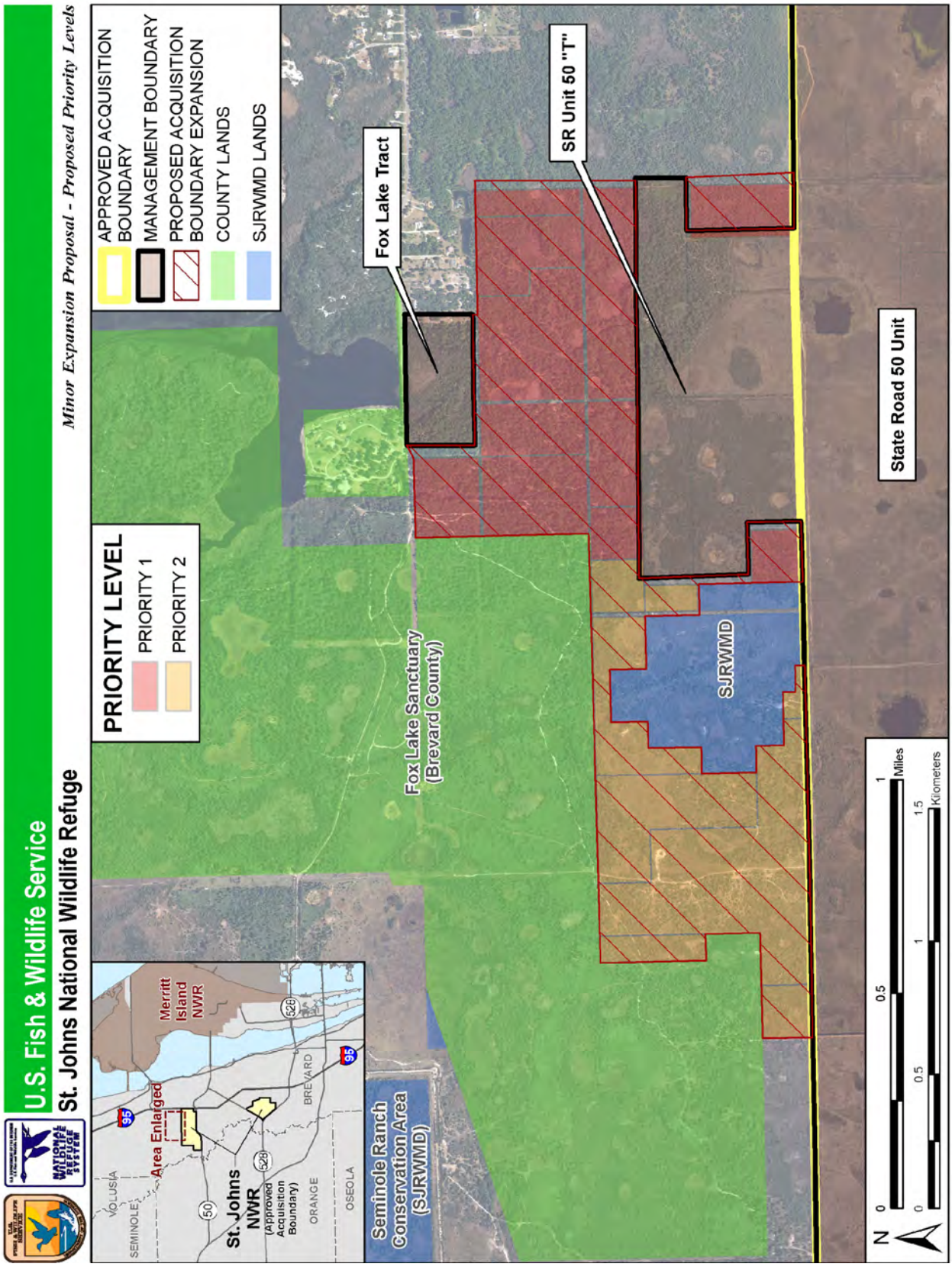
Refuge Name: St. Johns National Wildlife Refuge.

Date Established: August 16, 1971

The purposes of the refuge are to: provide protection for threatened and endangered species and native diversity. The primary purpose of the refuge relates to threatened and endangered species and applies to all lands and waters managed as part of St. Johns NWR: "…to conserve (A) fish or wildlife which are listed as endangered species or threatened species…or (B) plants…" (16 USC 1534, Endangered Species Act). A secondary purpose focuses more on native diversity and also applies to a few tracts: "…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 USC 668dd(a)(2), National Wildlife Refuge System Administration Act.

Recreational uses evaluated: (1) wildlife observation/photography; (2) environmental education and interpretation; and (3) potential recreational hunting of deer and feral hog in accordance with federal and state regulations.

Figure 18. St. Johns NWR minor expansion proposal – proposed priority levels



Funding required to administer and to manage the recreational use: Minimal funding in the amount of $50,000 would be necessary and made available to establish and mark trail(s), provide fencing and boundary posting, and provide support for non-consumptive uses including wildlife observation and photography and environmental education and interpretation.

Based on a review of the refuge budget allocated for recreational use management, I certify that funding would be adequate to ensure compatibility and to administer and manage the proposed recreational uses.

Project Leader: _____
(Signature/Date)

Refuge Supervisor: _____
(Signature/Date)

Regional Chief, National Wildlife Refuge System, Southeast Region: _____
(Signature/Date)

Appendix K. List of Preparers

- **Layne Hamilton**, U.S. Fish and Wildlife Service, Merritt Island National Wildlife Refuge
- **Leon J. Kolankiewicz**, Wildlife Biologist/Environmental Planner, Mangi Environmental Group
- **Mike Legare**, U.S. Fish and Wildlife Service, Merritt Island National Wildlife Refuge
- **Ralph Lloyd**, U.S. Fish and Wildlife Service, Merritt Island National Wildlife Refuge
- **Bill Miller**, Wildlife Biologist/Natural Resource Planner, U.S. Fish and Wildlife Service, Southeast Regional Office
- **Candice Stevenson**, U.S. Fish and Wildlife Service, Merritt Island National Wildlife Refuge
- **Tim Towles**, Biological Scientist IV, Division of Habitat and Species Conservation, Florida Fish and Wildlife Conservation Commission
- **Barry Wood**, U.S. Fish and Wildlife Service, South Florida Ecological Services Field Office
- **Dorn Whitmore**, U.S. Fish and Wildlife Service, Merritt Island National Wildlife Refuge