



U.S. Fish & Wildlife Service

Supawna Meadows National Wildlife Refuge

Comprehensive Conservation Plan

July 2011



Front and Back Cover:

Northern Harrier (Circus cyaneus)

© Mike Danzenbaker



*This blue goose, designed by
J.N. "Ding" Darling, has become
the symbol of the National Wildlife
Refuge System.*

The *U.S. Fish and Wildlife Service* is the principal Federal agency responsible for conserving, protecting, and enhancing fish, wildlife, plants, and their habitats for the continuing benefit of the American people. The Service manages the 150-million acre National Wildlife Refuge System comprised of more than 550 national wildlife refuges and thousands of waterfowl production areas. It also operates 70 national fish hatcheries and 81 ecological services field stations. The agency enforces Federal wildlife laws, manages migratory bird populations, restores nationally significant fisheries, conserves and restores wildlife habitat such as wetlands, administers the Endangered Species Act, and helps foreign governments with their conservation efforts. It also oversees the Federal Assistance Program which distributes hundreds of millions of dollars in excise taxes on fishing and hunting equipment to state wildlife agencies.

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

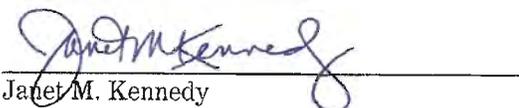


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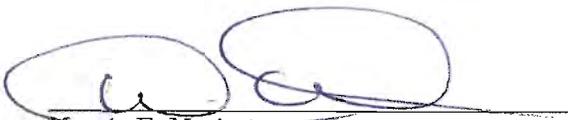
**Supawna Meadows National
Wildlife Refuge**

*Comprehensive Conservation Plan
July 2011*

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U.S. Fish & Wildlife Service

Supawna Meadows National Wildlife Refuge

Comprehensive Conservation Plan July 2011

Abstract

Type of Action: Administrative – Development of a Comprehensive Conservation Plan

Lead Agency: U.S. Department of the Interior, Fish and Wildlife Service

Location: Supawna Meadows National Wildlife Refuge
Salem County, NJ

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This Comprehensive Conservation Plan (CCP) for managing the 3,016-acre Supawna Meadows National Wildlife Refuge (NWR) is the culmination of a multi-year planning effort involving New Jersey State agencies, local partners, refuge neighbors, private landowners, the Friends of Supawna Meadows NWR, and the community. This CCP establishes 15-year management goals and objectives for wildlife and habitats, public use, and administration and facilities.

Under this plan, we propose improvements to our biological and public use programs. We focus refuge management on restoring refuge tidal habitats to support Federal trust resources and species of conservation concern in the area, in particular, we emphasize providing resting and foraging habitat for Pea Patch Island colonial-nesting wading birds, secretive marsh birds, migratory waterfowl, shorebirds, and other species of conservation concern. Our Visitor Services program will be enhanced to provide more opportunities for wildlife observation, photography, hunting, fishing, environmental education, and interpretation. We will also continue to identify and protect valuable wildlife habitats diligently with our partners. Finally, we will employ an adaptive management approach that includes adjusting our activities as results from management actions and monitoring efforts are better understood. This flexibility is especially important as we face increasing ecological uncertainties, such as predicted effects of climate change.

Supawna Meadows National Wildlife Refuge

Comprehensive Conservation Plan *July 2011*

Refuge Vision Statement

Supawna Meadows National Wildlife Refuge will continue to provide essential tidal marsh habitat to feed and shelter migrating waterfowl and to feed nearby colonial-nesting wading birds, thereby maintaining its significant role as part of the Delaware Bayshore system of wetlands and upland buffers that is one of the most important migratory bird habitats in the nation.

The refuge will continue to serve as an oasis of native biotic communities within sight of the burgeoning industrial, transportation, and residential developments of the lower Delaware River Basin and South Jersey by providing an array of wetland and upland habitats that support a diverse community of breeding and migrating birds, native mammals, and other species.

Visitors will be able to hunt and fish, observe and photograph wildlife, and learn of the ecological importance and diversity of wildlife at Supawna Meadows National Wildlife Refuge. They will understand the refuge as part of a larger network of protected lands within the National Wildlife Refuge System, set aside specifically for wildlife.

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Chapter 1



USFWS

Impoundment at Supawna Meadows NWR

The Purpose of and Need for Action

- Introduction
- The Purpose of and Need for Action
- Project Area
- The Service and the Refuge System Policies and Legal Mandates Guiding Planning
- National and Regional Conservation Plans Guiding the Project
- Establishing Authority and Refuge Purposes
- Refuge Vision Statement
- Refuge Goals

Introduction

This Comprehensive Conservation Plan (CCP) for Supawna Meadows National Wildlife Refuge (Supawna Meadows NWR, the refuge) was prepared pursuant to the 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 et seq.; Refuge Improvement Act). An environmental assessment (EA), required by the National Environmental Policy Act of 1969 (NEPA), was prepared with the draft CCP.

This final CCP presents the combination of management goals, objectives, and strategies that the U.S. Fish and Wildlife Service (Service, we, our) believes will best achieve our vision and goals for the refuge, contribute to the mission of the National Wildlife Refuge System (NWRS, Refuge System), achieve the refuge purposes, fulfill legal mandates, address key issues, incorporate sound principles of fish and wildlife management, and serve the American public. This CCP will guide management decisions and actions on the refuge over the next 15 years. It will also help us communicate our priorities to the natural resource agencies of New Jersey, our other conservation partners, local communities, and the public.

Chapter 1, “The Purpose of and Need for Action,” sets the stage for chapters 2 through 5.

The chapter

- describes the purpose and need for a CCP for the refuge;
- defines the planning analysis area;
- identifies national and regional mandates and plans that influenced this document;
- highlights establishing purposes and land acquisition history of the refuge; and
- presents the vision and goals that drive refuge management.

Chapter 2, “The Planning Process,” explains the planning process we followed in developing this document, and describes the key issues, concerns, and opportunities that arose as we developed the plan.

Chapter 3, “Existing Environment,” describes the physical, biological, and human environment of the refuge.

Chapter 4, “Management Direction and Implementation,” presents the management strategies for meeting refuge goals and objectives that will guide our decisions.

Chapter 5, “Consultation and Coordination,” summarizes how we involved the public and our partners in the planning process and credits Service and non-Service contributors.

The glossary with acronyms, literature cited, and nine appendixes provide additional documentation and references to support our narratives and management decisions.

The Purpose of and Need for Action

We developed a final CCP for the refuge that, in the Service's best professional judgment, best achieves the refuge's establishing purposes, vision and goals, contributes to the mission of the Refuge System, adheres to relevant Service policies and mandates, addresses key public and conservation issues, and uses sound principles of fish and wildlife science.

Our purpose in developing a CCP for Supawna Meadows NWR is to establish management direction that best meets the following goals:

Goal 1: Protect, enhance, and restore biological integrity, diversity, and environmental health of tidally influenced habitats to support native wildlife and plant communities including species of conservation concern.

Goal 2: Protect, enhance, and restore biological integrity, diversity, and environmental health of upland habitats to support native wildlife and plant communities with emphasis on migrating and wintering birds and other species of concern.

Goal 3: Protect, enhance, and restore biological integrity, diversity, and environmental health of non-tidal wetland habitats to support native wildlife and plant communities with emphasis on breeding, migrating, and overwintering birds and other species of conservation concern.

Goal 4: Provide opportunities for compatible, high-quality, wildlife-dependent public uses.

Goal 5: Protect cultural resources on the refuge.

Goal 6: Enhance refuge management through partnerships, friends, volunteers, and community outreach.

Developing a CCP is vital for the future management of every national wildlife refuge. A CCP provides strategic management direction for the next 15 years by

- providing a clear statement of desired future conditions for habitat, wildlife, visitor services, staffing, and facilities;
- providing state agencies, refuge neighbors, visitors, and partners with a clear understanding of the reasons for management actions;
- ensuring refuge management reflects the policies and goals of the Refuge System and legal mandates;
- ensuring the compatibility of current and future public use;
- providing long-term continuity and direction for refuge management; and
- providing direction for staffing, operations, maintenance, and annual budget requests.

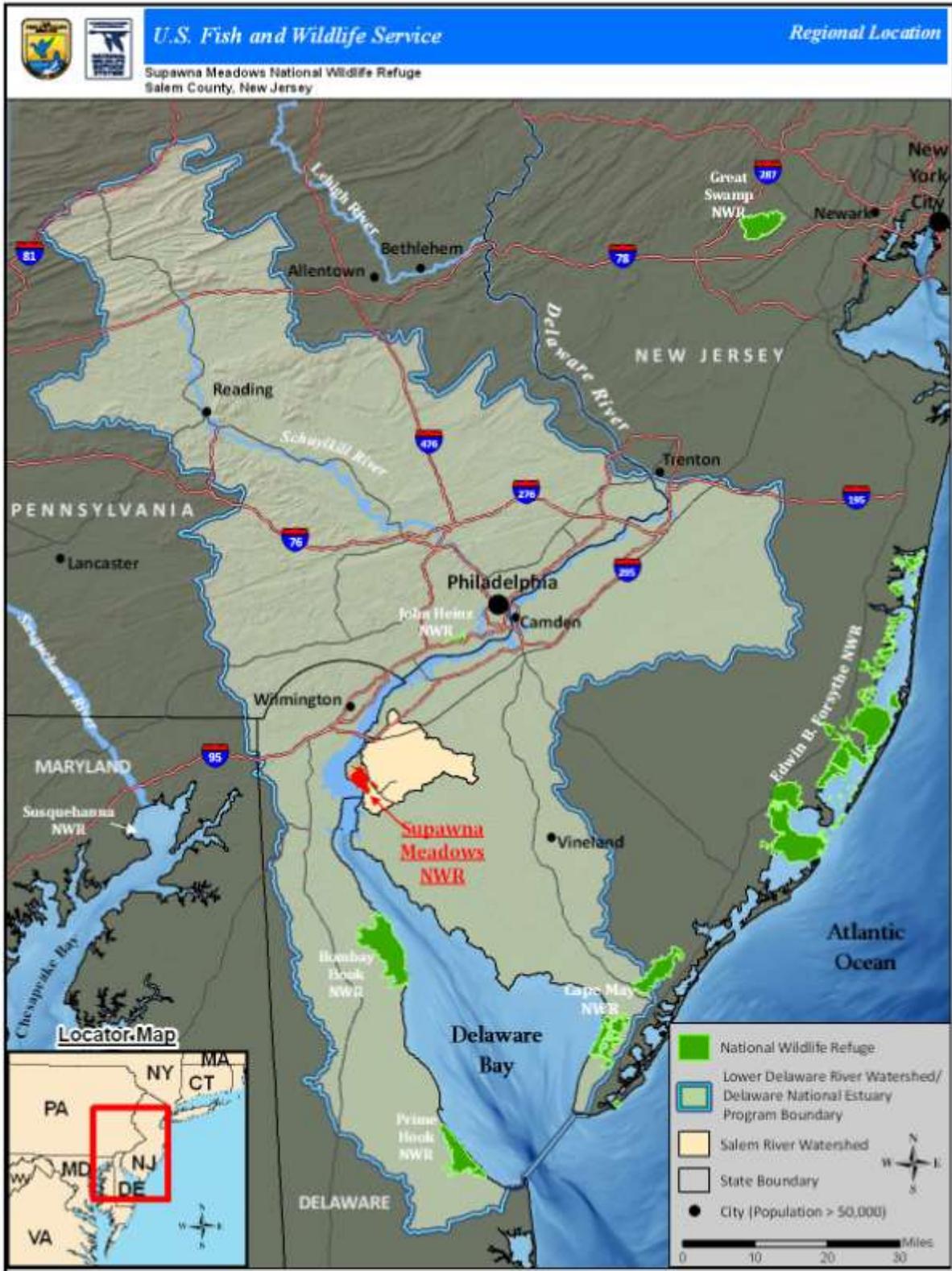
The need to develop a CCP for the refuge is threefold. First, the Refuge Improvement Act requires that all refuges have a CCP in place to help fulfill the mission of the Refuge System. Second, the refuge was administratively complexed with Cape May NWR (located in Cape May Court House, New Jersey) in March 2004 to increase management efficiencies, which resulted in changes to onsite staffing. The CCP for Cape May NWR was completed separately in June 2004. Third, there is currently no master plan establishing priorities and ensuring consistent and integrated management for Supawna Meadows NWR. A vision statement, goals, objectives, and management strategies are needed to effectively manage the refuge's natural resources. Public and partner involvement is critical to resolving issues related to public use, cultural resources, and habitat management.

Project Area

Supawna Meadows NWR is located along the shoreline of the Delaware River where it widens to become the Delaware Bay estuary (map 1.1) in Salem County, New Jersey (map 1.2). The refuge currently includes 3,016 acres of tidal waters and marsh¹, grassland, shrubland, and forest habitats. The approved refuge acquisition boundary (map 1.3) encompasses approximately 4,527 acres along the Upper Delaware Bay and Salem River in Pennsville Township, New Jersey. The refuge boundaries are roughly defined by the Delaware Bay, Salem River, and Fort Mott Road. It is located with the Service's Northeast Region, also known as Region 5.

Supawna Meadows NWR was originally established in 1971 as the Goose Pond addition to the Killcohook Migratory Bird Refuge. Killcohook Migratory Bird Refuge (also referred to as the Killcohook Coordination Area) was established by Executive Order 6582 on February 3, 1934. The lands acquired as the Goose Pond addition were renamed Supawna Meadows National Wildlife Refuge and officially separated from Killcohook Migratory Bird Refuge on April 10, 1974. On October 30, 1998, the Service's jurisdiction over Killcohook Migratory Bird Refuge was revoked (Public Law 105-312, Sec. 203).

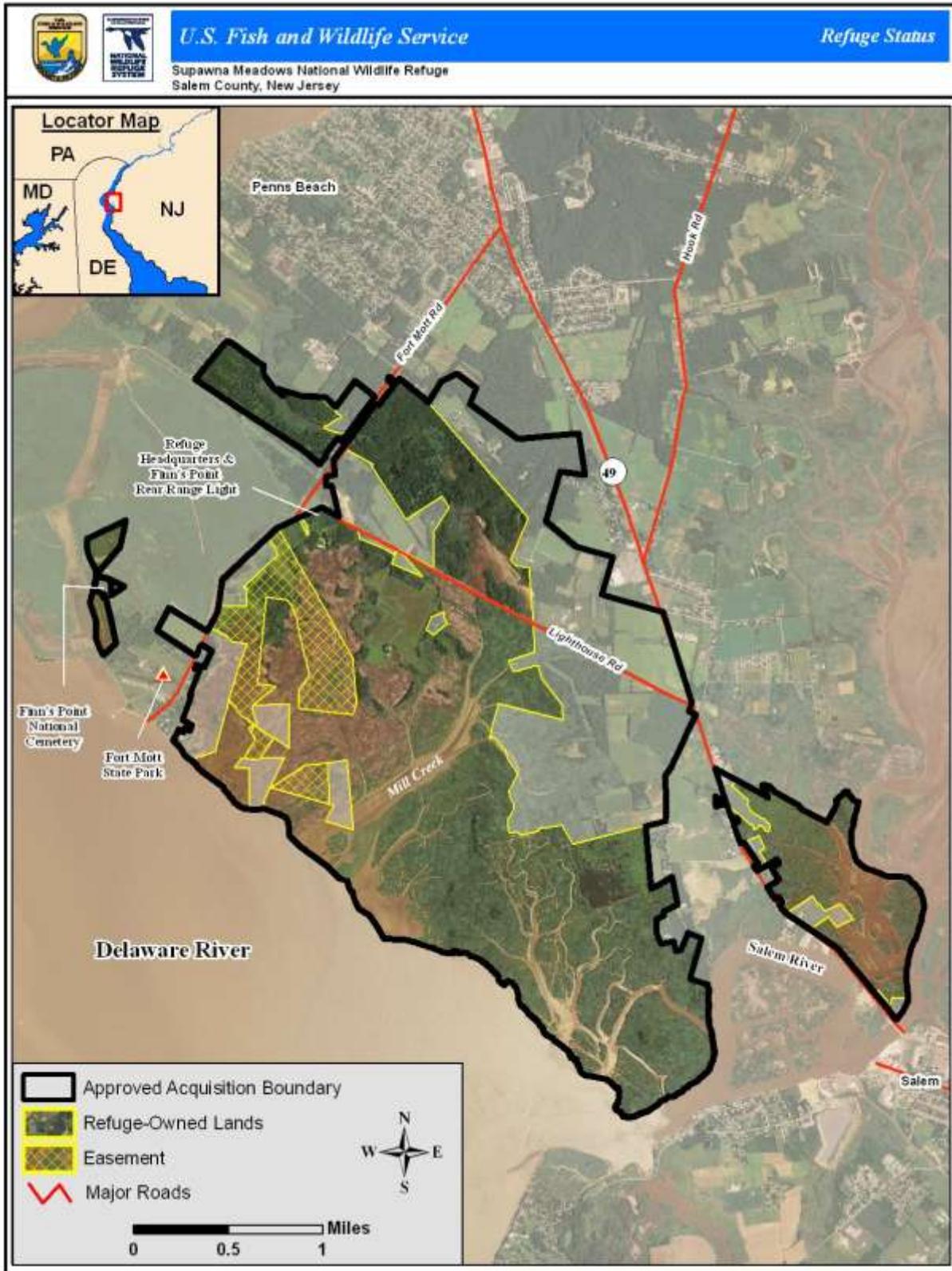
¹The state of New Jersey retains ownership over open tidal waters below the mean high tide. In this document, when we refer to Service ownership, or describe refuge management actions in tidal waters, we mean tidal marsh areas and areas above mean high tide.



Map 1.1. Supawna Meadows National Wildlife Refuge regional location.



Map 1.2. Supawna Meadows National Wildlife Refuge location.



Map 1.3. Supawna Meadows National Wildlife Refuge current land status map.

The Service and the Refuge System Policies and Legal Mandates Guiding Planning

This section presents hierarchically, from the national level to the local level, highlights of Service policy, legal mandates, and existing regional, State, and local resource plans that directly influenced development of this CCP.

The U.S. Fish and Wildlife Service and Its Mission

The Service, part of the Department of the Interior, administers the National Wildlife Refuge System. The Service mission is:

Working with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people.

Congress entrusts the Service with the conservation and protection of national resources such as migratory birds and fish, federally listed endangered or threatened species, inter-jurisdictional fish, and certain marine mammals. The Service also manages national wildlife refuges (refuges) and national fish hatcheries, enforces Federal wildlife laws and international treaties on importing and exporting wildlife, assists with state fish and wildlife programs, and helps other countries develop wildlife conservation programs.

The Service manual contains the standing and continuing directives to implement its authorities, responsibilities, and activities. You can access it at <http://www.fws.gov/policy/manuals/>. Special Service directives affecting the rights of citizens or the authorities of other agencies are published separately in the Code of Federal Regulations (CFR), and are not duplicated in the Service manual.

The National Wildlife Refuge System and its Mission

The Refuge System is the world's largest collection of lands and waters set aside specifically for conserving wildlife and protecting ecosystems. Since its inception in 1903, the Refuge System has grown to over 550 refuges and other lands encompassing more than 150 million acres (USFWS 2009a). The Refuge System has interests in every state and several island territories. Each year, more than 34 million visitors hunt, fish, observe and photograph wildlife, or participate in environmental education or interpretation activities on refuges, generating almost \$1.7 billion annually (Carver and Caudill 2007). More detailed information on the Refuge System can be found on the Service's Web site at <http://www.fws.gov/refuges/>.

In 1997, Congress passed the Refuge Improvement Act, which amended the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee). The Refuge Improvement Act established a unifying mission for the Refuge System, a new process for determining compatible public use activities on refuges, and required CCPs for all refuges. It states that, first and foremost, the Refuge System must focus on wildlife conservation. It further states that the Refuge System mission, coupled with the purpose(s) for which a refuge was established, will provide the principal management direction for that refuge.

The mission of the Refuge System is:

To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (Refuge Improvement Act; Public Law 105-57).

In addition, the Refuge Improvement Act requires that all existing or proposed public uses of a refuge must be compatible with refuge purpose(s). The refuge manager determines compatibility after evaluating an activity's potential impact on refuge resources, and ensuring that it does not materially interfere with, or detract from, refuge purpose(s). This act also stipulates six wildlife-dependent public uses that are to receive enhanced consideration in CCPs: hunting, fishing, wildlife observation and photography, and environmental education and interpretation. These are called the six priority public uses for refuges.

Fulfilling the Promise

During the late 1980s and throughout the 1990s, changes in the guiding mission and vision for the Refuge System, combined with growing concerns for the needs of fish, wildlife, and plants, underscored the need for the Service to articulate what the Refuge System would be over the next century. In 1997, the Service initiated a yearlong process involving four teams of Service employees who examined the Refuge System within the framework of Wildlife and Habitat, People, and Leadership. The teams completed a draft report that focused on these four key areas and was at the center of the first ever Refuge System Conference in Keystone, Colorado in October 1998. Every refuge manager in the country, other Service employees, and scores of conservation organizations attended the conference. The final report, "Fulfilling the Promise: The National Wildlife Refuge System, Visions for Wildlife, Habitat, People, and Leadership" (USFWS 1999), was completed in 1999. Many "Promises Teams" formed to develop strategies for implementing the 42 recommendations of the final report. Information from teams, such as Wildlife and Habitat, Goals and Objectives, Strategic Growth of the Refuge System, Invasive Species, and Inventory and Monitoring, helped guide the development of the goals, strategies, and actions in this CCP.

Refuge System Planning Policy

This policy establishes requirements and guidance for Refuge System planning, including CCPs and step-down management plans. It states that we will manage all refuges in accordance with an approved CCP, which, when implemented, will achieve refuge purposes; help fulfill the Refuge System mission; maintain and, where appropriate, restore the ecological integrity of each refuge and the Refuge System; help achieve the goals of the National Wilderness Preservation System; and meet other mandates. This policy helps to ensure that CCPs are founded on principles of sound fish and wildlife management and available science, and are consistent with legal mandates and our other policies, guidelines, and planning documents. Above all else, it helps ensure that wildlife comes first on refuges (602 FW 1, 2, 3).

Appropriate Refuge Uses Policy

This policy provides a national framework and procedure for refuge managers to follow in deciding whether uses are appropriate on a refuge. It also clarifies and expands on the compatibility policy (603 FW 2.10D), which describes when refuge managers should deny a proposed use without determining compatibility. When we find a use is appropriate, we must then determine if the use is compatible before we allow it on a refuge. This policy applies to all proposed and existing uses in the Refuge System only when we have jurisdiction over the use, and does not apply to refuge management activities or situations where reserved rights or legal mandates provide we must allow certain uses (603 FW 1). The appropriate use requirements of the Refuge Improvement Act were adopted in the Service's Final Appropriate Refuge Uses Policy, published June 26, 2006 (Federal Register, Vol. 71, No. 122, pp. 36408-36418). Appendix B further describes the Appropriate Refuge Uses Policy and describes its relationship to the CCP process.

Compatibility Policy	<p>Federal law and Service policy provide the direction and planning framework to protect the Refuge System from incompatible or harmful human activities and ensure that Americans can enjoy its lands and waters. The Refuge Improvement Act is the key legislation regarding management of public uses and compatibility. This act requires that all existing or proposed public uses of a refuge must be compatible with refuge purpose(s). Specifically, for a use to be found compatible, it must not “materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuge” (Refuge Improvement Act; Public Law 105–57). The refuge manager is responsible for determining if a public use is compatible.</p> <p>The current compatibility requirements of the Refuge Improvement Act were adopted in the USFWS Final Compatibility Regulations and Final Compatibility Policy, published October 18, 2000 (Federal Register, Vol. 65, No. 202, pp. 62458-62496). The compatibility determinations for the Supawna Meadows NWR can be found in appendix B, along with additional information on the process. The policy and regulations can be viewed online at http://www.fws.gov/hanfordreach/documents/compatibility.pdf.</p>
Maintaining Biological Integrity, Diversity, and Environmental Health Policy	<p>This policy provides guidance on maintaining or restoring the biological integrity, diversity, and environmental health of the Refuge System, including the protection of a broad spectrum of fish, wildlife, and habitat resources found in refuge ecosystems. It provides refuge managers with a process for evaluating the best management direction to prevent the additional degradation of environmental conditions and to restore lost or severely degraded environmental components. It also provides guidelines for dealing with external threats to the biological integrity, diversity, and environmental health of a refuge and its ecosystem (601 FW 3).</p>
Wildlife-dependent Recreation Policy	<p>The Refuge Improvement Act establishes six wildlife-dependent priority public uses: hunting, fishing, wildlife observation and photography, and environmental education and interpretation. The Refuge Improvement Act further states that, if compatible, these six public uses are to receive enhanced consideration over other public uses in refuge planning and management. The Wildlife-Dependent Recreation Policy explains how we will provide visitors with opportunities for those priority public uses on units of the Refuge System and how we will facilitate the priority public uses (605 FW 1-7).</p>
Other Legal and National Policy Mandates	<p>Although Service and Refuge System policy and each refuge's purpose provide the foundation for management, the administration of refuges conforms to a variety of other Federal laws (e.g., Migratory Bird Treaty Act, Endangered Species Act, Wilderness Act, Archaeological Resources Protection Act, National Historic Protection Act), Executive Orders, treaties, interstate compacts, and regulations pertaining to the conservation and protection of natural and cultural resources. The “Digest of Federal Resource Laws of Interest to the USFWS” lists these and can be viewed online at http://www.fws.gov/laws/Lawsdigest.html.</p>
Wild and Scenic River Review	<p>There are no rivers or segments of rivers that qualify for review within the boundary of the refuge; therefore, a wild and scenic river review was not conducted for this CCP.</p>
National and Regional Conservation Plans Guiding the Project	<p>In late 2001, the U.S. Congress passed the Department of the Interior and Related Agencies Appropriations Act of 2002 (Appropriations Act; Public Law 107- 63) which created the State Wildlife Grants (SWG) program. State Wildlife Grants are available to state fish and wildlife agencies “for the development and implementation of programs for the benefit of wildlife and their habitat, including species that are not hunted or fished.” To continue receiving SWG</p>

New Jersey Wildlife Action Plan (revised 2008) money, each state was required to develop a Wildlife Action Plan (WAP; officially known as a Comprehensive Wildlife Conservation Strategy) focusing on the species of greatest conservation need by October 1, 2005. To satisfy this Federal requirement, the New Jersey Division of Fish and Wildlife (NJDFW), in collaboration with the public; New Jersey conservation groups; and other stakeholders, developed the **New Jersey WAP for the conservation of the State's species of greatest conservation need**. Originally submitted in 2005, the most recent draft is dated January 23, 2008 (NJDFW 2008a).

To better assess conservation needs, goals, and priorities, the New Jersey WAP uses the landscape regions (or ecoregions) and 26 conservation zones already identified in the **State's Landscape Project (NJDFW 2008b)**. It identifies nearly 200 species of greatest conservation need, as well as identifying habitat needs and priorities for each region and conservation zone. We discuss the **Landscape Project in more detail below**. The refuge's tidal marshes supply important resting, feeding, and over-wintering habitat for colonial-nesting wading birds, freshwater wetland birds, and many other special concern wildlife species identified by the State. We used this plan to help develop habitat management goals, objectives, and strategies, and in developing the list of species of conservation concern in appendix A.

North American Waterfowl Management Plan (updated 2004) The North American Waterfowl Management Plan (NAWMP) is designed to promote partnership-based habitat conservation for waterfowl and other wetland birds. This plan was first developed in 1986 and has been revised twice, most recently in 2004 (USFWS 2004a). Another revision is planned for 2011/2012. The **first NAWMP established "joint venture" partnerships across the country (USFWS 1986)**. Joint venture partnerships involving Federal, State and provincial governments, Tribal nations, local businesses, conservation organizations, and individual citizens are assembled for the purpose of protecting habitat and species. Currently, there are 18 habitat-focused joint ventures in the United States and three species-focused joint ventures. Supawna Meadows NWR falls within the Atlantic Coast Joint Venture (ACJV). The current mission of the **ACJV is to "...provide a forum for Federal, State, regional and local partners to coordinate and improve effectiveness of bird conservation planning and implementation in the Atlantic Flyway region of the United States" (ACJV 2004)**.

The ACJV has developed several plans to help step-down the goals and objectives identified by NAWMP including the ACJV Waterfowl Implementation Plans (ACJV 1988, ACJV 2005) and the ACJV Strategic Plan (ACJV 2004). The most recent ACJV Waterfowl Implementation Plan (ACJV 2005) identifies several focus areas, i.e., habitat complexes that are priorities for waterfowl conservation. Seven focus areas have been identified in New Jersey. Portions of the Supawna Meadows NWR fall within one of these focus areas, called the Delaware Bayshores Marshes Focus Area.

North American Waterbird Conservation Plan (2002) and Mid-Atlantic/New England/Maritimes (MANEM) Waterbird Conservation Plan (Review Draft 2006) The North American Waterbird Conservation Plan (Kushlan et al. 2002) represents a partnership among individuals and institutions with the interest in and responsibility for conserving waterbirds and their habitats. The partnership, known as Waterbird Conservation for the Americas, shares a vision that the distribution, diversity, and abundance of populations and habitats of breeding, migratory, and non-breeding waterbirds are sustained or restored throughout the lands and waters of North America, Central America, and the Caribbean (Kushlan et al. 2002). It provides a framework for conserving and managing waterbirds. The plan also facilitates continent-wide planning and monitoring, national, state, and provincial conservation, regional coordination, and local habitat protection and management.

Sixteen waterbird planning regions were identified to allow for planning at a scale that is practical yet provides a landscape-level perspective. Supawna Meadows NWR falls within the Mid-Atlantic/New England/Maritimes (MANEM) region. To facilitate waterbird conservation in the MANEM region of the United States and Canada, a partnership of organizations and individuals has drafted a regional waterbird conservation plan for 2006 – 2010. According to the MANEM Waterbird Conservation Plan, 74 waterbird species utilize habitats in the MANEM region for breeding, migrating and wintering (MANEM Waterbird Working Group 2006). Avian families that occur within the region include loons, grebes, shearwaters, storm-petrels, boobies, pelicans, cormorants, herons, ibises, rails, gulls, terns, skuas, jaegers, and alcids. Summarized information on waterbirds and their habitats from this plan provides a regional perspective for local conservation action. We used this plan to help develop objectives and strategies for goals 1 and 3.

U.S. Fish and Wildlife Service Birds of Conservation Concern (2008)

The Birds of Conservation Concern (BCC) is a report that identifies nongame migratory birds that, without strong conservation action, are likely to become candidates for listing under the Federal Endangered Species Act (ESA; USFWS 2008b). The BCC compiles the highest ranking species of conservation concern from these major nongame bird conservation plans: Partners in Flight North American Landbird Conservation Plan (Rich et al. 2004), the United States Shorebird Conservation Plan (Brown et al. 2001), and the North American Waterbird Conservation Plan (Kushlan et al. 2002). We used the BCC list in compiling appendix A and to help focus on which species might warrant special management attention.

U.S. Shorebird Conservation Plan (2001, 2nd Edition) and North Atlantic Regional Shorebird Plan (2000)

Concerns about shorebirds led to the creation of the U.S. Shorebird Conservation Plan (Brown et al. 2001). Developed as a partnership with individuals and organizations throughout the United States, the plan presents conservation goals for each United States region, identifies important habitat conservation and research needs, and proposes education and outreach programs to increase public awareness of shorebirds and of threats to them.

In the Northeast, the North Atlantic Regional Shorebird Plan (USFWS 2004b) was drafted to step-down the goals of the continental plan to smaller scales to identify priority species, species goals, habitats, and prioritize implementation projects. We used both plans in developing our objectives and strategies for goals 1 and 3.

Partners-in-Flight Bird Conservation Plan: Physiographic Area 44, Mid-Atlantic Coastal Plain (1999)

Partners in Flight (PIF) began in 1990 as a voluntary, international coalition of government agencies, conservation organizations, academic institutions, private industries, and citizens, dedicated to reversing the population declines of bird species. The mission of PIF is to help species at risk, keep common birds common, and encourage voluntary partnerships for birds, habitats, and people (PIF 2009). The foundation of PIF's long-term strategy is a series of scientifically based bird conservation plans using physiographic areas as planning units. The plan for each physiographic area ranks bird species according to their conservation priority, describes their desired habitat conditions, develops biological objectives, and recommends conservation measures. The priority ranking factors include habitat loss, population trends, and the vulnerability of a species and its habitats to regional and local threats.

Supawna Meadows NWR lies in Physiographic Area 44, the Mid-Atlantic Coastal Plain. The PIF plan for this region was completed in 1999 (Watts 1999). We used this plan in compiling appendix A and to help develop our habitat goals, objectives, and management strategies for the refuge.

Mid-Atlantic/ Southern
New England Bird
Conservation Region (BCR
30) Final Implementation
Plan (2008)

Bird Conservation Regions (BCRs) originated from the North American Bird Conservation Initiative (NABCI). NABCI is a coalition of many governmental agencies, private organizations, academic organizations, and private industry leaders in Canada, the United States, and Mexico (NABCI 2009). It was formed to address the need for coordinated bird conservation that will benefit all birds in all habitats. NABCI's approach to bird conservation is regionally based, biologically driven, and landscape-oriented. It fills in knowledge gaps, implements conservation actions through dynamic partnerships, and draws together the major bird conservation plans already in existence for waterbirds, shorebirds, waterfowl, and landbirds. NABCI members developed BCRs to facilitate regional planning efforts. The primary purposes of BCRs are to facilitate communication among the bird conservation initiatives; facilitate a regional approach to bird conservation; promote new, expanded, or restructured partnerships; and identify overlapping or conflicting conservation priorities. BCRs are ecologically distinct regions in North America with similar bird communities, habitats, and resource management issues. There are 67 BCRs across the United States, Canada, and Mexico.

Supawna Meadows NWR lies within BCR 30, which includes portions of 10 states and covers approximately 24.4 million acres. Members of the ACJV have developed the Mid-Atlantic/Southern New England Bird Conservation Region (BCR 30) Final Implementation Plan to guide conservation priorities in the region (ACJV 2008). The purpose of this plan is to bring the common goals of many other regional plans (e.g., State Wildlife Action Plans, Partners in Flight Bird Conservation Plan for the Mid-Atlantic Coastal Plain [Physiographic Area 44], U.S. Shorebird Conservation Plan) together into one format that can be used by state agencies, non-governmental organizations, and other bird conservation interests to implement bird conservation activities. The plan identifies the bird species and habitats in greatest need of conservation action in the region, activities thought to be most useful to address those needs, and geographic areas believed to be the most important places for work to occur. It identifies Supawna Meadows NWR as part of a focus area (i.e., important bird area) important to a broad range of shorebirds, waterfowl, and landbirds within BCR 30. We used this plan to help develop objectives and strategies for goals 1 and 2, and to help create appendix A.

The Pea Patch Island
Heronry Region: Special
Area Management Plan
(1998)

Pea Patch Island is a small island located in the mid-channel of the Delaware River near its entrance into Delaware Bay. It is a low, marshy island currently owned by the State of Delaware as Fort Delaware State Park (see map 1.2). Pea Patch Island is home to the largest wading bird colony on the Atlantic Coast of the United States. The Delaware River, wetlands, and uplands that surround the island support the foraging habits of these birds. The birds nest on the island from March to September and depend on the region's natural resources during this time. The Pea Patch Island Heronry Region Special Area Management Plan (SAMP) was published in July 1998 (Delaware Department of Natural Resources and Environmental Control 1998). The purpose of the SAMP was to outline a broad, ecosystem-based approach to protecting and improving the resources that support the Pea Patch Island Heronry, to build knowledge about the heronry, and to ensure the commitments necessary for its long-term protection. The development of the SAMP was a consensus-based effort involving representatives from Federal, State and local government agencies, nonprofit organizations, and industry. The SAMP identifies several issues that may positively or negatively affect the health of the heronry population and surrounding area, and uses these issues to guide the development and ranking of 28 management strategies. Birds breeding on Pea Patch Island frequently use the refuge to rest and forage. We used this plan to help develop our habitat goals, objectives, and management strategies for the refuge.

National - State Agency
Herpetological
Conservation Report (Draft
2004)

The National State Agency Herpetological Conservation Report (NHCR) is a summary report sponsored by Partners in Amphibian and Reptile Conservation (PARC 2004). Partners in Amphibian and Reptile Conservation (PARC) was created in response to the increasing national declines in amphibian and reptile populations. PARC members come from state and Federal agencies, conservation organizations, museums, the pet trade industry, nature centers, zoos, the power industry, universities, herpetological organizations, research laboratories, forest industries, and environmental consultants. Its five geographic regions - Northeast, Southeast, Midwest, Southwest, and Northwest - focus on national and regional herpetofaunal conservation challenges. Regional working groups allow for region-specific communication.

The NHCR provides a general overview of each state wildlife agency's support for reptile and amphibian conservation and research, and includes lists of the amphibian and reptile species of concern for each state. Its purpose is to facilitate communication among state agencies and partner organizations throughout the PARC network to identify and address regional and national priorities for reptiles and amphibians. PARC intends to expand the scope of the NHCR to include other states, provinces, and territories. It would also include other state agencies that are supporting conservation and research on amphibians and reptiles, such as transportation departments, park departments, and forest agencies. We used the latest draft NHCR plan in developing objectives and strategies for goals 1 through 3, and in developing appendix A.

U.S. Fish and Wildlife
Service Fisheries Program
Northeast Region
Strategic Plan (2009)

The Service's Fisheries Program maintains healthy populations of coastal and anadromous fish, fish species that cross state or national boundaries, and endangered aquatic animals and their habitats. In 2002, working with its many partners in aquatic conservation through the Sport Fishing and Boating Partnership Council's Fisheries Steering Committee, the Service completed its Strategic Vision (Vision) document, "Conserving America's Fisheries, U.S. Fish and Wildlife Service Fisheries Program Vision for the Future" (USFWS 2002a). The document includes goals, objectives, and action items on a national programmatic scale.

The Service's original Northeast Region Strategic Plan (USFWS 2004c) is an extension of our Fisheries Program Strategic Vision document (USFWS 2002a), describing more specifically how the Northeast Region will fulfill the goals and objectives identified in this document over 5 years (2004 through 2008). This plan, developed in cooperation with over 40 partners and stakeholders, addresses the decline of fish populations and other aquatic resources, and the economic impact of those declines. The plan is implemented with partners through annual project work plans.

Recently, the Service updated the plan (USFWS 2009b) to address the years 2009 to 2013. The updated plan uses a more transparent process to show partners and other members of the public how we arrived at various priorities. We have consulted with the Northeast Region's Fisheries Program staff and used this plan in developing aquatic objectives and strategies under goals 1 and 2, and in creating appendix A.

Regional Wetlands
Concept Plan - Emergency
Wetlands Resources Act
(USFWS 1990)

In 1986, Congress enacted the Emergency Wetlands Resources Act to promote the conservation of our nation's wetlands. This act directed the Department of the Interior to develop a National Wetlands Priority Conservation Plan identifying the location and types of wetlands that should receive priority attention for acquisition by Federal and state agencies.

In 1990, the Service's Northeast Region completed a Regional Wetlands Concept Plan to provide more specific information about wetlands resources in the Northeast. It identifies nearly 850 wetland sites that warrant consideration for acquisition to conserve wetland values in this region. A portion of one of these sites, Mannington Meadow, is included within the refuge boundary. We used this plan to help guide management strategies for this and other wetlands within the refuge.

U.S. Fish and Wildlife Service Indiana Bat Draft Recovery Plan: First Revision (2007)

In 1967, the Federal Government listed the Indiana bat (*Myotis sodalis*) as endangered because of declines in their numbers documented at seven major hibernacula in the Midwest. At the time of their listing, Indiana bats numbered around 883,300. Surveys in 2005 numbered the population at 458,332. Although population numbers are down, surveys in most states' hibernation sites indicated that populations increased or at least remained stable in 2004 and 2005.

In 2006, the first evidence of a new illness affecting cave-dwelling bats was detected (USFWS 2009c). While the causative agent of this illness is still in question, it is called white-nose syndrome because affected bats usually have a white fungus on their muzzles and other parts of their bodies. Bats with white-nose syndrome frequently lack adequate body fat to survive until spring and exhibit uncharacteristic behavior, such as flying during the day or flying when they would normally be hibernating. Smaller bats, such as Indiana bats, appear to be more susceptible to white-nose syndrome than larger bats.

Since the initial detection in 2006, white-nose syndrome has been detected from Vermont to Virginia. In some affected hibernacula, 90 to 100 percent of the bats are dying. Preliminary estimates of the Northeast Region's Indiana bat population indicate that the population has declined approximately 30 percent between 2007 and 2009 (USFWS 2009c).

Long-term effects of this illness on bat species are unknown, but it is possible that entire bat species, including the Indiana bat, may become extinct. Supawna Meadows NWR is home to a maternity colony of about 1,500 bats that use a barn on the refuge. We conducted surveys of the maternity colony in 2004, 2007, and 2008. Using mist nets and harp traps, approximately 250 bats were captured and identified. The majority of bats were little brown bats (*Myotis lucifugus*), a small number were big brown bats (*Eptesicus fuscus*). We have not confirmed that any of the bats from the Supawna Meadows NWR site have white-nose syndrome and the colony is not showing signs observed at maternity colonies in affected areas. Signs of white-nose syndrome observed at other maternity colonies include malformed pups, large numbers of dead pups, and little to no reproduction (Scherer 2009 personal communication).

While no Indiana bats have been documented at the Supawna Meadows NWR, the refuge's forested and upland habitats have a potential for supporting wintering, foraging, and roosting habitats for Indiana bats. The Service would implement recovery plan tasks (USFWS 2007a) for this species, as appropriate, if the Indiana bat was documented within the refuge boundary.

National Marine Fisheries Service Final Recovery Plan for the Shortnose Sturgeon (1998)

Shortnose sturgeon (*Acipenser brevirostrum*) was listed as endangered in 1967 under the Endangered Species Preservation Act (32 FR 4001). The original listing did not specify reasons for the decline, but subsequent documents cite water pollution and overfishing, including bycatch in the shad fishery, as principal reasons for the species' decline (NMFS 1998). The National Marine Fisheries Service (NMFS) currently recognizes 19 distinct population segments, including one population in the Delaware River (NMFS 1998). While the Delaware River is not included within the refuge boundary, the river and several

	<p>tributaries form part of the refuge’s border. Therefore, activities occurring on the refuge could have minimal effects on the shortnose sturgeon habitat. We used this plan to help guide management strategies for refuge habitat to ensure potential effects on adjacent sturgeon habitat are neutral or wholly beneficial.</p>
<p>The Landscape Project, New Jersey Endangered and Nongame Species Program, New Jersey Department of Environmental Protection (2002)</p>	<p>In 1994, the New Jersey Division of Fish, Game, and Wildlife’s Endangered and Nongame Species Program (ENSP) adopted a landscape-level approach to rare species protection. The goal is to protect New Jersey’s biological diversity by maintaining and enhancing rare wildlife populations within healthy, functioning ecosystems. Five landscape regions have been identified. Supawna Meadows NWR lies within the Piedmont Plains Region. Using an extensive database that combines rare species location information with land cover data, the ENSP has identified and mapped areas of critical habitat for rare species (i.e., State-listed and federally listed threatened or endangered species) within each landscape region. Critical areas are ranked by priority. A geographic information system (GIS) database provides baseline information to conservation partners for help in prioritizing habitat protection, open space acquisition, and land management planning. This information was utilized in our land protection planning.</p>
<p>Comprehensive Conservation and Management Plan for the Delaware Estuary (1996)</p>	<p>The Delaware Estuary is faced with continuing threats from toxic substances, habitat loss and fragmentation, and human development. To help address these threats, the Delaware Estuary Program worked with many partners to develop the Comprehensive Conservation and Management Plan (CCMP) for the Delaware Estuary (Delaware Estuary Program 1996). The CCMP is a comprehensive document describing the existing conditions of the Delaware Estuary and providing seven action plans (land management, water use management, habitat and living resources, toxics, education and involvement, and monitoring) and an implementation plan. While the Delaware Estuary Program has since merged with the Partnership for the Delaware Estuary, this reorganized entity is still active and is now responsible for addressing the various actions identified in the CCMP. We used this plan as a reference in developing habitat management and land protection planning objectives.</p>
<p>Establishing Authority and Refuge Purposes</p>	<p>Refuges can be established by Congress through special legislation, by the President through Executive Order, or administratively by the Secretary of the Interior (delegated to the Director of the Service), who is authorized by Congress through legislation. Refuge System lands may be acquired under a variety of legislative and administrative authorities.</p>
<p>Supawna Meadows NWR Establishing Authority</p>	<p>Supawna Meadows NWR was originally established as an addition to the Killcohook Migratory Bird Refuge. Killcohook Migratory Bird Refuge was established by Executive Order 6582 on February 3, 1934. In 1971, the Service purchased 653 acres from the Philadelphia Conservationists (now known as the Natural Lands Trust). These acres were called the Goose Pond addition to the Killcohook Migratory Bird Refuge. On April 10, 1974, the Service renamed these 653 acres as the Supawna Meadows National Wildlife Refuge and officially separated this land from Killcohook Migratory Bird Refuge. On October 30, 1998, the Service’s jurisdiction over Killcohook Migratory Bird Refuge was revoked. The Service has acquired interests in over 2,300 additional acres for this refuge since 1971. Killcohook Migratory Bird Refuge is now called the Killcohook Coordination Area, and is used by the U.S. Army Corps of Engineers (ACE) to deposit dredged soil.</p>
<p>Supawna Meadows NWR Purposes</p>	<p>Refuge purposes are specified in or derived from the laws, proclamations, executive orders, agreements, public land orders, donation documents, or administrative memoranda, that establish, authorize, or expand a refuge, refuge unit, or refuge subunit.</p>

Supawna Meadows NWR was established for the following purposes:

- as property with particular value in carrying out the national migratory bird management program (The Transfer of Certain Real Property for Wildlife Conservation Purposes Act, as amended [16 U.S.C. §667b-667d; 62 Stat. 240]);
- for use as an inviolate sanctuary, or for any other management purpose, for migratory birds (The Migratory Bird Conservation Act [16 U.S.C. §715D]); and
- as a refuge suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species (Refuge Recreation Act, as amended [16 U.S.C. 460k-1]).

Refuge Vision Statement

Our team developed the following vision statement to provide a guiding philosophy and sense of purpose for our planning effort:

Supawna Meadows National Wildlife Refuge will continue to provide essential tidal marsh habitat to feed and shelter migrating waterfowl and to feed nearby colonial-nesting wading birds, thereby maintaining its significant role as part of the Delaware Bayshore system of wetlands and upland buffers that is one of the most important migratory bird habitats in the nation.

The refuge will continue to serve as an oasis of native biotic communities within sight of the burgeoning industrial, transportation, and residential developments of the lower Delaware River Basin and South Jersey by providing an array of wetland and upland habitats that support a diverse community of breeding and migrating birds, native mammals, and other species.

Refuge visitors will be able to hunt and fish, observe and photograph wildlife, and learn of the ecological importance and diversity of wildlife at Supawna National Wildlife Refuge. They will understand the refuge as part of a larger network of protected lands within the National Wildlife Refuge System, set aside specifically for wildlife.

Refuge Goals

Our planning team developed the following goals for the refuge after a review of legal and policy guidelines, the Service mission, regional plans, refuge purposes, our vision for the refuge, and public comments. All of these goals fully conform with and support national and regional mandates and policies.

Goal 1: Protect, enhance, and restore biological integrity, diversity, and environmental health of tidally influenced habitats to support native wildlife and plant communities including species of conservation concern.

Goal 2: Protect, enhance, and restore biological integrity, diversity and environmental health of upland habitats to support native wildlife and plant communities with emphasis on migrating and wintering birds and other species of concern.

Goal 3: Protect, enhance, and restore biological integrity, diversity, and environmental health of non-tidal wetland habitats to support native wildlife and plant communities with emphasis on breeding, migrating, and overwintering birds and other species of conservation concern.

Goal 4: Provide opportunities for compatible high-quality, wildlife-dependent public uses.

Goal 5: Protect cultural resources on the refuge.

Goal 6: Enhance refuge management through partnerships, friends, volunteers, and community outreach.

Chapter 2



USFWS

Snowy Egret on the Refuge

The Planning Process

- The Comprehensive Conservation Planning Process
- Issues and Opportunities
- Plan Amendment and Revision

The Comprehensive Conservation Planning Process

This chapter describes the process by which we developed this CCP and outlines how others were included in that process. It details how we first invited, and will continue to encourage, the partnership of other Federal and state agencies, civic, public, and private conservation and education organizations, and the affected public in our decisions about managing the refuge.

Service policy establishes an eight-step planning process that also facilitates our compliance with NEPA (figure 2.1.²). Our planning policy and CCP training course materials describe those steps in detail. We followed that process in developing this CCP.

Since 1974, we have focused on conserving and managing Supawna Meadows NWR to help sustain migrating waterfowl, wading birds, and other trust species, and to facilitate wildlife-dependent public uses.

We began the CCP process for the refuge in May 2007 (Step A) with a kick-off meeting. We discussed the current status of the refuge, important issues to be addressed in the CCP, and the status and sources of data for the analysis. We defined a core team to include refuge managers and staff from Cape May NWR, Service regional planners, and a NJDFW representative.

We held an internal scoping meeting, site visit, and field review in July 2007 to identify issues, concerns, management ideas, and data sources for the development of the CCP and analysis of management strategies.

We published and distributed our first newsletter in August of 2007 (Step B).

On September 7, 2007, we held two public scoping meetings at the Pennsville Public Library to solicit comments from the community and other interested parties on the scope of the CCP and the issues and impacts that should be evaluated in the draft CCP/EA.

We published an official notice in the Federal Register on September 24, 2007, that announced we were preparing a draft CCP/EA.

Between 2008 and 2010, we worked on “Step C: Review Vision Statement, Goals, and Identify Significant Issues” and “Step D: Develop and Analyze Alternatives.” On April 15, 2008, we held a biological workshop with representatives of the Service, the NJDFW, and the Delaware Division of Parks to discuss management objectives for the array of refuge habitats.

On May 6, 2008, we held a public use objectives meeting that addressed hunting, access to Finns Point Rear Range Light (FPRRL), and a variety of other public use opportunities, issues, and concerns.

After a review meeting in June 2008 with senior staff at the Service’s Northeast Region headquarters, we revised the biological and public use objectives.

We distributed a second newsletter in July 2008.

² “The Comprehensive Conservation Planning Process” (<http://policy.fws.gov/602fw3.html>)

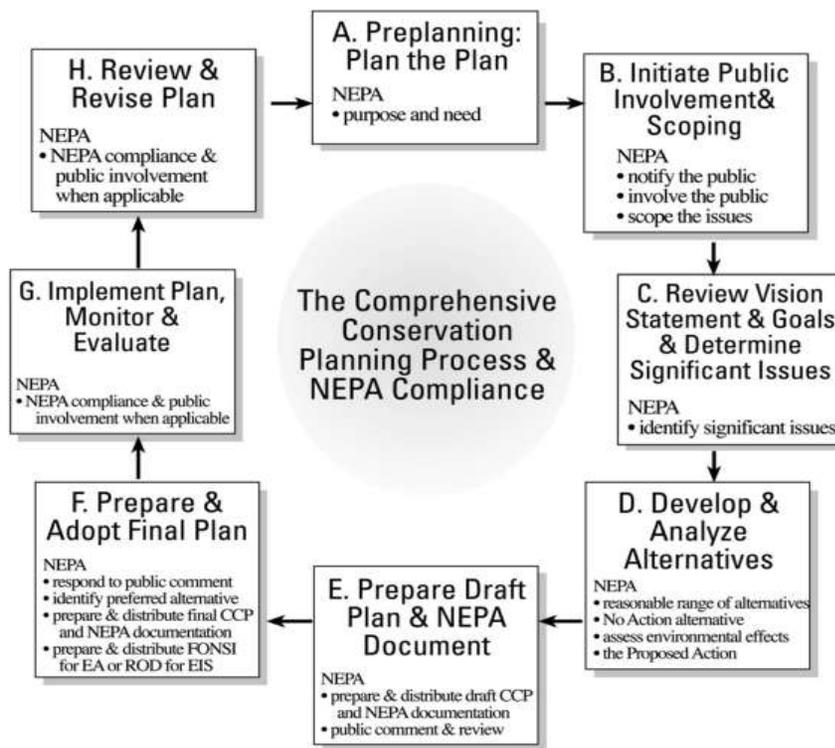


Figure 2.1. The Comprehensive Conservation Planning Process

We completed “Step E: Prepare Draft Plan and NEPA Document” by publishing our Notice of Availability (NOA) in the Federal Register announcing the release of the draft CCP/EA and by distributing it for public review on September 27, 2010. During a 30-day period of public review, we distributed a third newsletter and a press release and held two public meetings to obtain comments. We also received comments by regular mail, electronic mail, and at the refuge. After the comment period expired, we reviewed and summarized all of the substantive comments we have received and prepared our responses. These are presented in appendix H.

At the same time, we sent a copy of the draft CCP/EA to the New Jersey State Historic Preservation Office (SHPO) for review and comment on compliance with the National Historic Preservation Act (NHPA) and other applicable State and Federal laws relating to cultural resources. On November 23, 2010, we received an email indicating New Jersey SHPO concurrence with the draft CCP/EA. We also sent a copy of the draft CCP/EA and an intra-service consultation form to the Service’s New Jersey Ecological Services (ES) Office to ensure compliance with the ESA. We received the signed concurrence from the New Jersey ES Office on November 29, 2010.

This CCP was submitted to our Regional Director for review and approval. He determined that it warranted a Finding of No Significant Impact (FONSI; see appendix I) and found its analysis sufficient to simultaneously issue his decision adopting this CCP. We announced his final decision by publishing a Notice of Availability in the Federal Register, where we also notified people of the availability of the CCP. This completes “Step F: Prepare and Adopt a Final Plan.”

“Step G: Implement Plan, Monitor and Evaluate” can now begin with approval of this CCP. As part of “Step H: Review and Revise Plan,” we will modify the final CCP as warranted following the procedures in Service policy (602 FW 1, 3, and 4) and NEPA requirements. Minor revisions that meet the criteria for categorical exclusions (550 FW 3.3C) will require only an Environmental Action Memorandum. As the Improvement Act and Service policy stipulate, we must fully revise CCPs every 15 years.

Issues and Opportunities

From public meeting and planning team discussions, we developed a list of issues, concerns, opportunities, and other items requiring a management decision. We placed them in two categories: key issues and issues outside the scope of the EA.

Key issues - Key issues are those the Service has the jurisdiction and authority to resolve. The key issues, together with refuge goals, formed the basis for developing and comparing the different management alternatives we analyzed in chapter 3 of the draft CCP/EA. The varying alternatives were generated by the wide-ranging opinions on how to address key issues and conform to the goals and objectives.

Issues and concerns outside the scope of this analysis - These topics fall outside the jurisdiction and authority of the Service or were deemed impractical. We discuss them after “Key Issues” below, but this plan does not address them further.

Key Issues

We derived the following key issues from public and partner meetings and further team discussions. **Chapter 4, “Management Direction and Implementation”** shows how these issues will be addressed in such a way as to best support refuge goals.

1. Which species should be a focus for management and how will the refuge promote and enhance their habitats?

Congress entrusts the Service with protecting federally listed endangered or threatened plant and animal species, anadromous and inter-jurisdictional fish species, migratory birds, and certain marine mammals, and mandates their treatment as management priorities when they occur on a refuge. Appendix A identifies Federal trust resources on the refuge, as well as other species of special concern.

Numerous species of concern, including those species listed by the NJDFW as endangered, threatened, or a species of special concern, are potentially present in the vicinity of the refuge. The shortnose sturgeon is present in the adjacent Delaware River. Other federally listed threatened or endangered species may enter the Delaware Bay and may occasionally travel up the river as far as the refuge. No sea turtle nesting habitat is present on the refuge; however, some turtles including Atlantic hawksbill (*Eretmochelys imbricata*), Atlantic loggerhead (*Caretta caretta caretta*), Atlantic ridley (*Lepidochelys kempii*), and Atlantic leatherback (*Dermochelys coriacea*) may enter the Delaware Bay. Whales occasionally enter the Delaware Bay and one individual is known to have strayed as far north as Philadelphia, Pennsylvania (Spotila et al. 2007). Sensitive joint-vetch (*Aeschynomene virginica*), a federally listed threatened species, was found on the muddy tidal banks of the Delaware River on August 8, 1881. No plants were found during a survey conducted on September 30, 1992. Although these federally listed species may be found close to the refuge, their presence is largely limited to the Delaware River and Delaware Bay where the Service does

not have jurisdiction. Therefore, the Service is limited in its ability to support recovery objectives for these species through refuge management.

Migratory birds are also a Federal trust resource. The challenge with migratory bird management lies in determining how each refuge can contribute significantly to the conservation of migratory bird species of concern. One important question we address is, “Which migratory bird species and associated habitat types should be a priority for management on these refuges?” Management emphasis on a certain species or species group may preclude management for other migratory bird species of concern. On the refuge, for example, managing for grassland-dependent bird nesting habitat would likely reduce the habitat potential for interior forest nesting birds. Migratory bird species associated with both habitat types are in decline throughout PIF Area 44.

This CCP identifies the migratory bird species of management emphasis, associated management and land protection, and their impacts on other species of concern. Refuge goals 1 through 3 address our response to this issue.

2. How will the refuge manage invasive, exotic, and overabundant species?

Invasive plant species such as phragmites (*Phragmites australis*), Japanese stiltgrass (*Microstegium vimineum*), Japanese honeysuckle (*Lonicera japonica*), mile-a-minute vine (*Polygonum perfoliatum*), autumn olive (*Elaeagnus umbellata*), multiflora rose (*Rosa multiflora*), and Canada thistle (*Cirsium arvense*) threaten refuge habitats by displacing native plant and animal species, degrading wetlands and other natural communities, and reducing natural diversity and wildlife habitat values. They out-compete native species by dominating light, water, and nutrient resources, and are particularly menacing when they affect native habitats, as when phragmites invades tidal marsh habitat.

Invasives are able to establish themselves easily, reproduce prolifically, and disperse readily, which makes eradicating them difficult. Once they have become established, getting rid of them is expensive and labor intensive. Many cause measurable economic impacts, especially in agricultural fields. Preventing new invasions is extremely important for maintaining biological diversity and native plant populations. The control of affected areas will require extensive partnerships with adjacent landowners, State agencies, and local governments.

Invasive animal species, such as mute swans (*Cygnus olor*) and feral cats also threaten refuge habitats by displacing, harming, or devastating native plant and animal species, degrading wetlands and other natural communities, and reducing natural diversity and wildlife habitat values. The threats of invasive animal and plant species are very similar.

We suspect that several wildlife species on the refuge are adversely affecting natural biological diversity. Native species (e.g., deer, resident Canada geese, and snow geese) and small furbearing mammals (e.g., beavers, raccoons, woodchucks, and muskrats) can become problems when their populations exceed the range of natural fluctuation and the ability of their habitat to support them. In particular, issues surface when these animals directly affect trust species or degrade natural communities. Small mammalian predators have been known to destroy neotropical migratory bird nests. Although we expect some predation in a natural system, concerns arise when it prevents our meeting conservation objectives.

There can be adverse ecological and economic impacts when deer, Canada geese, or snow geese forage excessively on fields or marsh vegetation, or when beavers and woodchucks affect water quality, degrade water control structures or impoundment dikes, or cause flooding where it is not desirable. As adjacent lands are developed for residential or commercial use, the concentrations of deer can rise on less developed lands, like the refuge. An overabundance of deer can produce long-term negative effects, such as potential disease epizootics (Demarais et al. 2000); increased browsing pressure on landscapes, vegetation, and crops; and severe habitat degradation (Cypher and Cypher 1988). When deer populations become excessive, they can also compromise human health and safety. An increase in vehicle-deer collisions or the incidence of Lyme disease raises community concerns. The measures for controlling each species are potentially controversial, and may include lethal removal, visual and acoustic deterrents, and destroying nesting or den sites. Our response to this issue is addressed in refuge goals 1 through 4.

3. How will the refuge manage impoundments and forested wetlands?

Impoundments are confined bodies of water. The refuge has five impoundments with water control structures (WCS) totaling approximately 84 acres, and five impoundments without WCSs totaling approximately 4 acres. Natural changes in water levels can occur from rainfall and natural springs. Water levels can be altered in impoundments with WCSs by inserting or removing boards that either release water or allow tidal water to flow into the impoundments. Currently, the water level is managed in three of the five impoundments with water control structures. Changes in water levels during specific times of the year provide habitat and food for an array of wildlife including shorebirds, wading birds, and waterfowl. Shorebirds benefit from impoundments when water levels are lowered and mudflats are exposed providing foraging habitat. Wading birds and waterfowl benefit when water levels are higher providing food such as aquatic vegetation, invertebrates, and fish.

The refuge has approximately 186 acres of forested wetland habitat. A WCS is located along Xmas Tree Lane in forested wetland habitat. Managing the water levels here would provide additional forested wetland habitat (i.e., a green-tree reservoir). This area represents an excellent example of mature forest quality with great size class diversity. Forested wetlands provide habitat for wood duck nesting and brood rearing, roosting eastern screech owls, and breeding reptiles and amphibians.

Managing areas with WCSs could benefit a variety of species by changing water levels at various times of year. The habitats could also be restored by removing WCSs and dikes to allow the habitat to revert to historic conditions, such as in the Tract 11 impoundment where the habitat surrounding the dike is tidal marsh, or by plugging ditches and restoring the natural hydrology to the forested wetland habitat. The Tract 11D Lighthouse Road impoundment could be managed to benefit wading birds and waterfowl. The Xmas Tree Lane impoundment could be used to provide fishing opportunities to the public. Our responses to these issues are addressed in refuge goals 3 and 4.

4. How will the refuge provide opportunities for compatible wildlife-dependent public uses, realizing that those uses occasionally conflict?

The Refuge Improvement Act does not establish a hierarchy among the six wildlife-dependent priority public uses of refuges, nor does it establish any clear process for determining such a hierarchy. Unfortunately, those uses sometimes conflict with each other in time, space, or the allocation of resources. For

example, environmental education and interpretation programs could conflict with hunting if they occur in an area open to hunting at the same time. In the Northeast Region, we have established “areas of emphasis” to identify where each refuge may make its greatest contribution to the six priority public uses. Supawna Meadows NWR’s areas of emphasis are the same as Cape May NWR’s areas of emphasis - interpretation and wildlife observation and photography.

Some people express concerns when refuge resources are disproportionately allocated toward one use and opportunities for other uses suffer. An additional challenge for the refuge manager is determining the carrying capacity of the refuge to support these uses while still managing to provide a quality experience. Our responses to this refuge issue are addressed in refuge goal 5.

Traditional wildlife-dependent uses of the refuge include fishing and hunting of waterfowl and white-tailed deer. Until 2007, the refuge provided opportunities for limited shotgun, muzzleloader, and bow hunting for white-tailed deer. After the completion of an approved EA and FONSI, deer hunting opportunities were changed to include only bow hunting.

5. How will the refuge manage compatible non-priority public uses on the refuge?

Service policy provides that a use might be inappropriate based on compliance with other laws and policy, the availability of resources to manage the uses, possible conflicts with other uses, safety concerns, or other administrative factors. Inappropriate uses may, nonetheless, be compatible in the sense that it may not materially interfere with the purposes of the refuge or the Refuge System’s mission. Other uses, such as historic uses, might be appropriate and compatible, but may not be priority public uses or wildlife-dependent uses.

During the period 1989 through 2004, we provided public access to the Finn’s Point Rear Range Light (FPRRL) for 10 weekends (Saturday and Sunday) during the summer months. With the decline in onsite personnel and safety concerns, this activity is currently limited to allowing access only during the New Jersey Lighthouse Challenge, directly sponsored by the Friends of Supawna Meadows and the New Jersey Lighthouse Society. The Challenge is held annually one weekend in October.

Visitors have requested permission to participate in a variety of non-priority public uses at Supawna Meadows NWR. A few of these non-priority public uses (e.g., scientific research) have been considered compatible. All other non-priority public uses (for example, horseback riding, bicycling, jogging, physical geocaching, group gatherings not related to wildlife-dependent recreation, and picnicking) have been determined to be inappropriate and incompatible with the refuge’s purposes (see appendix B for Findings of Appropriateness and Compatibility Determinations).

6. How will the refuge cultivate an informed and educated public to support the mission of the Service and the purposes for which the refuge was established?

Community involvement in support of our Refuge System mission is both very important and very rewarding. Outreach ties the refuge to local communities, inspiring an interest in the Refuge System and in natural resource conservation and stewardship. It is important that people understand what we are doing, why we are doing it, and how we can work together to improve our communities. Our challenge lies in determining how best to reach out, raise the visibility of the

refuge in the local community, and cultivate a relationship. Some people advocate increasing the number of refuge programs open to the public, while others promote refuge staff involvement in established community events, government committees, and conservation organizations. Goal 6 of the CCP addresses our responses to this issue.

7. What additional lands will the refuge protect or acquire?

New Jersey is the most densely populated state in the nation. One of the consequences of that distinction is the extreme pressure it places on natural resources. Previously undeveloped lands are being developed rapidly. During our public scoping process, many individuals encouraged us to expand the refuge for a variety of reasons and many expressed concern over the rapid rate of development. Some spoke of the direct benefits, even the necessity, of maintaining land in its natural state, which the refuge exemplifies.

The refuge's current approved acquisition boundary encompasses 4,527 acres, of which the Service currently owns 3,016 acres in fee title lands. An additional 254 acres is managed under a conservation agreement. We will continue to maintain an active land acquisition program and work with willing sellers to acquire properties within the existing acquisition boundary. The primary funding source for land acquisition comes from the Land and Water Conservation Fund (LWCF), which Congress approves annually. In past years the availability of LWCF funding for Supawna Meadows NWR has been limited. As funds become available, the primary acquisition emphasis will be on those properties within the acquisition boundary.

8. How will the refuge obtain the staffing and funding necessary to complete priority projects?

Between 1998 and 2004, Supawna Meadows NWR was staffed with a refuge manager, a biologist, a maintenance worker with collateral law enforcement responsibilities, and a part time administrative assistant. In March 2004, the refuge was administratively complexed with Cape May NWR. In response to funding shortfalls, the 2006 Regional Work Force Planning Report identified Supawna Meadows NWR as an unstaffed satellite refuge complexed to the Cape May NWR. Therefore, the refuge currently has no onsite staff. **Approximately 20 percent of the Cape May NWR staff's time is spent annually providing management, maintenance, and law enforcement support to Supawna Meadows NWR.**

As the CCP was developed, we had to consider what could be accomplished in the next 15 years without onsite staff. If we are able to hire onsite staff, what positions would we want to fill and what additional management activities would they be able to support?

9. How will we preserve, protect, and interpret cultural and historic resources on refuge lands?

The FPRRL was listed in the National Register of Historic Places on August 30, 1978. It is a well-known historic feature located on refuge land. The catwalk was open to the public for viewing in the recent past, but engineering inspection has shown it to pose a potential safety hazard that would require substantial funding to correct. Although it is not directly related to the goals of refuge management, the Service recognizes its responsibility to maintain the FPRRL in accordance with the National Historic Preservation Act of 1974. The New Jersey Lighthouse Society and others expressed interest in having the refuge provide

opportunities for public access to the lighthouse during the annual Statewide lighthouse challenge. Questions were raised as to how best to meet the needed protection of the lighthouse and provide public access. Would this be more appropriately accomplished through a property transfer agreement with the State Division of Parks and Forestry, or through cooperative agreements with non-government agencies, such as the New Jersey Lighthouse Society, and/or the Friends of Supawna Meadows NWR?

We also recognize the potential of the lighthouse to be a focal point for enhancing the public's knowledge and understanding of the environmental importance that the refuge provides to a variety of wildlife species and habitats, as well as interpreting the historic value of the lighthouse. Efforts in this regard would be subject to maintaining the historic integrity of the lighthouse.

There are two other sites on the refuge that generate cultural and historic interest. The first of these sites is a small family cemetery dating back to the late 1800s, located just off County Route 197 along the entrance road to the location of the old refuge office. The cemetery has not been assessed for eligibility as a site for the National Register of Historic Places; however, we do recognize the importance of maintaining this site suitable for visitor appreciation.

The second of these sites is the previous headquarters, the old farmhouse of the Samuel Urion Farmstead, which has been referred to as the Urion-Yerkes homestead. We will consult with the New Jersey SHPO about disposition of this building and will comply with any applicable requirements including mitigation, if needed. The farmhouse has fallen into extensive disrepair beyond reasonable restoration value over the years; therefore, demolition is the anticipated outcome.

The draft CCP/EA was sent to New Jersey SHPO for review and comment. We received an email response indicating their concurrence with the document, provided we continue to work with them to comply with applicable Federal and State laws and regulations.

Issues Outside the Scope of this CCP

1. Water Quality – Proposal to dredge the Delaware River

During the public scoping process, some members of the public expressed concerns about water quality in the Delaware and Salem rivers and the potential harmful effects a proposed dredging operation within the Delaware River could have on Supawna Meadows NWR. The project has been proposed for many years by the Army Corps of Engineers. The proposal to increase the depth of the river from 40 feet to 45 feet is currently involved in various lawsuits from environmental organizations and the States of Delaware, Pennsylvania, and New Jersey. At this point in time, the outcome of the litigation and final dredging operation plan are unclear and cannot be addressed in this CCP. Furthermore, completion of this project is not within the Service's jurisdiction.

2. Will the refuge expand upland hunting opportunities?

During a scoping meeting with NJDFW, it was recommended that we look into expanding hunting opportunities on the refuge, in particular to include wild turkey, American woodcock, eastern gray squirrel, northern bobwhite, ruffed grouse, and rabbit. Although we considered this recommendation, we have eliminated this from detailed evaluation because of the small size of the huntable area within the refuge and the potential conflicts with other public uses.

Plan Amendment and
Revision

Periodic review of the CCP will be required to ensure that objectives are being met and management actions are being implemented. Ongoing monitoring and evaluation will be an important part of this process.

Monitoring results or new information may indicate the need to change our strategies. At a minimum, CCPs will be fully revised every 15 years. We will modify the CCP documents and associated management activities as needed and we will follow the procedures outlined in Service policy, the Refuge Improvement Act, and NEPA requirements.



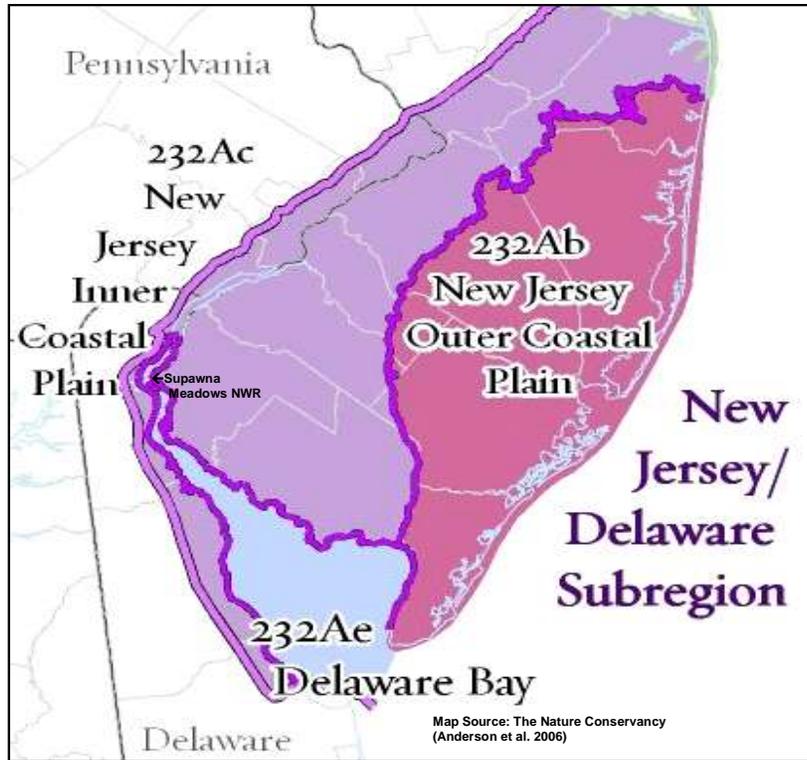
Steve Maslowski

Northern Bobwhite

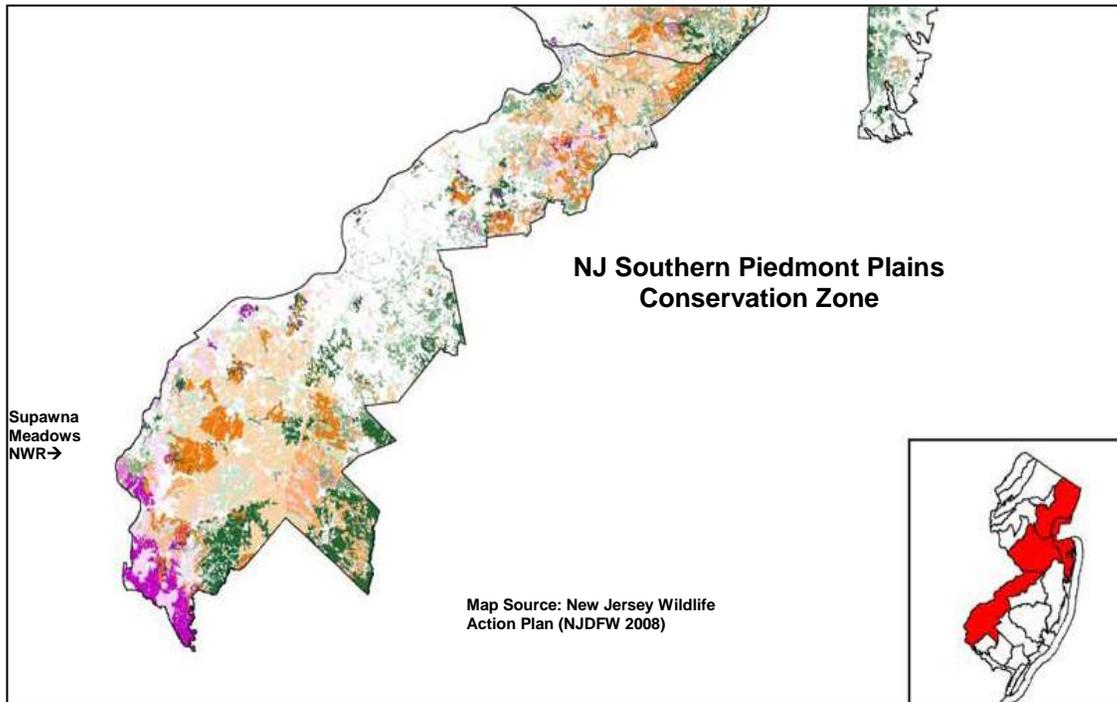
Existing Environment

- Introduction
- Physical Environment
- Socioeconomic Setting
- Refuge Administration
- Biological Resources
- Wildlife-dependent Public Use
- Cultural Resources

Introduction	This chapter describes in detail the physical, cultural, socioeconomic, biological, and administrative environments of the Supawna Meadows NWR and its resources directly related to our goals and key issues. It also provides the context for our management direction in chapter 4, “Management Direction and Implementation.”
Physical Environment	Elements of the physical environment considered include regional setting, air quality, water quality, soil types, and regional conservation lands.
Regional Setting	<p>According to The Nature Conservancy, Supawna Meadows NWR is located on the southwestern tidal shore of the Delaware River estuary in Salem County, New Jersey (Anderson et al. 2006). It is on the western edge of the New Jersey Inner Coastal Plain (232Ac) in the North Atlantic Coast Ecoregion (map 3.1). The New Jersey Wildlife Action Plan (NJDFW 2008a) shows the refuge located at the southwestern-most tip of New Jersey’s Southern Piedmont Plains conservation zone within the Piedmont Plains Landscape (map 3.2). The refuge is approximately 10 miles south of Wilmington, Delaware, and 35 miles south of Philadelphia, Pennsylvania. The refuge’s acquisition boundary encompasses approximately 4,527 acres. The refuge has acquired approximately 3,016 acres within the approved boundary.</p> <p>The refuge has a flat terrain typical of Delaware Estuary tidal areas. Elevations on the refuge range from zero to 10 feet above mean sea level (msl) (USFWS 2005a); however, in Pennsville, adjacent to the refuge, the elevation is 19 feet above msl.</p> <p>According to the National Oceanic and Atmospheric Administration (NOAA), the tidal amplitude on the Delaware River estuary in the vicinity of the refuge, as measured at a point near the refuge on the Salem River, averages about 5 feet (5.32 feet at Sinnickson’s Landing). The area’s climate can best be described as moderate, under a coastal influence (Delaware River/Bay). Days below zero degrees Fahrenheit (F) and above 100 degrees F are rare. The average frost-free period runs from late April to early October. Annual precipitation averages 41 inches per year and snowfall averages about 21 inches per year. Prevailing winds are from the northwest during the winter and from the southwest during the summer.</p> <p>Lands in the vicinity of the refuge have been in cultivation since the first permanent settlement was established in Salem County by John Fenwick in 1675, and farming is still the predominant land use surrounding the refuge. In the past, dikes were developed to block off the tides so wetlands could be farmed. These dikes required considerable maintenance. Storms and vandalism eventually breached all the dikes around the refuge; however, they remain to some degree between the Delaware River and the refuge. The last efforts by farmers to dike what are now refuge marshes ended in the late 1930s. Other traditional uses of the area include shad and sturgeon fishing, boat building and repair, muskrat trapping, and waterfowl hunting. All these activities, with the exception of sturgeon fishing, continue today.</p>



Map 3.1. Ecoregion location of Supawna Meadows NWR in the New Jersey/Delaware Subregion.



Map 3.2. Ecoregion location of Supawna Meadows NWR in the New Jersey Southern Piedmont Plains zone.

The land surrounding the refuge is primarily residential, commercial, and agricultural. A Ganes Chemical Company facility, a shopping center with a Wal-Mart store, and an ACE facility are located on properties either immediately adjacent to the refuge or just outside the refuge acquisition boundary. Agriculture is declining, leaving some lands fallow while others are replaced by development. Recent recreational use of lands adjacent to or near the refuge has included waterfowl hunting, deer hunting, fishing, trapping, wildlife observation, photography, horseback riding, and all-terrain vehicle/off-road vehicle use. All of these lands are in private ownership; general public access to these lands is rare. Recreational uses of waterways adjacent to or near the refuge include canoeing and kayaking, use of motorized boats, and jet skiing. Waterways adjacent to the refuge are under jurisdiction of New Jersey State, which allows public access.

Fort Mott State Park and the Salem River Wildlife Management Area are adjacent to the refuge acquisition boundary. Several other wildlife management areas and private conservation lands are located within a 30-mile radius of the refuge. These lands provide some degree of protection for wetlands, uplands, and deciduous forests.

Air Quality

The U.S. Environmental Protection Agency (EPA) has issued the following air quality standards (table 3.1):

Table 3.1. Environmental Protection Agency (EPA) air quality standards

Air pollutant	Air Quality Standard*
Carbon monoxide	35 ppm (1-hour average), 9 ppm (8-hour average)
Nitrogen dioxide	0.053 ppm (annual mean)
Ozone	0.12 ppm (1-hour average), 0.075 ppm (8-hour average)
Sulfur dioxide	0.14 ppm (24-hour average), 0.030 ppm (annual mean)
Airborne Particulates (< 2.5 micrometers in diameter)	35 µg/m ³ (24-hour average), 15.0 µg/m ³ (annual mean)

* ppm = parts per million

The New Jersey Department of Environmental Protection Bureau of Air Monitoring maintains a network of 44 air monitoring sites throughout the State for continuous monitoring of criteria air pollutants (NJDEP 2008). Air quality monitoring for Salem and Cumberland Counties is conducted at a monitoring site in Millville, New Jersey, approximately 30 miles southeast of Supawna Meadows NWR. In operation since 1983, the Millville site is currently monitoring nitrogen dioxide (NO₂), ozone (O₃), sulfur dioxide (SO₂), and particulate matter (PM) less than 2.5 micrometers in diameter (PM_{2.5}). The Salem/Cumberland County area is in non-attainment for ozone for the 8-hour standard, but is in attainment for the other criteria pollutants (EPA 2010). See table 3.2 for 2004 to 2008 ozone measurements at Millville.

Table 3.2. Ozone measurements* closest to Supawna Meadows NWR from 2004 to 2008.

Year	Ozone (in parts per million)	
	2nd Max 1-hour	4th Max 8-hour
2004	0.092	0.083
2005	0.111	0.085
2006	0.103	0.083
2007	0.093	0.083
2008	0.089	0.079

* Measurements taken in Millville, Cumberland County, New Jersey. Source: Environmental Protection Agency. 2010. US AirData webpage. <http://www.epa.gov/air/data/index.html> Accessed 9 July 2010.

Water Quality

New Jersey water quality is monitored and managed within watershed management areas. Watershed Management Area 17 (WMA 17) includes the Cohansey, Maurice, and Salem rivers, and the Alloway, Dividing, Manantico, Manusmuskin, Miles, Mill, Stow, and Whooping creeks. This area includes portions of Atlantic, Cumberland, Gloucester, and Salem Counties; over 39 municipalities; and encompasses 885 square miles. Land use in this watershed is about 40 percent cropland with the rest being woodland, tidal/freshwater marsh, urban, and pasture. Nonpoint sources of water pollution range from agricultural activities, such as tree harvesting, crop production, and animal pastures, to urban runoff from construction, septic systems, and urban surfaces.

The Salem River drains an area of 114 square miles and flows 32 miles, from Upper Pittsgrove Township west to Deepwater, then south to the Delaware River. The area lies within Salem County, the major population center being the city of Salem. Much of the lower portions of the river are tidal.

The Delaware River is the longest undammed river east of the Mississippi, extending 330 miles from the confluence of its east and west branches at Hancock, New York, to the mouth of the Delaware Bay where it meets the Atlantic Ocean (DRBC 2008). The river is fed by 216 tributaries, the largest of which are the Schuylkill and Lehigh rivers in Pennsylvania. In all, the basin contains 13,539 square miles, draining parts of Pennsylvania (6,422 square miles; 50.3 percent of the basin's total land area); New Jersey (2,969 square miles; 23.3 percent); New York (2,362 square miles; 18.5 percent); and Delaware (1,004 square miles; 7.9 percent). Included in the total area number is the 782 square mile Delaware Bay, which lies roughly half in New Jersey and half in Delaware. Nearly 15 million people (approximately five percent of the nation's population) rely on the waters of the Delaware River Basin for a multitude of uses, but the watershed drains only four-tenths of one percent of the total continental U.S. land area. The Delaware River Basin Commission's (DRBC) recreational use standards for fecal coliform and enterococcus bacteria apply in the tidal Delaware River and Delaware Bay (DRBC 2009). August 2009 sampling at Pea Patch Island and Reedy Island showed levels of enterococcus that exceeded the standard of 35 colony forming units (cfu)/100 milliliters.

Currently, fish consumption advisories exist for waters in all states surrounding the Delaware Estuary and along the Delaware River (Delaware Estuary 2008). Contaminants found in estuarine fish that result in consumption advisories include polychlorinated biphenyls (PCBs), mercury, dioxins/furans, and chlorinated pesticides, including dichlorodiphenyltrichloroethane, better known as DDT. Given that fish accumulate many contaminants in their fatty tissues,

certain species with higher oil contents can pose more human consumption risks than others.

Soil Types

The U.S. Department of Agriculture's Natural Resource Conservation Services mapped the soils within Salem County, New Jersey in 1996. The major soil types found within the refuge include Transquaking mucky peat (65 percent of total acres), Mannington-Nanticoke complex (10 percent), Mattapex silt loam (9 percent), and Othello, Falsington, and Trussum soils (9 percent). The remaining soils on the refuge include Mattapex silt loam (2 percent); Othello and Falsington soils (2 percent); Sassafrass-Woodstown complex (2 percent), and Matapeake silt loam (1 percent). The major soil types are described below (USDA 1996, 2002):

Transquaking mucky peat, 0 to 1 percent slopes-This series consists of very deep, very poorly drained soils formed in thick organic deposits. They are very frequently flooded and occur on the brackish estuarine marshes along tidally influenced rivers and creeks.

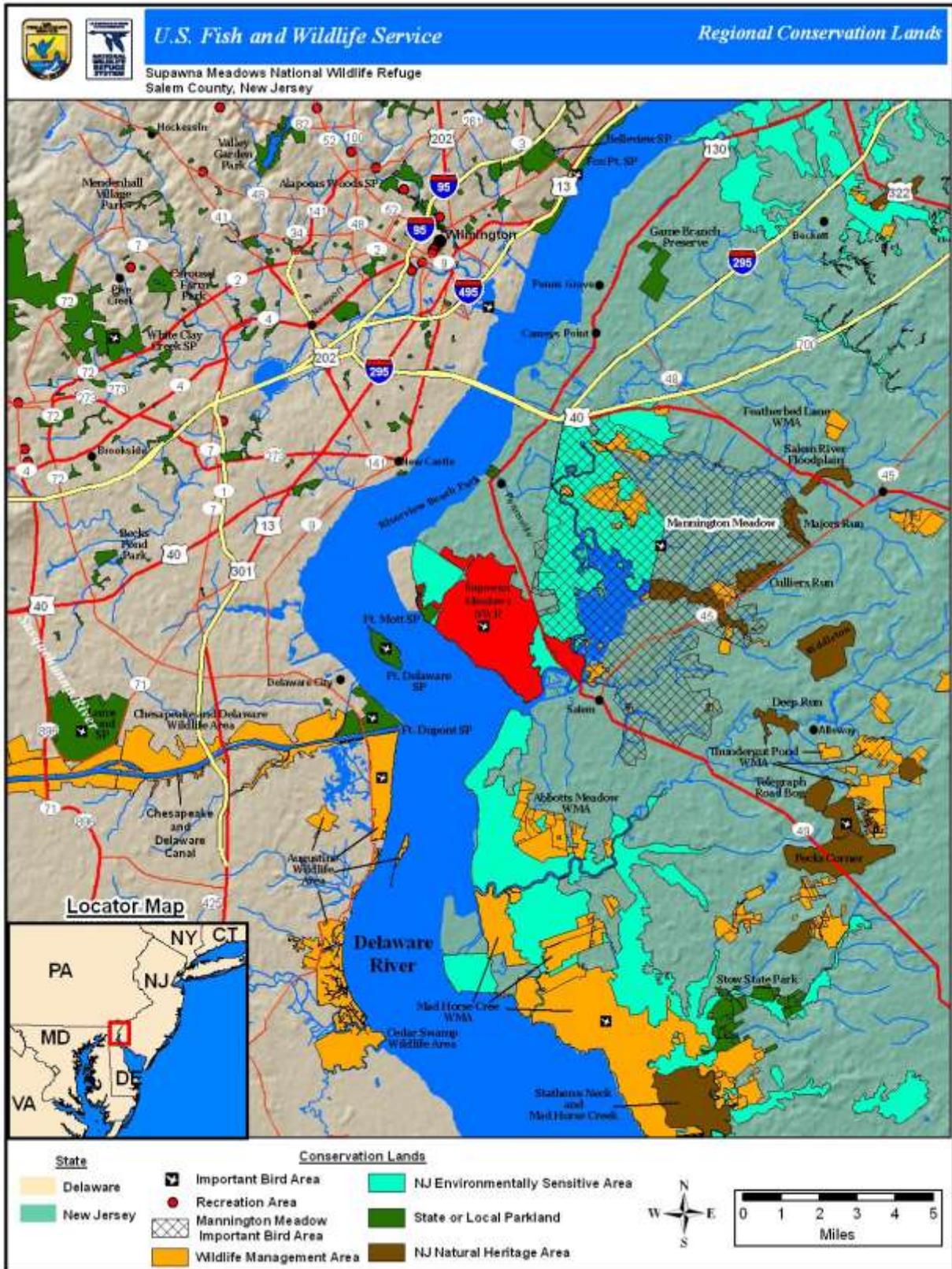
Mannington-Nanticoke complex, 0 to 1 percent slopes-This series consists of mucky silt loam, formed in silty estuarine deposits over organic, herbaceous material. These soils are non-acidic, fine silty, mixed soils that are very poorly drained, frequently flooded, and occur in tidal flats.

Mattapex silt loam, 2 to 5 percent slopes-These are very deep, moderately well drained soils formed from silty eolian deposits over coarser fluviomarine deposits. They have moderate to rapid permeability and are slightly acidic.

Othello, Falsington, and Trussum soils, 0 to 2 percent slopes-Both the Falsington and Othello series are very deep, poorly drained soils formed from silty eolian deposits over fluviomarine deposits. These occur on upland flats and depressions.

Regional Conservation Lands

There are several state, Federal, and locally managed conservation lands in the vicinity of Supawna Meadows NWR (map 3.3).



Map 3.3. Regional conservation lands around Supawna Meadows National Wildlife Refuge.

Socioeconomic Setting

Located in the southwestern corner of New Jersey, Salem County is bordered by Gloucester County to the north, Cumberland County to the east and south, and the Delaware River to the west. While only 15 minutes from Wilmington, Delaware and 35 minutes to Philadelphia, Pennsylvania, Salem County remains by far the least populated county in New Jersey. In spite of its close proximity to these urban and regional centers and major roadways (such as the New Jersey Turnpike, I-295, U.S. Routes 40 and 130, and New Jersey State Highways 45 and 49), only 13 percent of the county's land has been developed for residential, commercial, or industrial use. The remaining 90 percent of the county is farmland or tidal and freshwater wetlands, lakes, ponds, and forests (NJDEP 2002b).

Salem County

Salem County has, for the most part, maintained its traditional industries and land use patterns. The original settlements were made in the western end of the county where a network of rivers, streams, and creeks feed into the Delaware River. Lumber and grain mills were established among the major creeks as early industry was supported by timber and agriculture. Agriculture has played an important role in Salem County, both prior to European settlement, when it was inhabited by the Lenni Lenape Tribe, and through the 17th Century arrival of the Swedes, Finns, and Quakers (Salem County Visitors Center 2010).

Approximately 40 percent of the county contains productive farmland today, largely concentrated in the rural central and eastern sections. According to the Census of Agriculture, more than \$70.5 million of agricultural products were grown and raised on the 753 farms in Salem County in 2002 (USDA 2002). Salem ranks first in the State for wheat, barley, sweet corn, and potatoes, and second for milk production, soybeans, asparagus, and corn harvested for grain. Representing more than 10 percent of the State's agricultural market, Salem County is among the leaders for many other agricultural products as well (USDA 2002).

While agriculture is the mainstay of the eastern and central sections, western Salem County remains home to industry, the county's major employer. For more than a century, E.I. DuPont de Nemours and Company (DuPont) has formed the backbone of the chemical industry. At its peak in 1917, DuPont reportedly employed 25,000 people. By the 1960s, DuPont Chambers Works was the largest chemical factory in the world and DuPont employed 25 percent of Salem County households. Since then, the manufacturing industry in the United States has declined, as have the payrolls and outputs of DuPont and other companies in Salem County. Global competition and environmental regulations have led DuPont to relocate many of the site's business lines, cease operations of some altogether, and otherwise downsize its operation at the Chambers Works facility. The corresponding reduction in the industrial tax base, diminished employment opportunities, and significant loss of disposable income in the community has compromised the high quality of life associated with Salem County. By 2000, the county's per capita income was \$20,874, 23 percent lower than the State's per capita income of \$27,006 (US Census 2000).

Pennsville Township

Pennsville Township comprises 23.10 square miles located in the Philadelphia-Camden Metropolitan area. Pennsville has a population of 13,194, according to the 2000 Census. Estimated median household income in 2007 was \$57,310, which increased about 17 percent from \$47,494 in 2000. The town is predominately white, non-Hispanic (96.1 percent); Hispanic is the second largest demographic, at 1.6 percent (City Data 2009).

Contribution of the Refuge to the Local Economy

Refuges provide many benefits to local economies. Property values and associated property taxes often increase near open spaces, benefitting local communities (Gies 2009). In addition, land in public ownership requires little in the way of services from municipalities, yet provides valuable recreation opportunities for local residents. Based on a 2006 report completed by the Service, over 34 million people visited refuges for recreation that year (Carver and Caudill 2007). These visits generated almost \$1.7 billion in sales for regional economies, supporting 27,000 jobs and nearly \$543 million in employment income. Refuge recreation spending generated an additional \$185.3 million in tax revenue at the local, county, state, and Federal levels.

National wildlife refuges currently contribute to local economies through shared revenue payments. Under the provisions of the Refuge Revenue Sharing Act (the Act of June 15, 1935, 16 U.S.C. §715s), the Service pays an annual refuge revenue sharing payment to counties that contain lands the Service administers. The exact amount of the annual payment depends on Congressional appropriations, which in recent years have tended to be less than the amount to fully fund the authorized level of payments. Those payments will be continued in accordance with the law, commensurate with changes in the appraised market value of refuge lands, and new appropriation levels dictated by Congress. Recent Service revenue sharing payments for Supawna Meadows NWR are presented in table 3.3.

Table 3.3. Supawna Meadows NWR Revenue Sharing Payments

Year Paid	Amount Paid*
2000	\$9,396.00
2001	\$8,199.00
2002	\$8,369.00
2003	\$7,818.00
2004	\$7,549.00
2005	\$6,677.00
2006	\$7,541.00
2007	\$7,816.00
2008	\$7,558.00
2009	\$5,864.00

*Paid to Pennsville, Salem County

Refuge Administration

The refuge’s approved acquisition boundary encompasses approximately 4,527 acres along the Delaware and Salem Rivers in Pennsville Township, New Jersey. The refuge boundaries are defined by the Delaware River, Salem River, New Jersey Route 49, West Supawna Road, Fort Mott Road, and Lighthouse Road (see map 1.3 in chapter 1).

Supawna Meadows NWR Land Acquisition History

Table 3.4 lists the land acquisition history for the refuge. The dates from the 1800s represent when some of the original refuge lands were first transferred from private ownership to the Federal government. These properties were owned by different Federal agencies and were eventually transferred to the U.S. Fish and Wildlife Service.

Table 3.4. Land acquisition history for Supawna Meadows NWR

Acquisition Year	Acres	Price*
1837	18.89	0
1837	19.01	\$1,500.00
1876	1.86	0
1935	1.86	0
1941	5.0	0
1973	562.4	0
1973	91.0	\$300,000.000
1974	41.8	\$15,700.00
1979	1002.3	0
1979	11.9	\$154,044.00
1987	367.5	0
1987	114.4	\$84,000.00
1990	81.06	0
1990	254.47	\$415,000.00
1992	288.4	0
1992	32.8	\$327,400.000
2006	121.0	0
2009	254.3**	0
Total	3,270.05	\$1,297,644.00

*Zero price indicates land was donated

**All held in conservation easement

Operating Budget

With the complexing of Supawna Meadows NWR to Cape May NWR in 2004 and the implementation of the Northeast Region's Strategic Workforce Plan in 2006, no specific operating budget has been allocated for Supawna Meadows NWR. All operation and maintenance funding for Supawna Meadows NWR is supported by Cape May NWR's allocated annual budget.

Supawna Meadows NWR Staffing

The staff at Supawna Meadows NWR once consisted of a wildlife biologist, a maintenance worker (with collateral law enforcement duties), and an administrative support assistant. When the Northeast Region's Strategic Workforce Plan was implemented in 2006, the refuge was deemed an unstaffed satellite of Cape May NWR. The plan eliminated the wildlife biologist and administrative support assistant, and the maintenance worker position was relocated to Cape May NWR. Supawna Meadows NWR currently has no onsite staff. Cape May NWR currently has six full-time staff. Annually, about 20 percent of each full-time employee's time from Cape May NWR is spent providing management, maintenance, or law enforcement support to Supawna Meadows NWR (for more detailed information on staffing refer to appendix E).

Facilities and Maintenance

The refuge headquarters office is located along Lighthouse Road adjacent to the FPRRL. The building design was modeled after the FPRRL keeper's house to compliment this historic structure. It serves as office space for staff as well as a reception area for visitors; however, the building is currently unoccupied because there is no staff assigned to Supawna Meadows NWR. Also located at this site are a four-bay garage for storing equipment and three other outbuildings, including a small building that used to store oil for FPRRL. Buildings at the previous headquarters site, located approximately 0.5 miles from the refuge headquarters off Lighthouse Road, include a barn, garage, house, and office. The

refuge has two housing quarters. One is located off Route 49 and is currently used to house temporary employees. The other, located off Lighthouse Road, is vacant.

Refuge Operational Plans
("Step-down" Plans)

The Service Manual, Part 602, chapter 4 (Refuge Planning Policy), identifies more than 25 step-down management plans that generally are required on refuges. Those plans provide the details necessary to "step-down" general goals and objectives to specific strategies and implementation schedules. Some require annual revisions; others are revised every 5 to 10 years. Some require additional NEPA analysis, public involvement, and compatibility determinations before they can be implemented.

The following step-down plans are completed and up-to-date:

- Hunt Plan (reviewed annually)
- Fishing Plan (reviewed annually)
- Safety Plan
- Continuity of Operations Plan
- Fire Management Plan

The following step-down plans need to be completed for the refuge:

- Habitat Management Plan (HMP) (the highest priority plan to complete)
- Water Management Plan (to be incorporated into HMP)
- Law Enforcement Plan
- Integrated Pest Management Plan (to be incorporated into HMP)
- Facilities Plan
- Sign Plan
- Visitor Services Plan

Partnerships

The reduced staff time at Supawna Meadows NWR has limited our ability to fully participate in partnerships with agencies and organizations with which we have common conservation goals. We currently maintain partnerships with New Jersey Forest Fire Service, NJDFW, Friends of Supawna Meadows NWR, and New Jersey Audubon Society.

Volunteer Program

Approximately seven people regularly volunteer on the refuge. The primary duties consist of maintenance activities such as mowing around facilities and mowing and maintaining trails. The activities of the volunteers are critical to the operation of the refuge due to the lack of assigned full-time staff. Volunteers also engage in outreach activities sponsored by the Friends of Supawna Meadows NWR.

Friends Program

The Friends of Supawna Meadows NWR was created in 2003 by local residents and volunteers. The mission of the group is "To enhance this national treasure by fostering community awareness, conducting outreach and environmental education, and supporting habitat and wildlife conservation on the refuge." The group currently consists of about 50 members; however, the number of members is increasing and the group is actively working to raise the profile of the refuge.

The group's primary annual activity is the Youth Fishing Event, usually held in early June. Up to 100 youths attend the fishing derby. Participants are provided the gear and bait needed to fish. They also receive a free lunch and a prize.

Other activities organized by the Friends group include nature walks, trail maintenance days, and off-site outreach at local festivals such as Septemberfest and the Winter Raptor Festival. The Friends Group is also active in educating local and Federal officials about refuge needs and events.

Research	An impoundment study was conducted on the Tract 11 impoundment from 2005 through 2008 in cooperation with 22 other refuges in the Northeast and Midwest. The objectives of the study were to determine the response of waterbirds, plants, and invertebrates while providing habitat for migratory waterbirds; to use impoundment bathymetric data to meet spring shorebird, fall shorebird or fall waterfowl habitat requirements; and to study vegetation response to spring and summer drawdowns. Water levels in the impoundment were lowered for shorebird use and raised for waterfowl use during various times of year.
Special Use Permits	In general, special use permits are issued for associated wildlife related research projects or studies to cooperating partners such as NJDFW, New Jersey Audubon Society, and others. Proposed research projects and other compatible uses are issued special use permits when they are determined to be beneficial to the refuge mission.
Biological Resources	This section describes the physical characteristics and plant species composition of the principal refuge habitats as well as the invasive plant species that occur. It also identifies the wildlife species of conservation concern that use those habitats. Table 3.5 summarizes the acreage of each habitat type within the refuge. Approximately 87 percent of the refuge is in wetlands and impoundments, the other 13 percent is upland.
Tidal Marsh	<p>The largest single habitat type on Supawna Meadows NWR is slightly brackish (0 to 8 parts per thousand) tidal marsh, which comprises 2,423 acres, about 75 percent of the refuge's acreage. This habitat type includes marsh habitat (1,931 acres) and the open water tidal rivers and creeks (492 acres). The tidal marsh soils consist of organic silts and fine to very coarse dredge river material. They occur on flats along the Delaware River to a depth of 20 feet. These features are regularly flushed during high tides. Tidal pools and ponds are generally found in the interior portions of regularly flowing tidal marshes, but these water bodies themselves may not be flooded on every tidal cycle.</p> <p>The tidal marsh west of Route 49 was diked and drained for farming in the 18th century. Portions of the dike blew out in the 1930s, and the marsh reflooded. Originally, there was more sheet flow from the Delaware Bay to Mannington Meadow (to the east of Route 49). However, flow is now restricted to a few locations and Mannington Meadow is fresher than the marshes on the west side of Route 49.</p> <p>The portion of the refuge east of Route 49 lies within Mannington Meadow and contains a diversity of vegetation. Dominant species include smooth cordgrass (<i>Spartina alterniflora</i>), pickerelweed (<i>Pontederia cordata</i>), water hemp (<i>Amaranthus cannabinus</i>), wild rice (<i>Zizania aquatica</i>), rice cutgrass (<i>Leersia oryzoides</i>), and common reed or phragmites. The Baldridge Creek area contains a diversity of vegetation similar to that found in the Mannington Meadow area, but there is a greater amount of phragmites in this area. Several rare plants occur in tidal marshes on the refuge (for example, seashore mallow (<i>Kosteletzkya virginica</i>) and long-awned sprangletop (<i>Leptochloa fascicularis</i> var. <i>maritima</i>)).</p> <p>The Mill Creek and Mud Creek areas of the tidal marsh are extensively dominated by phragmites, which is the most prevalent invasive plant found on the refuge. Altogether, about 859 acres of the tidal marsh remain in native marsh vegetation; 762 acres are phragmites-dominated.</p> <p>Breeding birds that inhabit the tidal marsh include the clapper rail (<i>Rallus longirostris</i>), king rail (<i>Rallus elegans</i>), least bittern (<i>Ixobrychus exilis</i>), coastal plain swamp sparrow (<i>Melospiza georgiana nigrescens</i>), seaside sparrow</p>

Table 3.5. Habitats and refuge acres for Supawna Meadows NWR

Habitat Type	Current Acreage
Developed	27.26
Developed	0.42
Levee	5.21
Road	7.29
Rural	14.34
Forested Uplands	240.14
Mesic Mixed Oak Forest	22.73
Northeastern Modified Successional Forest	139.16
Norway Spruce Plantation	1.10
Successional Sweetgum Forest	77.15
Forested Wetlands	181.97
Red Maple - Sweetgum Swamp	172.03
Red Maple / Lizard's-tail Swamp	9.94
Grassland	122.02
Cropland	36.25
Hay	5.22
Northeastern Old Field	77.78
Pasture	2.78
Herbaceous Wetland	41.61
Freshwater Phragmites Marsh	38.79
Smartweed Pond	0.35
Successional Wet Meadow	2.48
Impoundments with Water Control Structures	85.61
Impoundments without Water Control Structures	3.98
Creeping Lovegrass Coastal Plain Pond	1.30
Other Impoundments	2.68
Scrub/Shrub Uplands	37.87
Northeastern Modified Successional Shrubland	37.87
Scrub/Shrub Wetlands	56.00
Northeastern Modified Successional Shrubland	56.00
Scrub/Shrub Wetlands (Tidal)	27.66
Maritime Shrubland (northern bayberry type)	3.90
Northeastern Modified Successional Shrubland	23.76
Tidal Marsh	1,934.05
Atlantic Giant Cordgrass Marsh	5.41
Brackish Meadow	2.31
Brackish Tidal Low Marsh	64.63
Cattail Brackish Marsh	370.41
Mesohaline Seepage Marsh	2.53
Oligohaline Marsh	47.27
Tidal Phragmites Marsh	1,438.23
Woolgrass Marsh	0.26
Open Waters	491.70
Grand Total	3,249.89*

*Includes 231 acres held under conservation easement by the refuge. The owners have reserved certain rights on an additional 20 acres of this easement so these acres are not included.

(*Ammodramus maritimus*), and sedge wren (*Cistothorus platensis*). The tidal marsh is an important foraging area for the nine Pea Patch Island colonial-nesting wading birds, which include five priority species: little blue heron (*Egretta caerulea*), glossy ibis (*Plegadis falcinellus*), snowy egret (*Egretta thula*), black-crowned night-heron (*Nycticorax nycticorax*), and least bittern.

The tidal marsh supports raptors including the bald eagle (*Haliaeetus leucocephalus*) and osprey (*Pandion haliaetus*). The marsh also provides migrating and wintering habitat for two populations of the Canada goose (*Branta canadensis*), Atlantic Population Canada geese and North Atlantic Canada geese; and for the tundra swan (*Cygnus columbianus*). It also supports migrating shorebirds such as the semipalmated sandpiper (*Calidris pusilla*), dunlin (*Calidris alpina*), and greater yellowlegs (*Tringa melanoleuca*).

The tidal marsh supports a diversity of other wildlife species including the marsh rice rat (*Oryzomys palustris*), a New Jersey nongame species of conservation concern (NCC), and the northern diamondback terrapin (*Malaclemys terrapin terrapin*). It also supports NCC insects of conservation concern such as the frosted elfin butterfly (*Callophrys irus*) and a noctuid moth (*Macrochilo sp. 1 nr. absorptalis*).

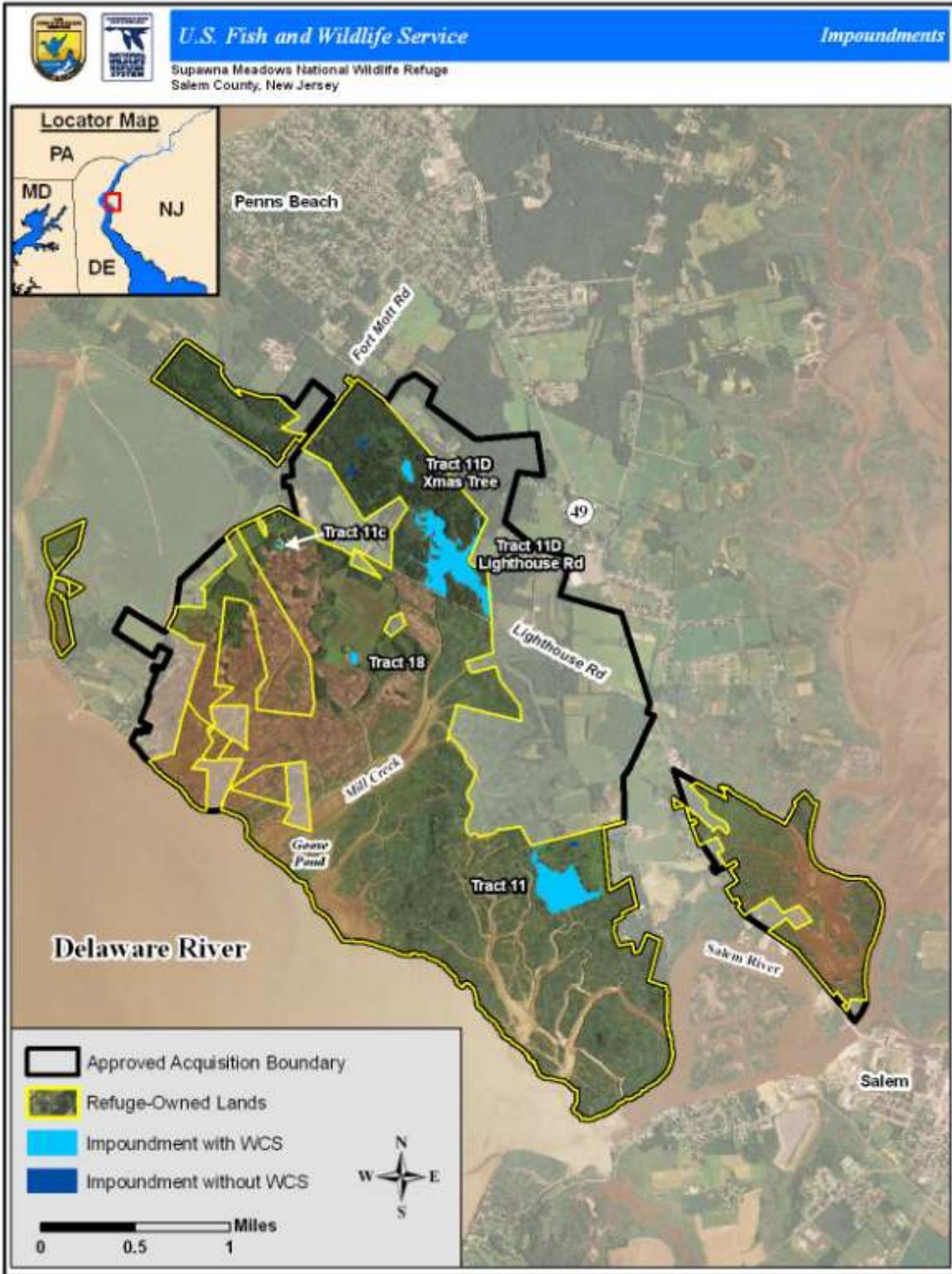
Managed Impoundments and Ponds

The refuge has five impoundments with water control structures, totaling approximately 84 acres (table 3.6, map 3.4). A natural increase in water levels can occur from rainfall and from natural springs. In these impoundments, boards are placed or removed to control the water level; either releasing impounded waters or allowing tidal water to flow into the impoundment. Currently, the water level is managed in three of the five impoundments.

Table 3.6. Managed impoundments of Supawna Meadows NWR

Name	Location	Size (acres)	Habitat:
Tract 11	Off West Supawna Road	30	cattail marsh; surrounded by tidal marsh and farm fields
Tract 11C	Behind new office/quarters	0.3	open water; surrounded by tidal marsh, forested and scrub/shrub wetlands, old field
Tract 11D Lighthouse Rd (LHR)	On Lighthouse Rd	48.5	open water; surrounded by tidal marsh, forest
Tract 18	At old office/barn	1.5	open water; surrounded by grassland and tidal marsh
Tract 11D Xmas Tree Lane (XTL)	Off X-mas Tree Lane/ off Forest Habitat Trail	3.3	open water; surrounded by forest

The Tract 11 impoundment is a 30-acre freshwater emergent wetland adjacent to the tidal marsh. A water control structure at the head of a tidal creek is used to manipulate water levels within the impoundment. Prescribed fire has been used to control vegetation in the impoundment. Mowing and flooding can also be used to reduce overcrowding vegetation. Water levels are managed to provide habitat for trust resources, primarily shorebirds, wading birds, and waterfowl. Plants that occur in this impoundment include Walter’s cockspur grass (*Echinochloa walteri*), spreading panic grass (*Panicum dichotomiflorum*), cattail (*Typha sp.*), bulrush (*Scirpus sp.*), and sedges (*Cyperus sp.*). Several rare plants occur in and around this impoundment including hooded arrowhead (*Sagittaria calycina var.*



Map 3.4. Impoundments at Supawna Meadows National Wildlife Refuge.

calycina) and giant foxtail (*Setaria magna*). Invasive species such as phragmites, purple loosestrife (*Lythrum salicaria*), Canada thistle, and mile-a-minute weed are displacing native species in the impoundments and along the dikes.

Breeding birds that use the impoundments include the little blue heron, marsh wren (*Cistothorus palustris*), American black duck (*Anas rubripes*), wood duck (*Aix sponsa*), and clapper rail.

Also supported are spring-migrating shorebirds including the semipalmated sandpiper, greater yellowlegs, and dunlin. In response to impoundment management for spring-migrating shorebirds during 2000 to 2001, almost 3,000 shorebirds were observed in the Tract 11 impoundment during late May at the peak of the spring migration. In 2004, weekly shorebird surveys were conducted from March through July at high tide. Greater yellowlegs, lesser yellowlegs (*Tringa flavipes*), semipalmated sandpipers, least sandpipers (*Calidris minutilla*), dunlin, common snipe (*Gallinago gallinago*), solitary sandpipers (*Tringa solitaria*), spotted sandpipers (*Actitis macularia*), and semipalmated plovers (*Charadrius semipalmatus*) were observed. The greatest number of shorebirds was detected on May 11 when 840 shorebirds, mostly semipalmated and least sandpiper, were observed.



USFWS

Tract 11 Impoundment

The Pea Patch Island wading birds use the impoundments for foraging. Weekly wading bird surveys were conducted from March through September 2002 at high tide. Great blue herons, (*Ardea herodias*), great egrets (*Ardea alba*), snowy egrets, little blue herons, cattle egrets (*Bubulcus ibis*), and glossy ibis were observed. The greatest number of wading birds was observed in the Tract 11 impoundment on May 14 when 63 individuals of 6 species were counted.

Weekly waterfowl surveys were conducted January through March and September through December 2002. American black ducks, Canada geese, gadwall (*Anas strepera*), green-winged teal (*Anas carolinensis*), mallards (*Anas platyrhynchos*), northern pintail (*Anas acuta*), and wood ducks were observed. The greatest number of ducks and geese was observed in the Tract 11 impoundment on November 25 when 326 Canada geese, 15 green-winged teal, 190 mallards, and 329 Northern pintail were counted.

Common snapping turtles (*Chelydra serpentina*), red-eared sliders (*Trachemys scripta elegans*), redbelly turtles (*Pseudemys rubriventris*), eastern painted turtles (*Chrysemys picta picta*), northern water snakes (*Nerodia sipedon*),

southern leopard frogs (*Rana sphenoccephala*), and northern spring peepers (*Pseudacris crucifer crucifer*) also are present in this impoundment. A number of amphibian and reptile species use all of the impoundments, including the **Fowler's toad** (*Bufo woodhousii fowleri*), which is listed as a non-game species of conservation concern by the New Jersey Division of Wildlife.

There are a number of small, unmanaged impoundments that lack water control structures. These consist of old clay pit ponds and other depressions in the forested areas. The ponds are man-made, most have high berms surrounding them, and some have drainage outlets. These impoundments are generally open water and unvegetated. However, the edges contain some plant species, such as **Walter's cockspur grass, spreading panic grass, cattail, bulrush, and sedges**. Wood duck and eastern screech owls (*Megascops asio*) benefit from nest boxes placed near these unmanaged impoundments.

Forested Wetlands

Forested wetlands comprise about 182 acres of refuge land. These wetlands are closed canopy swamps dominated by deciduous trees. The forest is interspersed with permanent and vernal ponds. Mature trees mostly have a 14 to 20 inch diameter breast height (dbh); dominant species include red maple (*Acer rubrum*), willow oak (*Quercus phellos*), sweetgum (*Liquidambar styraciflua*), and sour gum (*Nyssa sylvatica*). Dominant understory plants include southern arrowwood (*Viburnum dentatum*) and sweet pepperbush (*Clethra alnifolia*). Common groundcover plants include New York fern (*Thelypteris noveboracensis*) and false nettle (*Boehmeria cylindrica*). Several rare plant species occur in this habitat (for example, cutleaf water milfoil (*Myriophyllum pinnatum*) and stalked water horehound (*Lycopus rubellus*)). In many areas, the ground cover is dominated by the invasive plant Japanese stiltgrass (USFWS 2005a).

Upland Forests

Forested uplands, which include small forest openings not counted as scrub/shrub habitat, comprise about 240 acres of refuge land. At least 75 percent of the canopy coverage is from deciduous trees. The average height is at least 20 feet. Plant species include sweetgum, sour gum, black cherry (*Prunus serotina*), black oak (*Quercus velutina*), southern red oak (*Quercus falcata*), persimmon (*Diospyros virginiana*), American holly (*Ilex opaca*), and red maple. Dominant understory plants include southern arrowwood, highbush blueberry (*Vaccinium corymbosum*), and common greenbrier (*Smilax rotundifolia*).

Grassland

Approximately 86 acres of grassland habitat occur on the refuge, excluding cropland. A contiguous 78-acre grassland unit and several grassland patches of less than 6 acres occur on the refuge. The large grassland, located off Lighthouse Road, includes a diversity of grasses and forbs. It is maintained through mechanical methods, such as mowing, and by prescribed burning. Historically, the grassland was farmed; prior to farming, the conditions were maintained by fire that was periodically caused by lightning or man-made events. Some important plant species include cool season grasses, such as orchard grass (*Dactylis glomerata*), warm season grasses, such as switch grass (*Panicum virgatum*), and forbs, such as goldenrods (*Euthamia* sp. and *Solidago* sp.), and eupatoriums (*Eupatorium* sp.) (USFWS 2005a). Invasive plants of the grassland include Canada thistle, Chinese lespedeza (*Lespedeza cuneata*), and autumn olive. The grassland habitat does not support a large number of breeding birds but does provide migration and wintering habitat for songbirds, such as the bobolink, vesper sparrow, eastern meadowlark, and savannah sparrow, and for raptors, such as the northern harrier and short-eared owl.

Scrub/Shrub Habitat

There are approximately 122 acres of scrub/shrub and early successional habitats spread across the refuge, comprised of 84 acres of wetlands and 38 acres of uplands. These areas are dominated by a mixture of native plants (e.g.,

blackberry, goldenrod, grapevine, and bayberry (*Myrica pensylvanica*) and invasive plants (e.g., multiflora rose, autumn olive, Japanese honeysuckle, mile-a-minute weed, and phragmites) (USFWS 2005a).

Forest openings are mostly dominated by invasive plants (e.g., autumn olive, multiflora rose, Japanese honeysuckle, Japanese stiltgrass, and mile-a-minute vine). Other common plants in the forest openings include sweetgum, black cherry, blackberry (*Rubus* sp.), and grape vines (*Vitis* spp.). There are large patches within the mature forest where invasives do not occur. These patches host a number of S1³ and S2⁴ plants, including round-fruited hedge-hyssop (*Gratiola virginiana*), southern twayblade (*Listera australis*), stalked water horehound, cutleaf water milfoil, loblolly pine (*Pinus taeda*), and fragrant ladies' tresses (*Spiranthes cernua* var. *odorata*) (USFWS 2005a).

Invasive Plants

Invasive plants are found in all refuge habitats as discussed under each of the habitat types, but most importantly in the refuge's tidal marsh. The relative predominance of these species is shown in table 3.7, listing the most recent estimates of acreage across the refuge for each species.

Table 3.7. Important invasive plants* of Supawna Meadows NWR.

Common Name	Scientific Name	Total Acreage	Acres of Dense (Monotypic) Coverage
Phragmites/Common reed**	<i>Phragmites australis</i>	531	511
Japanese stiltgrass	<i>Microstegium vimineum</i>	78	57
Japanese honeysuckle	<i>Lonicera japonica</i>	120	16
Mile-a-minute vine	<i>Polygonum perfoliatum</i>	63	6
Autumn olive	<i>Elaeagnus umbellata</i>	72	2
Reed canary-grass	<i>Phalaris arundinacea</i>	2	2
Asiatic bittersweet	<i>Celastrus orbiculatus</i>	16	< 1
Multiflora rose	<i>Rosa multiflora</i>	93	< 1
Canada thistle	<i>Cirsium arvense</i>	44	< 1
Chinese lespedeza	<i>Lespedeza cuneata</i>	2	< 1
Wild Garlic	<i>Allium vineale</i>	5	< 1
Johnsongrass	<i>Sorghum halepense</i>	1	< 1
Bristled knotweed	<i>Polygonum caespitosum</i>	11	< 1
Black locust	<i>Robinia pseudoacacia</i> *	9	0
Purple loosestrife	<i>Lythrum salicaria</i>	1	0

*occupying a minimum of 1 acre as of 2002

**phragmites was not entirely mapped; the actual acreage is much higher.

Climate Change and Effects of Relative Sea Level Rise

Global climate change has already had an observable impact in the Northeastern United States, including an increase in the water temperatures, more days over 90 degrees Fahrenheit, less precipitation as snow fall, and sea level rise (Frumhoff et al. 2007). According to the Intergovernmental Panel on Climate Change (IPCC), sea level has risen worldwide approximately 4.8 to 8.8 inches (12 to 22 cm) during the last century (IPCC 2007). While there is some variation in projected sea level rise (e.g., Rahmstorf 2007, Pfeffer et al. 2008), the IPCC

³ S1: At very high risk due to extreme rarity (often 5 or fewer populations or occurrences in the State), very steep declines, or other factors.

⁴ S2: At high risk due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.

projects sea levels will rise an additional 7.1 to 23.2 inches, about 0.07 to 0.23 inches per year, between 1999 and 2099 (IPCC 2007). The historic trend for sea level rise for the refuge is 0.136 inches per year, about twice the global average for the last 100 years.

Tidal marshes are highly susceptible to effects of climate change, especially sea level rise. In an effort to address potential effects of sea level rise on refuges, the Service contracted the application of Sea Level Affecting Marshes Model (SLAMM) for many refuges in the Northeast, including Supawna Meadows NWR (see appendix G for SLAMM report). The SLAMM analysis looks at effects of projected sea level rise on the refuge's approved acquisition boundary under five scenarios: 1.28 ft, 2.26 ft, 3.28 ft, 4.92 ft, and 6.56 ft by 2100. Results from SLAMM indicate that by 2025 there will be noticeable changes in refuge habitats under all scenarios. For example, saltwater intrusion will increase salinity and the amount of saltmarsh within the refuge boundary between 140 and 200 percent (adding between 219 and 300 acres). Other tidal marsh habitats will likely decrease between 14 and 18 percent (losing about 300 to 400 acres). Over this same time span, tidal creeks within the refuge will likely increase between 22 and 31 percent (between 150 and 220 acres). Because much of the refuge's habitat is tidally influenced, sea level rise will likely change the species composition and associated habitat management for much of the refuge. We have not modeled potential effects of increased air temperatures and changes in seasons; however, these are likely to be much smaller compared to sea level rise given the tidal influence over much of the refuge's habitats.

Federally listed
Threatened or Endangered
Species and Other
Species and Habitats of
Special Management
Concern

The following federally listed threatened or endangered species may enter the Delaware Bay and may occasionally travel up the river as far as the refuge:

- Atlantic hawksbill
- Atlantic loggerhead
- Atlantic ridley
- Atlantic leatherback
- Shortnose sturgeon

All of these species are under the jurisdiction of NOAA. No sea turtle nesting habitat is present on the refuge. The shortnose sturgeon is present in the Delaware River; however, this species prefers larger rivers (Dadswell et al. 1984) and is not expected to occur within the refuge boundary. Whales occasionally enter the Delaware Bay, and one individual is known to have strayed as far north as Philadelphia, Pennsylvania.

Sensitive joint-vetch, a federally listed threatened species, has been reported at two locations near the refuge. It was found on the muddy tidal banks of the Delaware River on August 8, 1881 and to the north of the refuge in 1934. No plants were found during a brief survey conducted on September 30, 1992 (Snyder 2010 personal communication).

We will continue to consult with the Service's Ecological Services division and NOAA, as appropriate, regarding refuge activities that may affect federally listed threatened and endangered species. In addition, to ensure compliance with the ESA, this document has been subject to intragovernmental review under Section 7 of the ESA.

New Jersey maintains a State list of threatened or endangered species. Of these species, the osprey successfully nests on the refuge. Great blue heron feed on the refuge throughout the year. Bald eagles have nested on the refuge since 1998. Another pair of bald eagles has been maintaining a nest in the adjacent Salem River Wildlife Management Area. Peregrine falcons (*Falco peregrinus*) nest on

the Delaware Memorial Bridge, approximately seven miles north of the refuge. Peregrines may occasionally use the refuge for feeding and are occasionally observed during migration. Coast flatsedge (*Cyperus pseudovegetus*), a State-listed endangered species, was collected along the Delaware River on October 29, 1934. Floating pennywort (*Hydrocotyle ranunculoides*), another State-listed endangered species, was observed on the north side of Lighthouse Road, west/northwest of Harrisonville, in 1967 and again in 1985.

Appendix A lists the animals potentially found on the refuge that are federally listed threatened or endangered or are State-listed threatened, endangered, or a species of special concern.

Birds

Supawna Meadows NWR is located in the Atlantic Flyway where birds migrating from interior Canada and the coastal provinces merge to form the main stem of the flyway. The refuge not only serves as an important migration area, but also provides wintering habitat for large numbers of waterfowl. Midwinter waterfowl inventory flights for the Salem River watershed averaged more than 2,000 dabbling ducks and more than 11,500 Canada geese during the 2009 midwinter count (USFWS 2009d). Over 300 species of birds can be observed in Salem County during the year. Supawna Meadows NWR provides habitat for regionally and nationally significant species such as rails, neotropical migrants, and raptors (USFWS 2005a).

In describing the Supawna Meadows NWR Important Bird Area (IBA), the New Jersey Audubon Society noted the following:

The Supawna Meadows IBA provides breeding habitat for the State endangered bald eagle. Over 20 State threatened king rails also breed at this site. Significant numbers of breeding mixed upland forest, shrub/scrub, and forested wetland-dependent species occur at Supawna Meadows. The refuge marshes provide valuable foraging habitat for more than 6,000 pairs of colonial wading birds nesting less *than a mile away on Delaware's Pea Patch Island*. One of the largest heron rookeries on the east coast north of Florida supports nine species: great blue heron, great egret, little blue heron, tricolored heron, snowy egret, cattle egret, black and yellow-crowned night-heron and glossy ibis. The refuge provides important resting and feeding habitat for spring and fall migrants including waterfowl species and passerines. Mallards and northern pintails also winter at the refuge.

New Jersey Audubon Society 2009

Waterfowl

Thousands of waterfowl, including American black duck, American widgeon (*Anas americana*), Canada goose, blue-winged teal (*Anas discors*), green-winged teal, gadwall, mallard, northern pintail, snow goose (*Chen caerulescens*), and tundra swan use the refuge tidal marsh during winter and migration (USFWS 2005a).

Coastal salt marsh habitats of the mid-upper Atlantic coast, including the Delaware Bay marshes and Supawna Meadows NWR, have been identified by the Black Duck Joint Venture as the most important habitat for wintering black duck. Coastal wetlands, including the Delaware Bay marshes, are of international importance to wintering waterfowl, annually wintering 34 percent of the entire Atlantic Flyway black duck population (Black Duck Joint Venture 2008).

Raptors	<p>Notable raptor species observed on the refuge include bald eagle, northern harrier (<i>Circus cyaneus</i>), sharp-shinned hawk (<i>Accipiter striatus</i>), Cooper's hawk (<i>A. cooperii</i>), red-shouldered hawk (<i>Buteo lineatus</i>), red-tailed hawk (<i>Buteo jamaicensis</i>), American kestrel (<i>Falco sparverius</i>), and peregrine falcon. A number of State-listed endangered northern harriers and State-listed threatened osprey nest in the refuge tidal marsh (USFWS 2005a). A pair of bald eagles has nested on the refuge since 1998.</p>
Forest Birds	<p>The forest supports breeding wood thrush (<i>Hylocichla mustelina</i>), eastern wood-pewee (<i>Contopus virens</i>), northern flicker (<i>Colaptes auratus</i>), and Baltimore oriole (<i>Icterus galbula</i>); and migrating black-and-white warbler (<i>Mniotilta varia</i>), hooded warbler (<i>Wilsonia citrina</i>), and Kentucky warbler (<i>Oporornis formosus</i>), as well as Cooper's hawk.</p>
Grassland Birds	<p>As mentioned previously, the refuge's grassland habitat does not support a large number of breeding grassland birds, but it does support migrating and wintering songbirds, including the bobolink (<i>Dolichonyx oryzivorus</i>), vesper sparrow (<i>Poocetes gramineus</i>), eastern meadowlark (<i>Sturnella magna</i>), and savannah sparrow (<i>Passerculus sandwichensis</i>), as well as raptor species such as northern harrier and short-eared owl (<i>Asio flammeus</i>).</p>
Marsh, Wading, and Shorebirds	<p>Supawna Meadows NWR provides foraging habitat for more than 6,000 pairs of 9 species of wading birds that nest on Pea Patch Island, one of the largest rookeries on the East Coast. Specifically, black-crowned night-heron, yellow-crowned night herons (<i>Nyctanassa violacea</i>) (State-listed threatened), great egret, and little blue heron (State species of special concern) forage in the tidal marsh throughout the breeding season. The refuge receives significant use by shorebirds during both spring and fall migrations, mostly least sandpiper and semipalmated sandpiper. King rail and least bittern (State species of special concern) breed in the refuge tidal marsh.</p> <p>Pea Patch Island and the surrounding area, including the refuge, have been designated a Special Management Area (SMA) by the States of New Jersey and Delaware in accordance with the Coastal Zone Management Act.</p> <p>The refuge receives significant use by shorebirds during both spring and fall migrations. Both the New Jersey and Delaware shores of the Delaware Bay are designated as International Shorebird Preserves, based on the importance of the estuary to migrating shorebirds.</p>
Mammals	<p>A large number of New Jersey non-game species of conservation concern mammals are on the refuge, including eastern small-footed myotis (<i>Myotis leibii</i>), eastern red bat (<i>Lasiurus borealis</i>), hoary bat (<i>Lasiurus cinereus</i>), silver-haired bat (<i>Lasionycteris noctivagans</i>), and southern bog lemming (<i>Synaptomys cooperi</i>).</p> <p>Common mammalian species include the meadow vole (<i>Microtus pennsylvanicus</i>), white-footed mouse (<i>Peromyscus leucopus</i>), short-tailed shrew (<i>Blarina brevicauda</i>), cottontail rabbit (<i>Sylvilagus floridana</i>), groundhog (<i>Marmota monax</i>), muskrat (<i>Ondatra zibethicus</i>), opossum (<i>Didelphis virginiana</i>), skunk (<i>Mephitis mephitis</i>), red fox (<i>Vulpes vulpes</i>), raccoon (<i>Procyon lotor</i>), mink (<i>Neovison vison</i>), long-tailed weasel (<i>Mustela frenata</i>), and river otter (<i>Lontra canadensis</i>).</p> <p>White-tailed deer are numerous on the refuge. The NJDFW estimates the deer density around Salem County, Hunting Management Zone 63, to be 40.4 deer per square mile based on the harvest data for 2003 through 2005 hunting seasons.</p>

The overall deer condition and productivity in this zone is considered excellent by the NJDFW. However, the high population of deer on the refuge, which has led to habitat overbrowsing, was the catalyst in initiating a special permit refuge deer hunting season in 1988. At least 50 deer are expected to be harvested annually from the refuge. Prior to 2008, deer hunting was conducted based on a permit system. Limited hunting seasons were open on the refuge for bow, shotgun, and muzzleloader. The number of hunters was limited to 35, 25, and 25 individuals, respectively, and hunters were selected through a random lottery system. Hunters were required to pay a fee for their refuge permit and attend a hunter orientation session. Beginning with the 2008 hunting season, the refuge is closed to all firearm seasons. The refuge is currently open for all of the State bow hunting seasons. There is no longer a lottery, permit, fee, or hunter orientation.

A large maternity colony of more than 1,500 bats, primarily the little brown bat, roosts in a barn on the refuge. The federally listed endangered Indiana bat is known to form small colonies within large little brown bat colonies. Indiana bats have been documented within the Highlands region of New Jersey, but little survey work has taken place within the southern portion of the State. It is not yet known if the species is present within the Coastal Plain. The nearest potential natural habitat for these bats is in a forest on the refuge about 1 mile from the barn (USFWS 2005a).

Reptiles and Amphibians

A number of amphibians and reptiles are found on the refuge, including the eastern painted turtle, common snapping turtle, eastern garter snake (*Thamnophis sirtalis*), black rat snake (*Elaphe obsoleta*), southern leopard frog, green frog (*Rana clamitans melanota*), and American bullfrog (*Rana catesbeiana*). Reptile and amphibian species of conservation concern include northern diamondback terrapin, eastern box turtle (*Terrapene carolina carolina*), spotted turtle (*Clemmys guttata*), and Fowler's toad (USFWS 2005a).

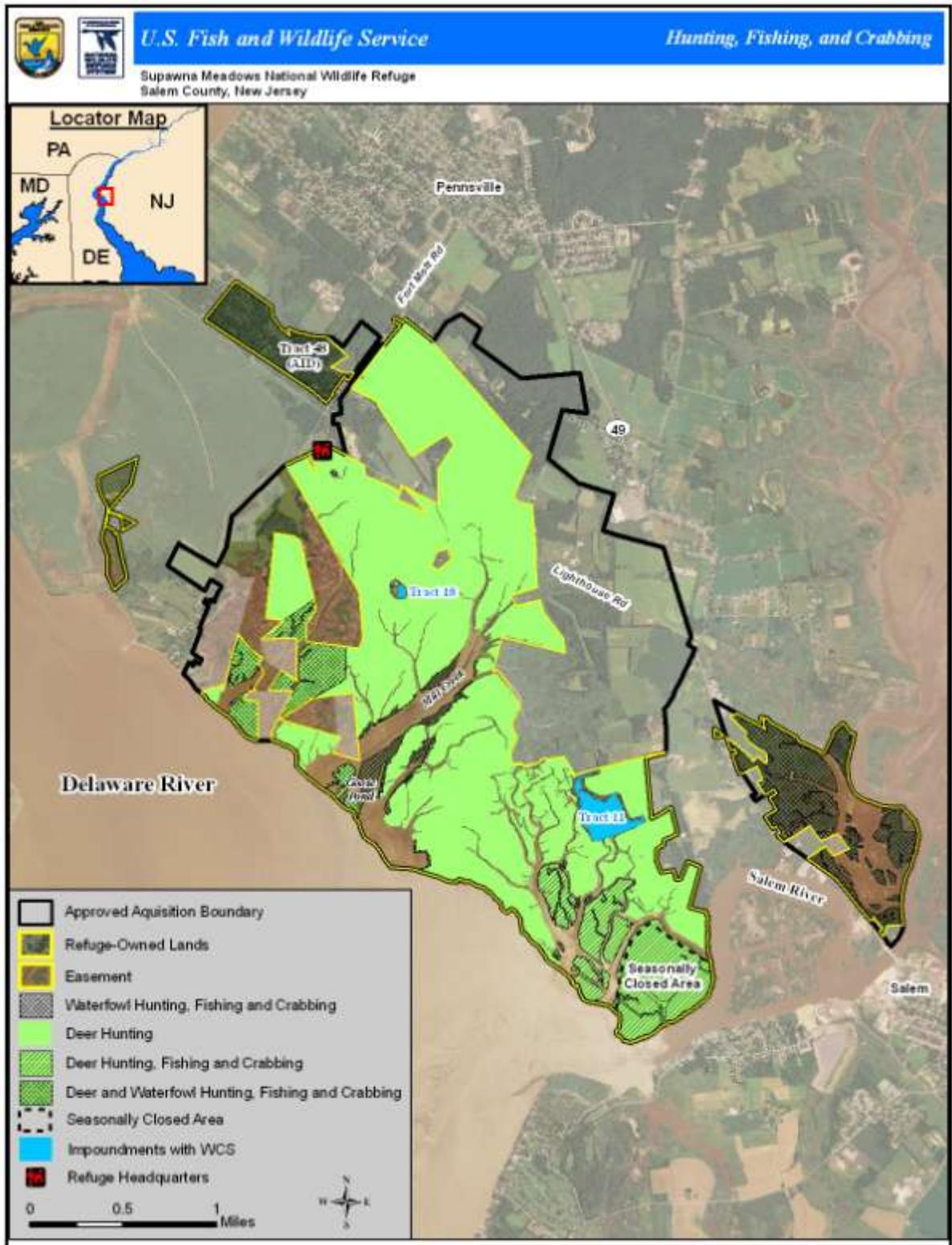
Fish

The tidal marshes, creeks, and ditches provide spawning, nursery, and feeding habitat for a variety of fish common to the Delaware Bay, Estuary, and River. Mummichog (*Fundulus heteroclitus heteroclitus*) is the most abundant forage fish. Striped bass (*Morone saxatilis*) and white perch (*Morone americana*) are two of the more important anadromous species. American eel (*Anguilla rostrata*), a catadromous species, is currently a species of concern in New Jersey and the Mid-Atlantic Fisheries Council. Prior to the closure of the season on elvers (immature eels), commercial netting of elvers on and around the refuge, and from road right-of-ways within the refuge boundary, was common. Other important fish species found near, and potentially affected by, refuge activities include the federally listed endangered short-nosed sturgeon, and the Atlantic sturgeon. The refuge provides nursery habitat for menhaden (*Brevoortia tyrannus*), blueback herring (*Alosa aestivalis*), alewife (*Alosa pseudoharengus*), American shad (*Alosa sapidissima*), and striped bass. Blue crabs (*Callinectes sapidus*) are also found within tidal waters near the refuge and are part of the local recreational shellfishery.

Invertebrates

A wide diversity of terrestrial and aquatic invertebrate species inhabit the refuge tidal marsh and other habitats, including the eastern amberwing (*Perithemis tenera*), common green darner (*Anax junius*), seaside dragonlet (*Erythrodiplax berenice*), and the calico pennant (*Calithemis elisa*). Butterfly species include the orange sulfur (*Colias eurytheme*), black swallowtail (*Papilio polyxenes*), spicebush swallowtail (*Papilio troilus*), and eastern tailed-blue (*Everes comyntas*).

Wildlife-dependent Public Use	The priority public uses of the Refuge System are hunting, fishing, wildlife observation and photography, and environmental education and interpretation. The FPRRL, a historic lighthouse on the refuge, also draws visitors (USFWS 2005a). Further details on the various public uses occurring on the refuge are presented in chapter 3 (pp. 3-5 and 3-22) and in appendix B.
Visitor Numbers	In 2009, an estimated 15,000 visits were made to the refuge. A visit is defined as an individual, uninterrupted visit to the refuge for any length of time in a day. One person may make multiple visits to the refuge in one day if they leave and return. Over the past 5 years, visitation has ranged from 15,000 to 20,000 visits. Visitors participated in the following activities: hunting, fishing, wildlife observation, photography, interpretation, and other refuge approved activities.
Hunting	Portions of Supawna Meadows NWR are currently open for deer and waterfowl hunting (map 3.5). The refuge is open to deer hunting for all four of New Jersey's bow hunting seasons according to the State Deer Management Zone 63 regulations. Portions of the refuge are open to waterfowl hunting per State regulations. Waterfowl are hunted mainly by boat entry to the refuge from the Delaware River and Salem River.
Fishing and Crabbing	Fishing and crabbing in the tidal marsh, according to State laws and regulations, are currently allowed in specific areas of the refuge (map 3.5). While boating is prohibited on all of the freshwater ponds and impoundments within the refuge, an annual youth fishing event is authorized on a freshwater tidal pond (see chapter 4, objective 4.2 for more details).
Wildlife Observation, Photography, and Interpretation	There are two walking trails for wildlife observation, photography, and interpretation (see also chapter 4, map 4.3). The Grassland Trail, along Lighthouse Road, offers visitors the opportunity to view grassland, forest, and tidal marsh habitat. A portion of the trail and the marsh overlook are wheelchair accessible. The Forest Habitat Trail is located off Fort Mott Road on Xmas Tree Lane. This trail goes through a forested upland and wetland section of the refuge through scrub/shrub habitat and surrounds the Tract 11D impoundment. Wildlife observation, photography, and interpretation at the refuge can also be accessed by boat using the tidal streams.



Map 3.5. Areas of Supawna Meadows National Wildlife Refuge currently open to waterfowl hunting, deer hunting, and fishing and crabbing.

Cultural Resources	Human occupation of the New Jersey coast began with the arrival of Native American hunter-gatherer bands approximately 10,000 B.C. The Lenni Lenape Tribe inhabited the land that is now the refuge as well as the surrounding area (USFWS 2005a).
Archaeological Resources	<p>An archaeological study conducted for ACE in 1992 (USACE 1994) identified four sites inhabited during the late Woodland period, circa A.D. 700 to A.D. 1600. Two additional pre-European contact sites were reported on current refuge lands in 1915, but they have not been scientifically investigated since that time. One is known to have contained pottery, so may also be Woodland in date.</p> <p>Permanent settlement of the area by Europeans began in the 17th century. Beginning in the late 18th century, farmers began to extensively dike the tidal marsh and excavate ditches to convert it to salt hayfields. In 1900, a rock dike was built along the marsh edge to prevent erosion that was increasingly damaging the earlier dike system. The rock dike failed early in the 1930s, reflooding the tidal marsh. Remains of the dike are still present between the marsh and the Delaware Bay, possibly restricting tidal flow and decreasing the quality of the marsh habitat. Some of the drainage ditches and earth dikes are also still present within the tidal marsh, altering its hydrology.</p> <p>There are 20 historic period archaeological sites recorded on the refuge, only one of which has been identified in the field. The locations of the other 19 are known only from historical maps. Up to five of them, including the Finn's Point Front Range Lighthouse (built in 1876) and a pair of small structures possibly associated with Fort Mott (begun in 1897), may have been lost to late 20th century coastal erosion. The majority of the others are farmsteads established in the mid-19th century or earlier and abandoned in the late 19th and early 20th century, many of which are now in marsh settings due to sea level rise.</p> <p>There is also a family cemetery on the refuge containing three gravestones that all date from 1880 located along the refuge's Grassland Trail on Tract 18. It is maintained by refuge volunteers and often visited by Pennsville residents (USFWS 2005a).</p>
Historic Period Structures	<p>The FPRRL, built in 1876 to aid navigation on the Delaware River, is on the National Register of Historic Places. It was extensively restored by the Service in 1983, with additional repairs in 1990 and 2003. In the past, volunteers maintained the site and opened the structure to the public the third Sunday of the month from April through October. Due to staff shortages, the site is currently only open to the public during the New Jersey Lighthouse Challenge in mid-October. A 2007 engineering inspection of the structure indicated a potential safety hazard of the catwalk that would require repair to assure public safety. Therefore, until repair, the catwalk is closed to the public. There is also a small shed located nearby that was historically used to store oil for FPRRL.</p> <p>The former Yerkes (Urion) farmstead, a 19th century dwelling with 20th century outbuildings, is located on Tract 18. All or part of the farmstead is potentially eligible for the National Register of Historic Places (National Park Service 2001). We plan to consult with the State Historic Preservation Office to formally determine its eligibility within fiscal years 2011 or 2012.</p>

Chapter 4



Gene Nieminen/USFWS

Supawna Meadows NWR Impoundment

Management Direction and Implementation

- Introduction
- General Refuge Management
- Goals, Objectives, and Strategies

Introduction	<p>This chapter describes the array of management actions that, in our professional judgment, work best toward achieving refuge purposes, vision and goals, and respond to public issues.</p>
Summary	<p>These actions prioritize protecting and restoring the refuge’s native tidal marsh habitat to benefit Pea Patch Island colonial-nesting wading birds, secretive marsh birds, migratory waterfowl, shorebirds, and other birds of conservation concern. A secondary consideration will be to manage a diversity of other refuge wetland and upland habitats to benefit breeding and migrating songbirds, waterfowl, and raptors as well as amphibians, reptiles, and mammals of conservation concern.</p> <p>Our Visitor Services program will be enhanced to provide more opportunities for a wide variety of compatible wildlife-dependent activities. In 2005, the Northeast Region Visitor Services Review Team identified visitor programs of emphasis for each refuge. The programs identified for this refuge were interpretation and wildlife observation and photography, the same as Cape May NWR, which administers Supawna Meadows NWR. This determination was based on careful consideration of our natural resources, existing staff, operational funds, existing and potential facilities, and which programs we would be most effective in providing “quality” opportunities for visitors.</p> <p>We have developed a habitat map (see map 4.1, p. 4-47) to help readers visualize how the refuge habitats, as broadly reflected by future vegetation cover, will look over the long term. Using GIS mapping tools and data sets, our habitat map is a graphic representation of the potential vegetation that will result. While the CCP describes potential vegetation management actions within a 15-year time frame, many of the habitat changes will not be visible until well beyond 15 years.</p>
General Refuge Management	<p>The actions presented in this section are actions required by law or policy, or represent actions that have undergone a separate NEPA analysis, public review, agency review, and approval. Or, they are administrative actions that do not necessarily require public review, but are actions we wanted to highlight in our implementation plan. Finally, most of the actions outlined in this part of chapter 4 support multiple goals and objectives and therefore do not lend themselves to the organization in the Goals, Objectives, and Strategies portion of this chapter.</p>
Acquiring Land within the Current Refuge Acquisition Boundary	<p>The Service will continue its policy of buying land from willing sellers and focus its land acquisition efforts on developable upland properties first. We will continue to purchase portions of the 1,257 acres of inholdings within the 4,527-acre acquisition boundary from willing sellers as funding allows.</p>
Managing Conservation Easements	<p>The refuge purchased a conservation easement in June 2009 on the 254.3-acre Davis Property. A conservation easement is a legal agreement voluntarily entered into by a property owner and a qualified conservation organization such as a land trust or a government agency. The easement contains permanent restrictions on the use or development of land in order to protect its conservation values. The owners have reserved certain rights on 20 acres of this easement.</p> <p>Many refuges have utilized the Service’s “Partners for Fish and Wildlife Program” to work with private landowners to conduct annual invasive species control measures on private lands. The acquisition of this conservation easement has allowed refuge staff to take advantage of this type of opportunity at Supawna Meadows NWR as well. The refuge will continue to enforce and monitor the terms of the conservation easement. This includes consultation with the landowner, invasive species control, inventory and survey requirements, and law enforcement. Staff time for this effort amounts to one to two days annually.</p>

Protecting Federally listed Threatened and Endangered Species	<p>The following federally listed threatened or endangered species occur or have historically occurred on refuge lands or in the tidal Delaware River:</p> <ul style="list-style-type: none">▪ Atlantic hawksbill▪ Atlantic loggerhead▪ Atlantic ridley▪ Atlantic leatherback▪ Shortnose sturgeon▪ Sensitive joint-vetch <p>None of these species are known to currently utilize refuge lands or waters. Shortnose sturgeon occur in the Delaware River and refuge activities could have minimal effects on their habitat or prey. We will continue to work closely with our Ecological Service's New Jersey Field Office, NMF'S, the Delaware Bay Estuary Project, and the New Jersey Department of Environmental Protection (NJDEP), if there are confirmed observations of these species or other federally listed species (for example, Indiana bats) in the future at the refuge and if we determine that actions taken on the refuge could be of value to their survival or recovery.</p>
Distributing Refuge Revenue Sharing Payments to Salem County	<p>As described in chapter 3, we pay Salem County refuge revenue sharing payments based on the acreage and the appraised value of refuge lands. These annual payments are calculated by a formula determined by Congress with funds appropriated by Congress. The Service will continue those payments in accordance with the law, commensurate with changes in the appraised market value of refuge lands or new appropriation levels dictated by Congress.</p>
Protecting Cultural Resources	<p>As a Federal land management agency, we are entrusted with the responsibility to locate and protect all cultural resources, specifically archaeological sites and historic structures listed or eligible for listing in the National Register of Historic Places. This applies not only to refuge lands, but also on lands affected by refuge activities.</p> <p>We will conduct an evaluation of the potential for our projects to impact archaeological and historical resources; we will continue to consult with the Service's archaeologists, architectural historian, and the New Jersey SHPO. This will be especially important for those projects that include moving or displacing soil or removing buildings. A preproject evaluation of activities will ensure we comply with section 106 of the National Historic Preservation Act. That compliance may require any or all of the following: a State Historic Preservation Records survey, literature review, or field survey.</p>
Animal Damage Control	<p>We will take necessary actions to address animal damage that threatens to destroy refuge resources, jeopardizes public safety, or causes potential harm to neighboring properties. Refuge staff will either control these animal populations with refuge resources, invite State-licensed volunteers to control them, or hire commercial trappers.</p>
Conducting a Wilderness Review	<p>The refuge system planning policy requires that we conduct a wilderness review during the CCP process. We inventoried all refuge lands and waters the Service owns in fee simple. Our inventory of this refuge determined that no areas meet the eligibility criteria for a wilderness study area as defined by the Wilderness Act. Therefore, we did not further analyze the refuge's suitability for wilderness designation. See appendix D for the results of the wilderness inventory. The refuge will undergo another wilderness review in 15 years as part of the next comprehensive conservation planning process.</p>

<p>Issuing Special Use Permits</p>	<p>Special use permits (SUPs) may be issued for special or unique activities allowed on refuges. Each activity will be evaluated on a case-by-case basis.</p>
<p>Vegetation Mapping</p>	<p>Vegetation mapping will be conducted based on National Vegetation Classification System criteria and we will map all habitat types, vegetation communities, and the location of habitats of focal species as identified in this CCP.</p>
<p>Water Quality Inventory and Monitoring</p>	<p>Adequate supplies of clean water are critical to plants, wildlife, and people. The Refuge System has a legislative mandate under the National Wildlife Refuge System Administration Act, as amended by the Refuge Improvement Act, to help maintain adequate water quality and quantity to fulfill the mission of the Refuge System and the purposes of each refuge. To better address this, the Refuge System is currently in the process of developing an inventory and monitoring program to document the status, assess conditions, and detect changes in the system's resources, including water quality and quantity. We will implement guidance provided by this effort when completed, provided staffing and funding allow. In addition to this legal mandate, the refuge will also participate in Spill Prevention, Control, and Countermeasure (SPCC) Plans, or other environmental emergency action plans, to aid in the protection of the Delaware Bay and River as needed.</p>
<p>Public Use of Land within the Current Refuge Acquisition Boundary</p>	<p>As the Service continues to acquire the remaining 1,254 acres of inholdings within the 4,527-acre acquisition boundary, each individual parcel of property acquired will be subject to authorized public use activities (this includes priority and non-priority public uses), unless subject to specific deed restrictions. The added parcels of property will also be subject to all refuge and Service policies and regulations. The EA analysis and Compatibility Determinations for this CCP will apply to these additional parcels.</p>
	<p>Priority Public Uses</p>
	<p>The 1997 Refuge Improvement Act designated six wildlife-dependent priority public uses on National Wildlife Refuges: hunting, fishing, wildlife observation and photography, and environmental education and interpretation. Per the General Guidelines for Wildlife-Dependent Recreation (605FW 1), we will strive to ensure that the wildlife-dependent recreation program:</p>
	<ol style="list-style-type: none"> 1. Promotes safety of participants, other visitors, and facilities. 2. Promotes compliance with applicable laws and regulations and responsible behavior. 3. Minimizes or eliminates conflict with fish and wildlife population or habitat goals or objectives in an approved plan. 4. Minimizes or eliminates conflicts with other compatible wildlife-dependent recreation. 5. Minimizes conflicts with neighboring landowners. 6. Promotes accessibility and availability to a broad spectrum of the American people. 7. Promotes resource stewardship and conservation. 8. Promotes public understanding and increases public appreciation of America's natural resources and our role in managing and conserving these resources. 9. Provides reliable/reasonable opportunities to experience wildlife. 10. Uses facilities that are accessible to people and blend into the natural setting. 11. Uses visitor satisfaction to help to define and evaluate programs.

In 2005, the Northeast Region Visitor Services Review Team identified visitor programs of emphasis for each refuge. The two programs identified for this refuge were wildlife observation and photography, the same as Cape May NWR. This determination was based on careful consideration of our natural resources, existing staff, operational funds, existing and potential facilities, and which programs we would be most effective in providing “quality” opportunities for visitors. While all of the priority public uses are important and offered to some degree on this refuge, wildlife observation and photography will receive greater emphasis when prioritizing refuge resources. As always, we look to our partners, Friends of Supawna Meadows NWR, and other volunteers to develop and assist with all refuge public use programs.

Chapter 1 describes the requirements for appropriateness and compatibility determinations. Appendix B includes approved findings of appropriateness and compatibility determinations to support the activities described here. We will only allow activities determined appropriate and compatible to meet or facilitate refuge purposes, goals, and objectives.

Currently, the State does not issue permits to hunt black bear in black bear hunting area 6 (BHA 6) where Supawna Meadows NWR is located, and refuge staff is not aware of any conflicts with bears on the refuge. However, New Jersey’s black bear population is increasing, and it is possible that bears could become a nuisance on or near the refuge within the next 15 years. If the State changes hunting regulations to allow black bear hunting in BHA 6 and we receive enough interest, we will evaluate whether or not to authorize this activity on the refuge. Before opening the refuge to bear hunting, we would need to thoroughly evaluate the effects of this activity. This process would include, amongst other things, completing additional analyses, providing opportunities for public review and comment, and making an announcement in the Federal Register.

Although we are not proposing to open the refuge to turkey hunting at this time, we are willing to discuss opening the refuge to spring turkey season with assistance from the State. As with evaluating opening the refuge to bear hunting, we would need to complete additional analysis to evaluate the effects of allowing turkey hunting through a separate NEPA process.

Non-Priority Public Uses Allowed

In addition to the six priority recreational and educational uses, we have determined that some other activities, for example FPRRL visitation and scientific research are appropriate and compatible on refuge lands under certain circumstances. These activities are either discussed earlier in this section or described in detail in the next chapter. Findings of Appropriateness and Compatibility Determinations for these activities are in appendix B.

Non-Priority Public Uses Not Allowed

We have received several requests for permission to engage in non-priority, non-wildlife dependent activities on the refuge. Activities evaluated by the refuge manager and determined not to be appropriate on refuge lands include, but are not limited to: bicycling, geocaching, horseback riding, jogging, non-wildlife dependent group gatherings, and organized or facility-supported picnicking. **Appendix B documents the refuge manager’s decision on appropriate activities.** Most of these activities are sufficiently allowed elsewhere on other nearby ownerships, so the lack of access on the refuge does not eliminate the opportunity in the area. According to Service policy 603 FW 1, if the refuge manager

determines a use is not appropriate, it can be denied without determining compatibility.

Controlling Animal Pests

At times, certain wildlife species and pest animals interfere with management objectives. The Refuge Manual (7 RM 14.4A) defines a pest as “Any terrestrial or aquatic plant or animal which interferes, or threatens to interfere, at an unacceptable level, with the attainment of refuge objectives or which poses a threat to human health.” In this section, we describe some situations involving native species and under what conditions we will initiate control.

In controlling pests, we use an integrated approach. The Refuge Manual (7 RM 14.4C) defines integrated pest management as “A dynamic approach to pest management which utilizes a full knowledge of a pest problem through an understanding of the ecology of the pest and ecologically related organisms and through continuous monitoring of their populations. Once an acceptable level of pest damage is determined, control programs are carefully designed using a combination of compatible techniques to limit damage to that level.”

An integrated approach uses various methods, including natural, biological, cultural, mechanical, and chemical controls. Some examples and potential remedies of pest management follow.

We will use the following general strategies in pest management:

1. Determine the need for site-specific control based on the potential to affect our management objectives for a given area. Although we will employ an adaptive management strategy, we also expect the lethal control or removal of individual animals to be the exception rather than the rule. Unfortunately, to establish general thresholds for that action is difficult. Instead, we will determine our solution on a case-by-case basis.
2. Employ integrated pest management techniques when a species is having a significant impact on an area resulting in major habitat replacement and loss of valuable canopy trees.
3. Monitor results to ensure that pests do not exceed acceptable levels.

Mute Swans

Despite their aesthetic appeal, mute swans can cause problems. The mute swan is native to Europe and Asia, but is nonnative species in the United States. Mute swans are established throughout New Jersey and are responsible for excessive herbivory to submerged aquatic vegetation in wetland habitats during key portions of the growing season. Mute swans are well distributed throughout New Jersey but are most abundant in park ponds and small lakes in northern New Jersey, as well as coastal ponds and impoundments along both the Atlantic Coast and Delaware Bay. The New Jersey Wildlife Action Plan (NJWAP) goal (NJDFW 2008a) is to reduce the impacts of mute swan herbivory to native vegetation in wetlands and managed impoundments based on population objectives identified for New Jersey in the Atlantic Flyway Mute Swan Management Plan (Atlantic Flyway Council 2003). The New Jersey mute swan population objective is 500 swans statewide. Populations should be particularly reduced in coastal impoundments managed for migrant and wintering waterfowl. Population growth and range expansion of this species has increased the number of swan-related problems for people and native wildlife.

A major concern is the effect of interspecific competition between mute and tundra swans. Mute swans have been observed exhibiting aggression toward tundra swans, driving them from protected coves and feeding areas, which are important habitats for native tundra swans. Since the mid-1970s, Maryland's

wintering tundra swan population has declined by about 30 percent (Hindman 2010); however, research is needed to determine if this decline is related to an increase in competition between native tundra swans and exotic mute swans. New Jersey hosts a smaller population of wintering tundra swans than Maryland, and currently there is no evidence to suggest mute swans are outcompeting tundra swans in New Jersey (Nichols 2009 personal communication).

The Service worked with states in the Atlantic Flyway to develop the Atlantic Flyway Mute Swan Management Plan (Atlantic Flyway Council 2003). This plan established mute swan population goals for the Atlantic Flyway, along with strategies to begin reducing populations to those levels within the parameters of the Migratory Bird Treaty Act.

In partnership with NJDFW, the refuge's treatment goal is to prevent competition with native migratory waterfowl. Eradication is the definitive goal; however, this may be unachievable if adjacent landowners are not willing or able to control mute swans. It is important to be vigilant in management efforts and monitor all areas throughout the year.

We will:

1. visually monitor all areas throughout the year, and take appropriate actions to discourage mute swans from becoming established or congregating on the refuge; and
2. to the extent possible, eradicate mute swans found on the refuge to reduce competition with native waterfowl. We may limit swan reproduction by oiling or adding eggs and removing adult swans. We will coordinate control efforts with NJDFW and U.S. Department of Agriculture Animal and Plant Health Inspection Services (USDA APHIS).

Snow Goose Monitoring

The greater snow goose population in the Atlantic flyway has increased significantly over the past decade and continues to increase. Damage to winter grain and salt hay fields and marsh areas in New Jersey is also increasing. We are aware of concerns by Service and State waterfowl experts that greater snow geese may be changing their migrating and wintering habits in the Atlantic Flyway, and their use may dramatically increase on protected areas, such as the refuge, over the next 15 years. With completion of an Environmental Impact Statement (EIS), the Atlantic Flyway Council and individual states have implemented a Light Goose Conservation Order. Light goose is the collective name applied to greater snow geese, lesser snow geese, and Ross's geese. The principal action to be taken in the State of New Jersey is an extended hunting season on light geese. We will monitor for increased use of the refuge by snow geese in conjunction with the State mid-winter waterfowl survey.

Refuge marshes and impoundments provide valuable late winter habitat for black ducks and pintails. As snow goose use of the refuge increases, hunting of greater snow geese on designated areas of the refuge may be permitted after the close of the duck season for the southern zone of New Jersey to achieve population goals for greater snow geese or reduce damage to refuge habitats and surrounding marsh and agricultural areas. Hunting during late winter has the potential to disturb wintering ducks, particularly black ducks, and decrease the value of the refuge as wintering habitat. However, impacts to wintering waterfowl will be minimal because greater snow geese are currently found primarily in the marshes, not in the impoundments. Other actions that may be considered include select control of snow geese or other proposals to discourage snow goose, as recommended by Service and State waterfowl experts.

Resident Canada Geese

The Service's Division of Migratory Bird Management prepared an EIS for Resident Canada Goose Management (USFWS 2005b). This document discusses the problems associated with resident Canada geese along with strategies to begin reducing populations. The following information was taken from this document.

The number of Canada geese that nest and/or reside predominantly within the conterminous United States has increased dramatically in the past 20 years. It has increased to levels that are increasingly coming into conflict with people and causing personal and public property damage.

Most resident Canada goose populations exhibit consistently high annual production and survival because they live in temperate climates with relatively stable breeding habitat conditions and a low number of predators; tolerate human and other disturbances; have a relative abundance of preferred habitat (especially those located in urban and suburban areas with current landscape techniques); and fly relatively short distances to winter (compared to other Canada goose populations). The virtual absence of waterfowl hunting in urban areas provides additional protection to those urban portions of the resident Canada goose population. Given these characteristics, resident Canada goose populations are increasingly coming into conflict with human activities in many parts of the country, both in rural and urban areas. Conflicts between geese and people affect or damage several types of resources, including property, concerns about human health and safety, agriculture, and natural resources.

Agricultural and natural resource impacts include losses to grain crops, overgrazing of pastures, and degrading water quality. In heavy concentrations, goose droppings can overfertilize lawns and degrade water quality, resulting in eutrophication of lakes and excessive algae growth (Manny et al. 1994). This can lead to oxygen depletion and fish kills. Degradation of water quality also occurs by fecal contamination and by erosion from areas stripped of vegetation by goose grazing and trampling. Habitat impacts from overgrazing by resident Canada geese are also evidenced by the loss of natural vegetation in marshes and impoundments. Resident geese can impact natural wild rice beds, crops, and other habitat maintained as both food sources and cover for migrant geese and other waterfowl.

Concentrations of resident Canada geese threaten wildlife with disease. Local concentrations of resident Canada geese may congregate around impoundments where water levels have been lowered. The remaining stagnant pools can be contaminated by fecal material and are a potential source of avian diseases, especially when temperatures are high. Canada geese serve as a reservoir for the highly contagious disease duck virus enteritis and pose a serious threat to other birds utilizing the habitat.

We will:

1. visually monitor all areas throughout the year, and take appropriate actions to discourage resident Canada geese from becoming established or congregating on the refuge; and
2. to the extent possible, eradicate resident Canada geese found on the refuge to reduce competition with native waterfowl, limit goose reproduction by oiling or addling eggs and removing adult geese, and coordinate control efforts with NJDFW and USDA APHIS.

Furbearers and Predators

Furbearers such as muskrat, woodchuck, and beaver (*Castor canadensis*) may cause damage to refuge habitats. These animals may burrow into soils, undermining or otherwise damaging impoundment dikes. Beavers may also dam and flood creeks or other drainage areas, killing native trees or flooding roads and private property, therefore preventing access or threatening public safety.

Mammalian predators such as red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*), coyote (*Canis latrans*), and raccoon, and avian predators such as crow, grackle, and gulls may cause unacceptable levels of predation on nesting birds. Domestic or house cats (*Felis catus*), both free ranging domestic and feral, also have negative effects on wildlife. Cats prey on wildlife, compete with native wildlife, and can transmit diseases to wildlife, pets, and people. Cat predation is an added stress to wildlife populations already struggling to survive habitat loss, pollution, pesticides, and other human impacts (American Bird Conservancy, 2009). The cumulative negative effects of cats on wildlife are impossible to quantify; however, the growing body of literature strongly indicates that domestic cats are a significant factor in the mortality of native small mammals, birds, reptiles, and amphibians (California Department of Fish and Game 2009).

We do not intend to initiate a public trapping program for furbearers at this time. Because we consider trapping on refuges a commercial activity, it must meet a higher standard of compatibility than priority wildlife-dependent public recreational uses or other non-commercial uses. We will consider opening the refuge to trapping if we determine it is needed to manage furbearers to achieve refuge purposes of the mission of the Refuge System. Prior to opening the refuge to trapping, we would need to determine if it is compatible and complete additional NEPA analysis and then include it as part of an approved Furbearer Management Plan.

We will:

1. use predator guards on nest boxes;
2. to the extent possible, remove animals or concentrations of animals that may pose a problem, inviting State-licensed individuals, hiring commercial trappers, or working with partners such as USDA Wildlife Services;
3. endorse the Cats Indoors! campaign; and
4. implement a zero tolerance policy for feral cats by visually monitoring all areas of the refuge for feral cats throughout the year and take appropriate actions to euthanize cats found on the refuge.

Monitoring and Abating Wildlife Diseases

The Service Manual chapter on disease prevention and control is not yet published. Until it is, we derive guidance on this topic from the Refuge Manual and specific directives from the Director of the Fish and Wildlife Service or the Secretary of the Interior. Refuge Manual 7 RM 17.3 lists three objectives for disease prevention and control:

1. to manage wildlife populations and habitats so the likelihood of disease contraction and contagion are minimized;
2. to provide for early detection and identification of disease mortality when it occurs; and
3. to minimize losses of wildlife from disease outbreaks.

These objectives were published in 1982. Since that time, in addition to diseases that cause serious mortality among wildlife, more attention has been given to those diseases that are transmitted through wildlife to humans. One example is Lyme disease. In 2002, a Service Manual chapter on Lyme Disease Prevention

was published (242 FW 5) to make employees, volunteers, and national service workers on refuges aware of this disease and how to prevent and treat it.

Another serious wildlife disease receiving considerable attention worldwide is avian influenza. Of particular concern is the highly pathogenic Eurasian form (H5N1). In 2006, all refuges were instructed to prepare an Avian Influenza Surveillance and Contingency Plan. The Supawna Meadows National Wildlife Refuge Avian Influenza Surveillance and Disease Contingency Plan was approved in October 2007 (USFWS 2007b) and discusses methods for dealing with this disease.

Chronic Wasting Disease (CWD) is a fatal disease that attacks the brain and spinal cord of deer and elk. While the exact cause is unknown, it is believed to be caused by a prion, an altered protein that causes other normal proteins to change and cause sponge-like holes in the brain. CWD was first identified in the 1960s in a Colorado research facility. Since that time, it has been found in numerous states including New York and West Virginia. CWD has not been found in white-tailed deer (*Odocoileus virginianus*) in New Jersey. Prion diseases like CWD do not move easily between species. There is no scientific evidence that CWD has been transmitted to animals other than deer, elk, and moose. The Chronic Wasting Disease Surveillance and Contingency Plan for Supawna Meadows NWR was approved October 2007 (USFWS 2007c) and discusses early detection and response to any potential CWD occurrence at the refuge.

Supporting Biological and Ecological Research and Investigations

Guidance on conducting and facilitating biological and ecological research and investigations on refuges is found in the Refuge Manual and the Service Manual. In 1982, the Service published three objectives for supporting research on units of the Refuge System in the Refuge Manual (4 RM 6.2):

- to promote new information and improve the basis for, and quality of, refuge and other Service management decisions;
- to expand the body of scientific knowledge about fish and wildlife, their habitats, the use of these resources, appropriate resource management, and the environment in general; and
- to provide the opportunity for students and others to learn the principles of field research.

In 2006, the Service Manual (603 FW 1.10D (4)) provided supplemental guidance in terms of the appropriateness of research on refuges as follows:

We actively encourage cooperative natural and cultural research activities that address our management needs. We also encourage research related to the management of priority general public uses. Such research activities are generally appropriate. However, we must review all research activities to decide if they are appropriate or not as defined in section 1.11. Research that directly benefits refuge management has priority over other research

Unless it is determined to be a management activity, all research conducted on the refuge must be determined in writing to be both appropriate and compatible. We have found several research projects to be appropriate and compatible. We expect that additional opportunities to conduct research on the refuge will arise in the future. In making determinations on the appropriateness and compatibility of future research proposals, we will follow guidance in the Refuge and Service Manuals, and will employ the following general strategies:

1. Seek qualified researchers and funding to help answer refuge-specific management questions.

2. Participate in appropriate multi-refuge studies conducted in partnership with the U.S. Geological Survey.
3. Facilitate appropriate and compatible research by providing temporary housing and equipment, if available, for persons conducting field work.
4. Pursue peer-reviewed publications of research, and/or ensure the Service is acknowledged as a contributor in research conducted on the refuge by others.

Practicing Adaptive Management

We will employ adaptive management as a strategy to ensure we respond quickly to new information or events in adherence to the Department of the Interior's Technical Guide on Adaptive Management (Williams et al. 2009). According to this document, "adaptive management [is a decision process that] promotes flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood" (Williams et al. 2009). The need for adaptive management is very compelling today because our present information on refuge species and habitats is incomplete, provisional, and subject to change as our knowledge base improves.

We must adapt our strategies to respond to new information and spatial and temporal changes or environmental events that may or may not have been predicted. We will continually evaluate management actions, both formally and informally, through monitoring or research, to consider whether our original assumptions and predictions are still valid. In that way, management becomes a proactive process of learning what really works.

The refuge manager is responsible for changing management strategies if they do not produce the desired conditions. Significant changes may warrant additional NEPA analysis and public comment. Minor changes will warrant documentation in project evaluation reports, or in our annual reports.

Generally, we can increase monitoring and research that support adaptive management without additional NEPA analysis, and assuming the activities, if conducted by non-refuge personnel, are determined compatible by the refuge manager in a compatibility determination. Many of our objectives identify monitoring needs. Our 2004 Wildlife Inventory Plan has determined what is planned in the foreseeable future. We will update this plan based on the final objectives and strategies in the CCP. See discussion on additional NEPA analysis requirements below. Implementing this strategy supports all refuge goals.

Determining the Appropriateness and Compatibility of Refuge Public Uses

Chapter 1 describes the requirements for appropriateness and compatibility determinations. Appendix B includes approved appropriateness and compatibility determinations to support the activities on the refuge. We will only allow activities determined appropriate and compatible to meet or facilitate refuge purposes, goals, and objectives. Further appropriateness and compatibility determinations will be prepared if new refuge uses are requested by the public.

Conducting Additional NEPA Analysis

NEPA generally requires site-specific analysis and disclosure of impacts for all major Federal actions, which may result in either an EA or an EIS. Other routine activities are categorically excluded from the NEPA requirements to prepare detailed environmental documents. Those generally include administrative actions. Before we implement the new hunting and fishing actions proposed in this plan, we must complete additional NEPA analysis. This information will be made available to the public. A new compatibility determination will be completed at that time.

Wildlife Habitat Management

We will expand our management to benefit trust species and other species of conservation concern in all refuge habitats. We will focus management efforts on providing native tidal marsh habitat to benefit key Federal trust species and groups of species. Specifically, we will provide foraging habitat for Pea Patch Island wading birds during the breeding season and nesting, migratory, and wintering habitats for marsh birds, waterfowl, shorebirds, raptors, and songbirds. We will actively manage tidal marsh and grassland habitats and will maintain dikes and water levels on our impoundments with water control structures, but we will not actively manage other refuge habitats. We will permit compatible research programs requested by other entities on refuge lands, but will not directly support them. If we are successful in achieving our habitat management objectives, the habitat composition of the refuge will be that listed in table 4.1 (below) and illustrated in map 4.1 (see page 4-48).

We will expand our invasive plant management efforts to include more extensive control of phragmites in the tidal marsh and use of a variety of treatment methods for invasive plant control elsewhere on the refuge. Specifically, we will coordinate with the New Jersey Department of Agriculture’s weevil release program to control mile-a-minute weed in some areas of the refuge.

Our primary tools will be mowing, prescribed burning, and use of herbicides to control phragmites and other invasive plant species and the continuation of hunting to control the white-tailed deer population.

Table 4.1. Land Use and Land Cover Acreage for Supawna Meadows NWR

Land Use/Land Cover Type	Current Acreage	Acquisition Acreage	Total Acreage
Tidal Marsh			
Native Marsh	902	131	1033
Phragmites-Dominated	1029	231	1260
Total Marsh	1931	362	2293
Developed	26	97	123
Forested Uplands	242	174	416
Forested Wetlands	190	156	346
Grassland	123	409	532
Herbaceous Wetland	42	13	55
Managed Impoundments	86	1	87
Unmanaged Impoundment	4	1	5
Scrub/Shrub Uplands	36	19	55
Scrub/Shrub Wetlands	48	4	52
Scrub/Shrub Wetlands (Tidal)	28	2	30
Open Tidal Waters	492	42	534
TOTAL	3,247¹	1,280	4,527

¹ Includes 231 acres held under conservation easement by the refuge. An additional 20 acres held in easement have a future building clause and are not included.

We will:

1. monitor known infestation sites for significant adverse impacts on wildlife habitat;
2. seed or plant disturbed sites with native species;
3. control 60 percent of phragmites where native plants are inhibited or where fire hazards need to be reduced;
4. control phragmites in any area where water level and wildlife habitat is unacceptable due to phragmites growth;
5. maintain healthy stands of native plants; and

6. monitor the deer population and its effects on refuge habitats. If the herd needs to be further culled, we will work with the State to offer a doe-first season, a firearms season, or another method for taking more deer off the refuge.

Managing Invasive Plants

The establishment and spread of invasive plants is a significant problem that reaches across all habitat types on the refuge. We will pursue a broad program of invasive plant management based on Service principles. For the purposes of this discussion, we use the definition of invasive species contained in the Service Manual (620 FW 1.4E): “Invasive species are alien species whose introduction does or is likely to cause economic or environmental harm, or harm to human health. Alien species, or non-indigenous species, are species that are not native to a particular ecosystem.” We are prohibited by Executive Order, law, and policy from authorizing, funding, or carrying out actions that are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere.

The unchecked spread of invasive plants threatens the biological diversity, integrity, and environmental health of all refuge habitats. In many cases, these plants have a competitive advantage over native plants and form dominant cover types, reducing the availability of native plants as food and cover for wildlife. Over the past several decades, government agencies, conservation organizations, and the general public have become more acutely aware of the negative effects of invasive species. There are many plans, strategies, and initiatives targeted toward more effective management of invasive species, including The National Strategy for Management of Invasive Species for the National Wildlife Refuge System (USFWS 2003a), Silent Invasion – A Call to Action by the National Wildlife Refuge Association (NWRA 2002), and Plant Invaders of Mid-Atlantic Natural Areas by the Service and the National Park Service (Swearingen et al. 2002). New information and updates on recent advances in control techniques are continually provided through the Refuge System biological discussion database and relevant workshops. There are also more funding sources, both within the Service’s budget and through competitive grants, to conduct inventories and control programs.

Guidance for managing invasive species on refuges is found in the Service Manual (620 FW 1.7G). These actions serve to define our general strategies on the refuge:

1. Manage invasive species to improve or stabilize biotic communities to minimize unacceptable change to ecosystem structure and function and prevent new and expanded infestations of invasive species.
2. Conduct refuge habitat management activities to prevent, control, or eradicate invasive species using techniques described through an integrated pest management plan, or other similar management plan, which comprehensively evaluates all potential integrated management options, including defining threshold/risk levels that will initiate the implementation of proposed management actions.
3. Evaluate native habitat management activities with respect to their potential to accidentally introduce or increase the spread of invasive species and modify our habitat management operations to prevent increasing invasive species populations.
4. Refuge integrated pest management planning will address the abilities and limitations of potential techniques, including chemical, biological, mechanical, and cultural techniques.
5. Manage invasive species on refuges under the guidance of the National Strategy for Invasive Species Management and within the context of applicable policy.

More specific strategies for the refuge include:

1. Continue treatment of the most problematic species as funding and staffing permit.
2. Maintain early-detection/early-response readiness regarding new invasions.
3. Remove parent sources of highly invasive species (species that are high seed producers or vigorous rhizome producers) from along edges of management units.
4. Maintain accessibility to affected areas for control and monitoring.
5. Continue and increase efforts to involve the community in promoting awareness of invasive species issues and to seek assistance for control programs on and off the refuge.

In addition to these general strategies, we will refine our control program to address the most critical problems first. Further, our priorities may be adjusted to reflect regional Service priorities, new information, or resource availability. We will continue to track the spread and control of all invasive plants on the refuge using GIS, GPS, permanent vegetation monitoring plots, and photo points.

Staffing and Project Funding

We used the Refuge System 2008 national staffing model to guide proposed staffing. Staffing models were developed to answer the question, “What level of staffing is needed to operate and manage a station to achieve the station’s purpose, contribute to the mission and goals of the Refuge System, and comply with the Refuge Improvement Act and other laws, regulations, and policy?” Earlier efforts suggest there are 10 functional categories that describe the work we do or need to do on stations in the Refuge System. These are: wildlife and habitat, visitor services, facilities and equipment, maintenance, realty, planning, communications, business management, information technology, law enforcement, and fire management. The model gives a total number of full time employees needed at a station to do the work, but management must still decide the best mix of disciplines to do that work and whether to deploy part-time, seasonal, or permanent employees.

In addition to this national staffing model, the Refuge System and the International Association of Chiefs of Police began working together in 2003 on a law enforcement staffing and deployment model. The goal for this effort was to develop a defensible staffing model to quantify law enforcement resource needs for the Refuge System, help refuge managers deploy law enforcement resources, and justify budget requests. The result was a “Deployment Model for the National Wildlife Refuge System” (International Association of Chiefs of Police), completed in May 2005 and slated for updating every 5 years.

The refuge will continue to be administered as a satellite refuge with management responsibility residing at Cape May NWR. We used the national staffing model to help determine the appropriate level of non-law enforcement staffing and the law enforcement deployment model to determine the proposed number of law enforcement staff. Based on our priorities, we are proposing four full-time staff stationed at Supawna Meadows NWR, and one full-time staff person that will be stationed at Cape May NWR and shared between the Cape May NWR and Supawna Meadows NWR. Supawna Meadows NWR will have an assistant refuge manager, a wildlife biologist, a park ranger (law enforcement), and a maintenance worker. A park ranger (visitor services) position will be shared with Cape May NWR. While the staff at Supawna Meadows NWR will continue to be supported by the current and any new staff at Cape May NWR, we anticipate that the visitor services position will spend substantial time at Supawna Meadows NWR to improve and implement the public use programs. Please see appendix E for the proposed staffing chart.

Refuge Buildings and Facilities	<p>We will operate and maintain the refuge office, both garages, (bat) barn, intern house on Route 49, and FPRRL. We propose demolition of all other buildings on refuge lands. We will work with the New Jersey SHPO and the Service's regional archaeologists to ensure compliance with applicable State and Federal laws and regulations. The demolition of refuge facilities will result in the conversion of developed land into wildlife habitat such as grassland and scrub/shrub upland habitat.</p> <p>The refuge headquarters office will be used full time by refuge staff, will be available for use by the Friends group as requested, and will be open to the public on a regularly scheduled basis. The four-bay garage at the refuge office and the garage at the previous headquarters site will be maintained. The quarters on Route 49 will be maintained for occasional use as needed. The barn currently used by bats will also be maintained.</p>
Resource Protection and Visitor Safety	<p>As described under staffing and project funding, we will add one full-time law enforcement officer to enforce laws and regulations on Supawna Meadows NWR. New onsite staff and a visitor services professional stationed at Cape May NWR will help to install and maintain appropriate signage and prepare and distribute resource protection information as appropriate.</p>
Land Protection	<p>We will continue to purchase portions of the 1,257 acres of inholdings within the 4,527-acre acquisition boundary as funding allows. The Service will continue its policy of accepting donations and buying from willing sellers and will focus on acquiring developable upland properties first.</p> <p>In addition, within 3 years of final approval of the CCP, we will begin to reevaluate the refuge's acquisition boundary through the Service's Preliminary Project Proposal process to address rising sea level caused by climate change because much of what is currently within the refuge boundaries will likely be under water in the next 50 to 100 years. Therefore, we need to start acquiring adjacent uplands to continue our stewardship of vital marsh habitat as the marsh gradually migrates inland. Additional impetus for land purchase will be:</p> <ol style="list-style-type: none">1. to maintain the ecological integrity of the current refuge by protecting the natural resources on adjacent lands;2. to acquire important nearby upland and wetlands areas that will expand our protection of those habitats and the trust resources and other sensitive species that rely on them; and3. to expand opportunities for public uses, particularly wildlife observation and photography and interpretation. <p>We will apply appropriate management to benefit species of conservation concern to any newly acquired lands.</p>
Baseline Plant and Animal Surveys	<p>We will conduct surveys and develop comprehensive inventories of all plants and animals found on Supawna Meadows NWR, including data on species abundance and distribution as staff and funding is made available. A Wildlife Inventory Plan was developed for Supawna Meadows NWR in 2004 (USFWS 2004e). This plan identifies the priority surveys and monitoring that should be completed on the refuge based on enabling legislations, Service initiatives, unit objectives, management plans, and related management activities. We believe we will have the staffing and funding necessary to implement this plan. The surveys to be completed, ranked in order of importance, are shown below in table 4.2.</p>

Table 4.2. Baseline Flora and Fauna Surveys to be Completed

Surveys	Priority Species Involved
1. Saltmarsh Sparrow Breeding Bird	coastal plain swamp sparrow seaside sparrow marsh wren
2. Landbird Breeding	coastal plain swamp sparrow marsh wren wood thrush yellow-breasted chat Baltimore oriole
3. Reptile and Amphibian Inventory	bog turtle eastern tiger salamander spotted turtle eastern box turtle northern diamondback terrapin Fowler's toad
4. Marshbird Callback	black-crowned night-heron great blue heron king rail least bittern little blue heron yellow-crowned night-heron
5. Nonbreeding Bird Use of Tidal Marshes	little blue heron yellow-crowned night-heron black rail
6. Nonbreeding Bird Use of Grasslands	northern harrier short-eared owl horned lark vesper sparrow bobolink grasshopper sparrow savannah sparrow eastern meadowlark
7. Grassland Breeding Bird	horned lark bobolink grasshopper sparrow savannah sparrow eastern meadowlark
8. Wading Bird Impoundment	great blue heron little blue heron
9. Shorebird Migration Impoundment	solitary sandpiper short-billed dowitcher
10. Anuran Call Count	Fowler's toad
11. Wintering Waterfowl Impoundment	American black duck
12. Christmas Bird Count	migratory birds
13. Butterfly and Dragonfly Inventory	dotted skipper Harris' checkerspot Hessel's hairstreak two-spotted skipper
14. Fish Inventory	unknown
15. Small Mammal Inventory	unknown
16. Woodcock Singing Ground	American woodcock
17. Muskrat Ground Dwelling	muskrat

Other priority surveys identified during scoping meetings that should be conducted (not in order of importance) are shown in table 4.3.

Table 4.3. Other Priority Surveys Identified During Public Scoping

Surveys	Priority Species Involved
Marsh Rice Rat	marsh rice rat
Bird Productivity in Phragmites Control Areas	clapper rail northern harrier marsh wren coastal plain swamp sparrow
Coastal Plain Swamp Sparrow	coastal plain swamp sparrow
Biological, Chemical, Sediment, and Contaminant (Contaminant Assessment Process) Baseline	tidal marsh habitat fish open water
Fish Inventory in Impoundments	alewife blueback herring Atlantic sturgeon Shortnose sturgeon
Native Animals and Plants in Scrub/Shrub Wetlands (Tidal)	northern harrier sedge wren
Plants	sensitive joint vetch

Goals, Objectives, and Strategies

Introduction

As described in chapter 1, developing refuge goals was one of the first steps in the planning process. Goals are intentionally broad, descriptive statements of the desired future condition for refuge resources. By design, they are more prescriptive than quantitative in defining the targets of refuge management. They also articulate the principal elements of refuge purposes and our vision statement and provide a foundation for developing specific management objectives and strategies.

The next step was to consider a range of possible management objectives that will help us meet those goals. Objectives are essentially incremental steps toward achieving a goal; they further define the management targets in measurable terms. They provide the basis for determining more detailed strategies, monitoring refuge accomplishments, and evaluating our success. The Service guidance in “Writing Refuge Management Goals and Objectives: A Handbook” (USFWS 2004d) recommends that objectives possess five properties to be “SMART”: (1) specific; (2) measurable; (3) achievable; (4) results-oriented; and (5) time-fixed.

A rationale accompanies each objective to explain its context and why we think it is important. We will use the objectives in writing refuge step-down plans. We will measure our successes by how well we achieve those objectives.

We next identified strategies for each of the objectives. These are specific actions, tools, techniques, or a combination of those that we may use to achieve the objective. The list of strategies under each objective represents the potential suite of actions to be implemented. By design, most will be further evaluated as to how, when, and where they should be implemented in refuge step-down plans.

Lastly, for biological objectives we identified a specific subset of strategies as monitoring elements. Monitoring elements are intended to help us measure our success with respect to our objectives. The results may trigger adjustments to management strategies, a reevaluation or refinement of our objectives, or both.

The management direction that comprises the rest of this chapter is based on **alternative B**, presented in the draft CCP/EA. **Alternative B** was the Service's preferred alternative, and we believe it best fulfills the refuge's purposes, vision and goals, and responds to public issues. It emphasizes management of specific refuge habitats to support Federal trust resources and species of conservation concern in the area. In particular, the priority will be to protect and restore the refuge's **native tidal marsh habitat** to benefit Pea Patch Island colonial-nesting wading birds, as well as secretive marsh birds, migratory waterfowl, shorebirds, and other birds of conservation concern. The description of the management direction is followed by maps 4.1, 4.2, and 4.3, which illustrate the proposed habitat management and public use strategies.

Goal 1

Protect, enhance, and restore biological integrity, diversity, and environmental health of tidally influenced habitats to support native wildlife and plant communities including species of conservation concern.

Objective 1.1 Tidal Marsh

Maintain up to 2,293 acres of brackish tidal marsh, with primary management focus on the area northwest of Mill Creek, providing critical foraging habitat for Pea Patch Island wading birds (for example, little blue heron, glossy ibis, snowy egret, black-crowned night heron, least bittern), migrating shorebirds (for example, semi-palmated sandpiper, greater yellowlegs, dunlin), migrating and wintering waterfowl, and other species of conservation concern (for example, bald eagles).

- Increase cover to 60 percent native emergent plant cover such as smooth cordgrass, pickerelweed, water hemp, wild rice, and rice cutgrass.
- Reduce cover of phragmites so that it comprises less than 40 percent cover of the tidal marsh.

Rationale

Supawna Meadows NWR provides critical foraging habitat for more than 6,000 pairs of 9 species of wading birds that nest on Pea Patch Island, a Continentally Important Bird Area. It is home for the largest heronry of mixed species on the East Coast. The island supports significant populations of breeding pairs of nine species of wading birds, including great blue heron, great egret, little blue heron, snowy egret, cattle egret, yellow-crowned night-heron, black-crowned night-heron, glossy ibis, and tri-colored heron. Pea Patch Island and the surrounding area, including the refuge, have been designated a SMA by the States of New Jersey and Delaware in accordance with the Coastal Zone Management Act.

The refuge receives significant use by shorebirds during both spring and fall migrations. The refuge also provides habitat for the State-listed bald eagle as well as a number of other State-listed species and species of conservation concern.

The refuge is located in the Atlantic Flyway, where birds migrating from interior Canada and the coastal provinces merge to form the main stem of the flyway. The area not only serves as an important migration area but also provides wintering habitat for large numbers of waterfowl. The 2009 midwinter waterfowl inventory flights for the Salem River watershed averaged more than 2,100 dabbling ducks and more than 11,500 Canada geese.

Our principal management challenge in sustaining the refuge's tidal marsh is control of phragmites. Phragmites invades tidal and non-tidal brackish and freshwater marshes, river edges, shores of lakes and ponds, roadsides, and disturbed areas. Once introduced, phragmites spreads quickly and will crowd out

native plants, changing marsh hydrology, altering wildlife habitat, and increasing fire potential. Its high aboveground biomass blocks light to other plants and occupies much of the growing space belowground. Phragmites is also considered a hazardous fuel and easily ignites during arson or wildfire. Based on the 2009 National Vegetation Classification System, phragmites has invaded approximately 74 percent (1,438 of 1,931 acres) of the refuge's tidal marsh.

The hydrology of Supawna Meadows NWR tidal marsh has historically been influenced by humans and continues to be affected today. The tidal marsh west of Route 49 was diked and drained in the 18th century. The dike failed in the 1930s and the marsh reflooded. Originally, there was more sheet flow from the Delaware Bay to Mannington Meadow (to the east of Route 49), but flow is now restricted to a few points and Mannington Meadow is fresher than the marshes on the west side of Route 49. These hydrologic factors are thought to influence the degree to which phragmites has been able to colonize and supplant native marsh plants on major portions of the refuge.

The changes to tidal marsh habitat over the course of this CCP will be a decrease in the phragmites dominated tidal marsh. Due to control of phragmites in the 500 acres of tidal marsh habitat west of Mill Creek, 70 to 80 percent of the phragmites-dominated tidal marsh in that area will be restored to native tidal marsh habitat. Due to the control of phragmites in the 17 acres of tidal marsh west of Fort Mott Road, the area will be restored to native tidal marsh habitat.

Strategies

1. Purchase up to 362 additional acres of tidal marsh within the approved acquisition boundary.
2. Within 5 years of CCP approval, evaluate removal of the remnant farm dike to restore tidal flow and reestablish natural marsh function.
3. Develop an Adaptive Management Framework for phragmites control so that treatments are monitored and evaluated for effectiveness. The refuge will be using an integrated approach to phragmites control, which will consider restoration of natural processes, herbicides, prescribed burning, biological control, and other tools as they are developed.
4. Continue to ensure compliance with the ESA by coordinating with the Service's New England Field Office on phragmites control efforts annually.
5. Work with adjacent private landowners to reduce phragmites on their properties.

Monitoring Elements

Conduct appropriate monitoring and survey programs, as funding and staffing permit, to measure our success with respect to our objectives. The results may trigger adjustments to management strategies, such as prescribed burning and mowing to achieve structural and species diversity of native emergent wetland species. Results may trigger a reevaluation or refinement of our objectives.

Examples of monitoring or surveys that we may implement follow:

1. Begin collection of baseline data to evaluate the existing tidal marsh biological integrity, diversity, and environmental health and parameters related to sea level rise (vegetation, elevation, sediment accretion, salinity, tidal fluctuation, water quality, and mean sea level rise changes along the Delaware River). Utilize data and evaluate trends to assess the impact of climate change and/or management activities in order to appropriately adjust management as necessary.
2. Prevent new invasive species from becoming established within the tidal marsh by utilizing Early Detection Rapid Response Techniques that detect newly established invasive species and immediately address those

populations through the appropriate control measure. This strategy will incorporate a combination of plant identification and inventories, maintaining updates of new invasive species present in the region, as well as having knowledge of the appropriate management techniques prior to conducting control efforts.

3. Conduct inventories and monitoring of shorebird, waterfowl, waterbird, and wading bird use and abundance in the tidal marsh. Utilize data to document the effectiveness of management activities and adjust management protocols as necessary.
4. Conduct callback surveys for secretive marsh birds to monitor overall diversity, evaluate habitat use patterns and identify potential areas for habitat protection or enhancement projects for focal species.
5. Conduct baseline small mammal inventory to obtain baseline information on species diversity and habitat utilization.

Objective 1.2
Tidal Scrub/Shrub
Wetlands

Manage up to 30 acres of tidal scrub/shrub habitat, containing a mix of shrub species including bayberry and marsh elder (*Iva frutescens*) consistent with local reference sites, to ensure that the quality and natural function of the marsh are sustained, provide breeding habitat for coastal plain swamp sparrow, and are comprised of less than 30 percent overall cover of invasive plants.

Rationale

Tidal scrub/shrub habitat is an important component of the refuge's tidal marsh complex that provides breeding habitat for birds of conservation concern. The coastal plain swamp sparrow is a subspecies of the swamp sparrow known to breed in Delaware, Maryland, and New Jersey tidal marshes. The refuge population of coastal plain swamp sparrows may constitute a significant portion of the total population of this unique subspecies of swamp sparrow that is being studied as a potential candidate species for listing under the ESA. The coastal plain swamp sparrow is restricted to an often narrow band of shrubby habitat at the interface of upland and high marsh. This habitat is particularly susceptible to recent changes such as rising sea level, ditching, impoundment, the invasion of phragmites, and the development of roads, farm fields, and housing tracts. Research indicates that these birds perch on phragmites; however, they do not nest in it. This species nests in dense grass at the base of shrubs, usually well concealed, and often anchored to the base of a high tide bush such as marsh elder. A dense tuft of salt hay such as salt meadow grass (*Spartina patens*) often camouflages the nest and provides some structural support (SMBC 2009).

The prairie warbler (*Dendroica discolor*) is a highest priority species in BCR 30, as well as being a high priority species in North America and in Partners in Flight Physiographic Area 44 (PIF 44). This species is experiencing relatively steep population declines. It uses moderately sized patches of shrubland and early successional forest. The PIF 44 report describing shrubland birds of highest conservation concern indicates that the prairie warbler utilizes a range of types from relatively young (abandoned) fields with scattered shrubs and trees to older fields with moderate shrub cover; however, it does not prefer later successional stages where shrubs and samplings form dense continuous tangles (Watts 1999).

The berry-producing shrubs of this habitat type are also beneficial to migrating birds. Other species of conservation concern that will benefit from our continued protection of the tidally influenced scrub/shrub habitat include the northern diamondback terrapin. These areas are difficult to access, but are currently maintained by naturally occurring processes.

Invasive plants are the greatest threat to this high quality habitat. Thickets contain autumn olive and phragmites. Maintaining scrub/shrub habitat on the refuge is problematic for a number of reasons that include

- ditches that drain the wetlands do not allow natural hydrology to support native plants;
- water level management options are limited due to concerns with flooding neighboring properties;
- woody trees are encroaching in scrub/shrub areas;
- scrub/shrub has historically comprised a small habitat area. The refuge cannot support much of this habitat due to approximately 75 percent of refuge habitat being tidal marsh; and
- there is overbrowse from deer limiting regeneration and exacerbating invasive plant species problems.

Within mid-Atlantic estuaries, coastal plain swamp sparrows are restricted to an often narrow band of shrubby habitat at the interface of upland and high marsh. This habitat is particularly susceptible to recent changes such as rising sea level, ditching, impoundment, the invasion of phragmites, and the development of roads, farm fields, and housing tracts. This is an important management consideration for the species (Beadell et al. 2003).

Management intervention may be necessary to enhance or restore habitat. Since poorly drained sections of tidal wetlands where medium-length cordgrass growth is favored, managers should consider blocking selected ditches on altered marshes to create additional habitat. Intervention that forms a mosaic of habitat patches consisting of favorable nesting substrate and suitable foraging sites should increase local populations significantly. Predator control may be necessary in some areas. On high marshes, shallow pools constructed near spoil deposits, which tend to be colonized by native shrubs, such as *Iva* spp., should encourage sparrows to settle, albeit at relatively low densities (Greenlaw 1992, Post and Greenlaw 1994). Controlled burning during the August-November wet season maintains favorable habitat (Post and Greenlaw 1994). Densely vegetated areas should be burned every 5 years and less dense areas every 8 to 10 years, with no more than 10 percent of the available habitat for a population burned in any given year (NatureServe 2009).

Strategies

1. Purchase up to two additional tidal scrub/shrub wetland acres within the acquisition boundary.
2. Maintain scrub/shrub habitat through selective cutting and/or herbicide to set back succession and, if necessary, treat invasive plants so that 70 percent of scrub/shrub habitat is in native species. The exact number of acres treated will depend on funding and management capability. Keep records of treated areas in GIS.
3. Coordinate with regional efforts and initiatives where possible and applicable with respect to climate change and sea level rise.
4. Manage 16,000 linear feet of scrub/shrub habitat along the high-tide line specifically to benefit coastal plain swamp sparrow.

Monitoring Elements

Conduct appropriate monitoring and survey programs, as funding and staffing permit, to measure our success with respect to our objectives. The results may trigger adjustments to management strategies, such as selective cutting and herbicide treatments, to achieve structural and species diversity of tidal scrub/shrub wetland species. Results may trigger a reevaluation or refinement of our objectives. Examples of monitoring or surveys that we may implement include:

1. Prevent new invasive species from becoming established within tidal scrub/shrub wetlands by utilizing Early Detection Rapid Response Techniques that detect newly established invasive species and immediately address those populations through the appropriate control measure. This strategy will incorporate a combination of plant identification and inventories, maintaining updates of new invasive species present in the region, as well as having knowledge of the appropriate management techniques prior to conducting control efforts.
2. Conduct inventories and monitoring of priority passerine species, such as the coastal plain swamp sparrow, to establish a baseline and research use of habitat by these species.
3. Conduct inventories and monitoring of landbird and wading bird use and abundance in the scrub/shrub habitat. Utilize data to document the effectiveness of management activities and adjust management protocols as necessary.
4. Conduct callback surveys for secretive marsh birds to monitor overall diversity, evaluate habitat use patterns, and identify potential areas for habitat protection or enhancement projects for focal species.
5. Using SLAMM results, monitor and evaluate conditions in the marshes over the next 15 years with respect to climate change and sea level rise.
6. To evaluate the effectiveness of prescribed burning, conduct post-burn surveys to measure the area, the intensity, and the success of the burn.
7. To determine the effectiveness of the white-tailed deer hunting program, evaluate regeneration of native shrubs and forbs by conducting vegetation surveys to gather information on species composition, abundance, and diversity.

Objective 1.3
Open Tidal Waters

Maintain and improve water quality and available aquatic habitat of tidally influenced rivers and estuaries through an active role in local, State, and Federal partnerships in order to reduce contaminants and to continue to provide year-round habitat for northern diamondback terrapins, shortnose sturgeon, blue crabs, and other aquatic species of conservation concern in the area's tidal waters.

Rationale

The refuge's wetlands are bordered by and hydrologically connected to the tidal creeks and the Delaware River. Therefore, refuge habitats are affected by water quality and refuge management may affect water quality of these waterways.

The refuge's tidal marsh supports a wide variety of aquatic organisms, many of which are of conservation concern. The waters of the Delaware River Estuary also support an important recreational fishery and shellfishery, which includes the blue crab. Fish and shellfish also serve as the food source for birds and other species of conservation concern. Fish in the tidal waters support local populations of osprey, bald eagle, and Forster's tern (*Sterna forsteri*). Thousands of waterfowl, including American black duck, American wigeon, Canada goose, blue-winged teal and green-winged teal, gadwall, mallard, northern pintail, snow goose, and tundra swan use the tidal marsh during winter and migration.

The federally listed endangered shortnose sturgeon and the Atlantic sturgeon are fish species of concern near Supawna Meadows NWR. These waters also provide nursery habitat for interjurisdictional fish species such as menhaden, blueback herring, alewife, American shad, and striped bass. Also of concern are mussel species including the yellow lampmussel (*Lampsilis cariosa*), tidewater mucket (*Leptodea ochracea*), and triangle floater (*Alasmidonta undulata*), all of which are listed as threatened by the State of New Jersey (NJDFW 2009a).

As noted under objective 1.1, the human-altered hydrology of the marsh appears to be an important factor in the success of invasive phragmites. Numerous other factors influence the refuge marsh and the water quality of tidal waters, including personal watercraft impacts, lack of major flooding, siltation/sedimentation, contaminants in the water and soil from past usage, temperature changes, sea level rise, mosquito control both on and off the refuge, upstream non-point source contaminants, and oil and hazardous material spills along the Delaware River, the second largest oil transport channel on the East Coast.

Due to the regional scale of water quality impacts, the refuge is reliant on actively engaging in partnerships with local communities, anglers, watershed associations, conservation groups, and researchers in order to meet this habitat objective.

Strategies

1. Implement best management practices, such as adhering to instructional labels when applying herbicides, to protect against potential contamination of the tidal rivers and other open tidal waters that could be impacted by refuge management activities.
2. Actively engage in partnerships with local communities, anglers, watershed associations, conservation groups, and researchers to help address water quality and other issues in the watershed.
3. Using SLAMM analysis results, monitor and evaluate conditions at Supawna Meadows NWR over the next 15 years with respect to climate change and sea level rise. Coordinate with regional efforts and initiatives where possible and applicable.

Monitoring Elements

Conduct appropriate monitoring and survey programs, as funding and staffing permit, to measure our success with respect to our objectives. The results may trigger adjustments to management strategies, or may trigger a reevaluation or refinement of our objectives. Examples of monitoring or surveys that we may implement include:

1. Conduct inventorying and monitoring of biological elements, chemical elements, sedimentation, and contaminants to benefit tidal marsh habitat, fish and open water.
2. Work in partnership with local universities, as well as State and Federal agencies, to complete a series of fish inventories to obtain baseline biological information of fish species diversity and species health in order to evaluate impacts of tidal marsh water quality changes.
3. Work with NJDEP and other appropriate agencies to develop data on the presence and distribution of fish and other aquatic species within the refuge.

Goal 2

Protect, enhance, and restore biological integrity, diversity and environmental health of upland habitats to support native wildlife and plant communities with emphasis on migrating and wintering birds and other species of concern.

Objective 2.1 Early Successional Grassland Habitat

Manage up to 532 acres of grassland habitat to create a mix of cool and warm season grasses and forbs to provide habitat diversity, forage, and cover for migrating and wintering grassland birds, such as bobolink, vesper sparrow, eastern meadowlark, and savannah sparrow; raptors, such as northern harrier, common barn owl (*Tyto alba*), and short-eared owl; and habitat for pollinators, such as bronze copper butterfly (*Lycaena hyllus*). Focus grassland management on fields larger than 20 acres, with an emphasis on those fields with minimal edge, less surrounding forest, and more surrounding open habitats (old fields,

emergent wetlands), and where possible, maintain grasslands in close proximity to one another. Encourage cover of desirable grassland plants in the following ways:

- increase cover to 80 percent desirable grassland plant cover (for example, switch grass, goldenrod spp., eupatorium spp.).
- reduce cover of invasive species (for example, Canada thistle, autumn olive) so that they comprise less than 20 percent cover of grassland habitat.

Rationale

Birds that depend on early successional habitats, such as grasslands and shrublands, are one of the fastest declining bird groups due to habitat loss and changes in farming practices in the Northeast. Habitat loss, conversion of pasture to intensive row crops, increased frequency of mowing, and lack of fire are cited as the causes of population declines in grassland-dependent species (Vickery 1996). Grasslands on the refuge are used extensively by migrating and wintering obligate grassland birds. Bobolink, eastern meadowlark, northern harrier, savannah sparrow, and vesper sparrow are examples of grassland bird species that increase in abundance during migration and in the winter.

In addition, the refuge will also emphasize monitoring pollinators in early successional habitats (particularly butterflies, which play a crucial role in plant pollination) using the refuge as many of these species are of conservation concern due to losses in habitat and nectar corridors that facilitate migration. A recent study of the status of pollinators in North America by the National Academy of Sciences found that populations of some native pollinators are declining, which may in part result from habitat loss, degradation, fragmentation, non-target effect of pesticides, competition from invasive species, and introduced diseases (National Academy of Sciences 2007). Flower-visiting Lepidoptera, many of which are actual or potential pollinators, currently dominate the list of endangered species: 17 species of butterfly and 3 species of moth constitute more than half of all insect species listed as endangered (USFWS 2010a). The State-listed endangered bronze copper butterfly, State-listed threatened frosted elfin butterfly, and a number of other moths and butterflies have been documented in the refuge's grassland habitat.

The northern diamondback terrapin is not federally listed; however, it is a State species of concern. While not traditionally considered a grassland species, members of the refuge staff have observed individuals in this habitat. It is possible that terrapins are attempting to use the grassland habitat for nesting purposes, which may negatively affect reproductive success. Terrapin nests in grassland areas may be subject to increased predation associated with increased predator access, as well as decreased hatch rates because of suboptimal hatching conditions (for example, nest temperature, environmental exposure).

Although total acres and patch sizes are less stringent during migration and winter, larger blocks (more than 20 acres) of grassland are recognized as optimal for grassland bird species survival requirements. Service biologists consider the grasslands at Supawna Meadows NWR to be limited in quality for breeding birds, so management measures will be employed to continue to provide grassland habitat for migrating and wintering birds.

Grasslands, being an early successional community type, require significant maintenance and time inputs to be maintained over a long-term period. In some areas, it will be more economically and ecologically beneficial to manage existing grassland habitats in a successional trajectory toward shrubland and ultimately

coastal or floodplain forest. Each individual grassland patch will require evaluation based on existing and potential habitat benefits.

Strategies

1. Purchase up to 409 additional grassland acres within the acquisition boundary.
2. Actively manage grasslands through the use of mowing and prescribed fire. Mow or burn 50 percent of the grassland acreage every 3 years.
3. Evaluate the potential for allowing managed grasslands, particularly those less than 20 acres in size, to succeed through natural processes to scrub/shrub habitat for priority migratory species.
4. Determine the value of grassland habitats to wintering and migrating birds using an adaptive management approach.
5. Use information gathered from Christmas Bird Counts and other non-standardized but repeated observations to determine habitat use and distribution.
6. Control Canada thistle, autumn olive, and other invasive plants to establish 80 percent cover of native species. The exact number of acres treated will depend on funding and management capability. Keep records of treated areas in GIS.
7. Provide a shrubland component to the fields, for migrating and breeding shrubland species, by creating a softer transition zone from grass to shrubs to forest at the edges of fields. Cull woody and invasive plants periodically to ensure native shrub species dominate.
8. Determine the value of grasslands for butterflies and other pollinators using refuge grassland habitat and incorporate surveys and/or monitoring efforts.

Monitoring Elements

Conduct appropriate monitoring and survey programs, as funding and staffing permit, to measure our success with respect to our objectives. The results may trigger adjustments to management strategies, or may trigger a reevaluation or refinement of our objectives. Examples of monitoring or surveys that we may implement include:

1. Conduct winter grassland transect surveys for measuring composition and relative abundance of grassland birds and raptors in grassland fields.
2. Prevent new invasive species from becoming established within early successional grassland habitats by utilizing Early Detection Rapid Response Techniques that detect newly established invasive species and immediately address those populations through the appropriate control measure. This strategy will incorporate a combination of plant identification and inventories, maintaining updates of new invasive species present in the region, as well as having knowledge of the appropriate management techniques prior to conducting control efforts.
3. To evaluate quality of grasslands for migrating grassland-dependent songbirds, conduct periodic vegetation surveys at landbird point counts for height, density measurements, and species composition or grass-forb ratio.
4. To evaluate achievement of the objective for migrating and wintering birds, conduct migration and winter bird counts.
5. Conduct baseline inventories of butterflies and other pollinator species to determine species abundance, density, and diversity as needed.
6. Conduct baseline small mammal inventory to obtain baseline information on species diversity and habitat utilization.
7. To evaluate the effectiveness of prescribed burning on grassland habitats, conduct post-burn surveys to measure the area, the intensity, and the success of the burn.

8. Monitor grasslands to determine if northern diamondback terrapins are using this habitat. If terrapins are using refuge grasslands, monitor individuals to determine how they are using this habitat and determine if management activities are appropriate to help protect this species.
9. Monitor presence of mute swans and Canada geese and work with USDA APHIS or other licensed agent to control these species as necessary to meet objectives.

Objective 2.2
Early Successional
Scrub/Shrub Habitat

Protect and manage up to 55 acres of upland scrub/shrub habitat to benefit migrating landbirds (for example, blue-winged warblers, American woodcock), breeding landbirds (for example, American Woodcock, prairie warblers), and other species of conservation concern with the following habitat attributes:

- >70 percent of a mixture of desirable native fruit-producing shrubs, such as blackberry (*Rubus* spp.), *Viburnum* spp., and bayberry; forbs, such as goldenrods; vines, such as grapevines and greenbrier (*Smilax laurifolia*); and tree species, such as sweetgum and black cherry < 20 feet in height;
- >50 percent of unmanipulated residual cover remaining annually for nesting species; and
- <30 percent cover of invasive species (for example, autumn olive, multiflora rose, Japanese honeysuckle, mile-a-minute weed).

Rationale

American woodcock is a high priority upland game bird that is of conservation concern at the continental, BCR 30, and PIF 44 scales. There is significant interest in managing early successional habitats for this species. Meeting these habitat requirements will also provide good habitat for many other species that use this habitat type. The refuge may also be as important for migratory stopover habitat as it is for breeding habitat for this species. American woodcock nesting habitat varies geographically, including drier woodland sites, young open woodlands, low shrubby cover, old fields, tall herbage bordering clearings, thickets, scrub oaks or pines, open woodland with dead leaf cover on the ground, and flat bottomlands near water. High shrub stem density and presence of edge habitat may be important in nest site selection in some areas.

The prairie warbler is also a high priority species at the continental, BCR 30, and PIF 44 geographic levels. The prairie warbler became a focal species in this CCP because of its geographic importance and its steep population declines. This species uses moderate sized patches of shrubland and early successional forest, which the refuge can be managed to sustain. It usually nests in a shrub, sapling, thicket, or fern clump from 0.3 to 3 meters above ground and occasionally higher.

The blue-winged warbler is a 2008 Service listed bird of conservation concern in BCR 30. During migration and winter, blue-winged warblers occur in brushy areas, scrub, and open woodland.

The New Jersey Wildlife Action Plan identifies the protection, maintenance, enhancement, and/or restoration of scrub/shrub habitats as a conservation goal necessary to maintain viable populations of declining scrub/shrub species (NJDFW 2008a). Shrub habitat comprised of various shrub species, or a diverse mix of young trees, provides an abundance of insect food for breeding birds and fruit for fall migrating birds. Many species of birds rely on shrub habitats at various times throughout the year. Because of this, responsibility for providing quality shrubland bird habitat is not limited to their breeding season.

The refuge lies in an important migratory bird pathway along the Atlantic flyway and provides an important stopover site for many migrating bird species.

Many scrub/shrub plant species bear fruit in the fall, which helps boost the fat reserves for migrating or wintering birds. During migration, vegetation structure, microhabitat conditions, and landscape context are the most important habitat features for these birds, rather than specific plant species (Dettmers 2003). In a study in Central New Jersey, Suthers et al. (2000) found that of the different successional habitat types, the one most frequently used by fall migrating birds were shrublands. Factors that contributed to the selection or abandonment of these habitats included vegetation structure and abundance and quality of resources. The study showed that migrant birds abandoned habitats that were shaded out by invading trees. It also showed that migrant birds were attracted to areas by abundance and quality of fruits.

As shrub habitats are transitional in nature, active management is necessary to periodically set back succession through mechanical treatments (for example, selective cutting) to provide a continued source of shrub habitat. Management actions even on smaller tracts can be effective as shrub-dependent birds are not typically sensitive to habitat patch size and many will use small patches of shrub habitat (Watts 2000).

Strategies

1. Purchase up to 19 additional scrub/shrub acres within the acquisition boundary.
2. Maintain scrub/shrub habitat through selective cutting and/or herbicide to set back succession.
3. Conduct invasive species control on scrub/shrub habitat so that 70 to 80 percent of habitat is in native species. The exact number of acres treated will depend on funding and management capability. Keep records of treated areas in GIS.
4. Continue the use of biological control measures to control invasive plant species.

Monitoring Elements

Conduct appropriate monitoring and survey programs, as funding and staffing permit, to measure our success with respect to our objectives. The results may trigger adjustments to management strategies, or may trigger a reevaluation or refinement of our objectives. Examples of monitoring or surveys that we may implement include:

1. Prevent new invasive species from becoming established within early successional scrub/shrub habitats by utilizing Early Detection Rapid Response Techniques that detect newly established invasive species and immediately address those populations through the appropriate control measure. This strategy will incorporate a combination of plant identification and inventories, maintaining updates of new invasive species present in the region, as well as having knowledge of the appropriate management techniques prior to conducting control efforts.
2. To evaluate achievement of the objective for breeding and migrating birds, conduct landbird surveys and migration and winter bird counts.
3. To evaluate achievement of the objective for migrating landbirds, conduct surveys during peak migration to determine bird abundance, density, and diversity. Surveys include area searches, constant-effort mist-netting and banding, and activity budgets.
4. Conduct woodcock singing ground surveys to evaluate habitat quality and utilization and species abundance on the refuge.
5. To evaluate quality of shrubland habitat for migrating landbirds, conduct periodic vegetation surveys for plant species composition, community structure, and berry production.

6. Gather baseline data on butterflies and other pollinators using refuge scrub/shrub habitat, and incorporate annual surveys and/or monitoring efforts.

Objective 2.3
Upland Forest Habitat

Maintain 2 additional acres of upland forest beyond those currently managed (up to 416 acres) benefiting breeding wood thrush, northern flicker, migrating black-and-white warblers and Kentucky warblers, migrating and wintering rusty blackbirds (*Euphagus carolinus*), roosting bats, and other forest-dependent species of conservation concern. Upland forest habitats are characterized by the following attributes:

1. Canopy cover of mixed deciduous forest >75 percent (including sweetgum, sour gum, black cherry, black oak, southern red oak, persimmon, American holly, and red maple);
2. Native deciduous shrubs and small sub-canopy trees <15 feet tall (highbush blueberry and southern arrowwood) and vines (common greenbriar) collectively cover >30 percent;
3. >30 percent native ground cover consisting of forbs and ferns with a major native component of flowering perennial herbaceous plants; and,
4. <20 percent cover of invasive plants (for example, Japanese stiltgrass, multiflora rose, Japanese honeysuckle) in understory/herbaceous layer.

Rationale

A large number of forest-dependent bird species are becoming increasingly rare because their habitats are diminishing in acreage or being broken into smaller blocks that do not provide optimal conditions for survival. The refuge does not provide sufficient unbroken forest to sustain forest interior birds; however, more tolerant species such as the wood thrush and flicker would benefit from active forest management, particularly control of invasive plants and white-tailed deer overbrowse.

The wood thrush is a high priority species at the continental, BCR, and PIF 44 scales. According to the Breeding Bird Survey, the wood thrush declined during the period of 1966 to 2007 (Sauer et al. 2008). The mid-Atlantic region is generally a stronghold for wood thrush, and this species is a good representative of many other species needing a structurally diverse understory within mature deciduous forest conditions.

The BBS data indicate a significant northern flicker population decrease in eastern North America between 1966 and 1989 (Sauer and Droege 1990). BBS data for 1966 to 1993 indicate large declines throughout eastern North America and the prairies. The flicker requires open forest (both deciduous and coniferous), open woodland, open situations with scattered trees and snags, riparian woodland, pine-oak association, and parks (AOU 1983). It nests in dead tree trunks or stumps, or the dead top of a live tree; it sometimes nests in a wooden pole, building, or earth bank. Northern flickers either dig a nest cavity or reuse an old one.

The black-and-white warbler and Kentucky warbler are listed as BCR30 species of high concern and New Jersey non-game birds of conservation concern. Both species require forest habitats for feeding during migration (NatureServe 2009). During migration and winter, rusty blackbird habitat is primarily wooded wetlands and riparian areas, but also includes various open woodlands, scrub, pastures, and cultivated lands (AOU 1983).

Major threats to the refuge's forest health and condition are overbrowse caused by white-tailed deer overabundance and infestation of invasive plant species. White-tailed deer thrive in fragmented non-urban areas and the resulting

overbrowse in forested landscape severely limits forest regeneration (NJDFW 2008c). White-tailed deer selectively browse native vegetation, giving invasive species (for example, mile-a-minute weed, etc.) a competitive edge in the forest understory (NJDFW 2008c). Deer browse pressure significantly impacts the regeneration of native woody species. Regeneration is essential to the success of the development of Supawna Meadow NWR's forest understory. Numerous studies have found that when white-tailed deer browse pressure is high, it can alter the growth, reproduction (Knight 2003), diversity (Lathan et al. 2005), and ultimately survival of plants within a specific population (Alverson and Waller 1997, Cote et al. 2004). In areas where deer density exceeds 20 deer per square mile, deer herbivory is related to declines in mid-story bird species (deCalesta 1994).

Supawna Meadows NWR has a severe infestation problem with the non-native mile-a-minute weed. This plant is an herbaceous trailing vine that is native to India and Eastern Asia. It is an aggressive plant that grows over native vegetation, which blocks light from penetrating to the plant. This reduces photosynthesis capability and may kill native plants (Okay et al. 2010). We will continue to work with New Jersey Department of Agriculture to maintain this habitat by using an Asian weevil (*Rhinoncomimus latipes*) to control mile-a-minute weed.

Based on results of host-range tests, a limited amount of native foliage was consumed by weevils (between 0.1 and 2.3 cm² over 30 days). However, none of the non-target plant species were consumed when the weevils were given a choice between them and mile-a-minute weed. Additionally, no eggs were laid on non-target plant species (Colpetzer 2003). The conclusions from field studies indicate the weevil establishes easily, produces multiple generations per year, and that adults can kill mile-a-minute plants through foraging (Hough-Goldstein 2008). The intention of the releases is that the weevils will consume mile-a-minute weed stems and leaves, which would result in reducing the spread of and, eventually, killing the plants.

The refuge includes an old barn that provides important habitat for bats and owls, wildlife that are dependent on upland forest habitat. A maternity colony of more than 1,500 bats, primarily little brown bats, roosts in a barn on the refuge. The federally listed, endangered Indiana bat is known to form small colonies within large little brown bat colonies. Indiana bats have been documented within the Highlands region of New Jersey, but little survey work has taken place within the southern portion of the State and it is not yet known if the species is present within the Coastal Plain (USFWS 2007a). Regardless of whether or not Indiana bats use the barn, the Service believes the barn should be maintained to support the maternity colony of little brown and big brown bats. If the barn is torn down, displaced bats may make their way into nearby homes and may be susceptible to harm by homeowners not willing to tolerate their presence. The barn would also support common barn owls, which is a New Jersey species of concern. Maintaining the barn would allow us to sustain this unique environment on the refuge as a resource for bats, owls, and other wildlife and as a component of refuge diversity in general.

Forested uplands provide important habitat for many species of bats. Quality habitats include the following: trees with shingle-like or shaggy bark ≥ 9 inches dbh, snags or diseased trees ≥ 5 meters tall, trees with cavities, habitat patches of mature trees ≥ 50 acres, and an open understory (Scherer 2009 personal communication). Indiana bats, a federally listed and endangered species and a trust resource of the U.S. Fish and Wildlife Service, have been confirmed breeding and hibernating in the State of New Jersey but are not documented on

the refuge. Typically, Indiana bats utilize trees or snags with exfoliating bark for maternity roosts; however, roosting Indiana bats have been documented in structures. The refuge's barn, adjacent to refuge grasslands and tidal marsh, provides artificial roosting habitat that houses the largest maternity colony of little brown bats and big brown bats in Salem County, New Jersey. Given the known range and maternity roost requirements of the Indiana bat, it is possible, although unlikely, that Indiana bats might use the barn for maternity roosting.

If Indiana bats are using the refuge for foraging and roosting, protecting, maintaining, and improving habitat quality on the refuge would contribute to the viability of the species and its recovery. Gathering more information about use of the refuge by this endangered species, in addition to other species of bats, would allow more informed management decisions and, if necessary, ensure the protection and improvement of habitats used as roost or maternity colonies.

The scrub/shrub habitat off Xmas Tree Lane and the Forest Habitat Trail was previously hydro-axed to maintain it in early successional habitat. This area will be restored to forested uplands to create a large block of forested habitat to benefit forest birds such as the red shouldered hawk. The scrub/shrub habitat off Lighthouse Road, east of the refuge office, would also be converted to forested upland habitat to create a larger forested block in that area and to benefit forest birds.

Strategies

1. Continue to coordinate with New Jersey Department of Agriculture's weevil release program to control mile-a-minute weed in some areas of the refuge, as described in the refuge's 2006 Compatibility Determination (USFWS 2006), and the accompanying U.S Department of Agriculture. Environmental Assessment (Firko 2004) that were completed for this activity. A more recent version of that compatibility determination is in appendix B.
2. Expand invasive species control on current and additional acreage on mile-a-minute weed, Japanese stiltgrass, multiflora rose, and Japanese honeysuckle so that 70 to 80 percent native vegetation is achieved. The exact number of acres treated would depend on funding and management capability. Keep records of treated areas in GIS.
3. Purchase up to 174 additional upland forest acres within the acquisition boundary.
4. Work with State and other partners to conduct limited surveys for bat species of conservation concern and implement appropriate action if white-nose syndrome is discovered in the colony.
5. Identify, locate, and manage additional native bat habitat.
6. Maintain and improve the structural integrity of the barn, located adjacent to the refuge's grasslands and tidal marshes, to continue to provide maternity roosting habitat for little brown and big brown bats, common barn owls, and other species of conservation concern.
7. Work with partners to monitor the barn owl nest box in the barn.

Monitoring Elements

Conduct appropriate monitoring and survey programs, as funding and staffing permit, to measure our success with respect to our objectives. The results may trigger adjustments to management strategies, or may trigger a reevaluation or refinement of our objectives. Examples of monitoring or surveys that we may implement include:

1. Prevent new invasive species from becoming established within upland forest habitats by utilizing Early Detection Rapid Response Techniques that detect newly established invasive species and immediately addresses those populations through the appropriate control measure. This strategy would incorporate a combination of plant identification and inventories, maintaining updates of new invasive species present in the region, as well as having knowledge of the appropriate management techniques prior to conducting control efforts.
2. Conduct landbird surveys, migration and winter bird counts to evaluate achievement of the objective for breeding, migrating, and wintering birds.
3. Conduct reptile and amphibian inventories to obtain baseline information on species diversity and habitat utilization.
4. Conduct acoustical monitoring surveys to determine presence of Indiana bats during their breeding season and detect occurrences of Indiana bats during migration.
5. Conduct acoustical monitoring surveys to determine species diversity and composition of bats on the refuge during breeding and migration.
6. Conduct baseline small mammal inventory to obtain baseline information on species diversity and habitat utilization.
7. In the barn, conduct comprehensive surveys for bat species of conservation concern and implement appropriate action if white-nose syndrome is discovered in the colony.
8. In the barn, monitor the barn owl nest box to determine use and hatching success.
9. To determine the effectiveness of the white-tailed deer hunting program, evaluate regeneration of native trees, shrubs, and forbs by conducting vegetation surveys to gather information on species composition, abundance, and diversity.
10. Work with the State on white-tailed deer control.
11. Monitor presence and impact of beaver in adjacent habitat, which impacts forested uplands, and work with USDA APHIS or other licensed agents to control these species as necessary to protect public safety and refuge resources.

Goal 3

Protect, enhance, and restore biological integrity, diversity, and environmental health of non-tidal wetland habitats to support native wildlife and plant communities with emphasis on breeding, migrating, and overwintering birds and other species of conservation concern.

Objective 3.1 Non-tidal Scrub/Shrub Wetlands

Protect and manage up to 52 acres of non-tidal scrub/shrub wetland habitat to benefit migrating landbirds such as eastern towhee (*Pipilo erythrophthalmus*), gray catbird (*Dumetella carolinensis*), brown thrasher (*Toxostoma rufum*), and other species of conservation concern with the following attributes

- >75 percent cover of native fruit-bearing shrubs (for example, dangleberry (*Gaylussacia frondosa*), southern arrowwood);
- <20 percent cover of native moist soil grasses and forbs (for example, coast cockspur, spike-rush (*Elocharis* spp.), smartweed (*Polygonum* spp.), switch grass); and
- <30 percent cover of invasive plants (for example, mile-a-minute weed, common velvet grass [*Holcus lanatus* L.], autumn olive).

Rationale

Scrub/shrub habitat is essential in supporting a number of bird species of conservation concern. The yellow-breasted chat, a year-round resident of Supawna Meadows NWR, is listed in the NJWAP as a species of concern in the Southern Piedmont Plains region (NJDFW 2008a). It nests in bushes, brier

tangles, vines, and low trees, generally in dense vegetation less than 2 meters above ground. In winter, it establishes territories in young second-growth forest and scrub. Early successional habitat is essential to its survival. The prairie warbler, another species of concern, has been described in objective 2.2 above (see page 4-25).

Scrub/shrub habitats are becoming increasingly rare in the Delaware Estuary region and correspondingly less able to sustain healthy populations of birds and other species of conservation concern. See objective 2.2 for additional rationale for scrub/shrub habitat management.

It is anticipated that management of shrublands for migrating landbirds will continue to provide habitat for breeding landbirds, such as gray catbirds and eastern towhees, and other species of conservation concern dependent on shrublands.

Strategies

1. Purchase up to 4 additional scrub/shrub acres within the acquisition boundary.
2. Maintain scrub/shrub habitat through selective cutting and herbicide application to set back succession.
3. Control invasive plants so that 70 percent of scrub/shrub habitat is comprised of native species. The exact number of acres treated will depend on funding and management capability. Keep records of treated areas in GIS.
4. Continue the use of biological control measures to control mile-a-minute weed.

Monitoring Elements

Conduct appropriate monitoring and survey programs, as funding and staffing permit, to measure our success with respect to our objectives. The results may trigger adjustments to management strategies, such as selective cutting and herbicide treatments to achieve structural and species diversity of non-tidal scrub/shrub wetland habitat. Results may trigger a reevaluation or refinement of our objectives. Examples of monitoring or surveys that we may implement include:

1. Prevent new invasive species from becoming established within non-tidal scrub/shrub habitat by utilizing Early Detection Rapid Response Techniques that detect newly established invasive species and immediately address those populations through the appropriate control measure. This strategy will incorporate a combination of plant identification and inventories, maintaining updates of new invasive species present in the region, as well as having knowledge of the appropriate management techniques prior to conducting control efforts.
2. To evaluate achievement of the objective for breeding and migrating birds, conduct landbird surveys, migration and winter bird counts.
3. To evaluate achievement of the objective for migrating landbirds, conduct surveys during peak migration to determine bird abundance, density, and diversity every 5 years. Surveys include area searches, constant-effort mist-netting and banding, and activity budgets.
4. To evaluate quality of scrub/shrub habitat for migrating landbirds, conduct periodic vegetation surveys for plant species composition, community structure, and berry production every 3 to 5 years.
5. Gather baseline data on butterflies and other pollinators using refuge non-tidal scrub/shrub wetland habitat and incorporate annual surveys and/or monitoring efforts within 5 to 10 years.

Objective 3.2
Non-tidal Herbaceous
Wetlands

Protect up to 55 acres of non-tidal herbaceous wetland habitat to benefit marsh wrens, southern bog lemmings, and other species of conservation concern with the following attributes

- >70 percent cover of herbaceous wetland species, such as rice cutgrass, *Polygonum* spp., *Juncus* spp., *Drosera* spp., and *Serracenia* spp; and
- <30 percent cover of invasive plants, such as phragmites and reed canary grass (*Phalaris arundinacea*).

Rationale

Non-tidal herbaceous wetlands at Supawna Meadows NWR provide habitat for species of conservation concern, including the marsh wren, which inhabits freshwater and brackish marshes in cattails, tule, bulrush, and reeds. Its success may be greatest in marshes with relatively dense vegetation and deep water. Though no longer listed by the Service as a bird of conservation concern in the region, it is considered a non-game species of conservation concern by the State of New Jersey (NJDFW 2008a). The southern bog lemming is also listed by New Jersey as a non-game species of conservation concern (NJDFW 2008a).

Non-tidal herbaceous wetlands are a small but important habitat component of the refuge because of the relative scarcity of this type of habitat in the vicinity of the refuge and the diversity of vertebrate and invertebrate species and plant life these wetlands typically support. Overbrowse from white-tailed deer limits regeneration of native herbaceous plants and exacerbates invasive plant species problems.

Strategies

1. Purchase up to 13 additional non-tidal herbaceous wetland acres within acquisition boundary.
2. Develop an Adaptive Management Framework for phragmites control so that treatments are monitored and evaluated for effectiveness. The refuge will be using an integrated approach to phragmites control, which will consider restoration of natural processes, herbicides, prescribed burning, biological control, and other tools as they are developed.
3. Monitor habitat destruction impacts of white-tailed deer. Implement population control measures on white-tailed deer if significant habitat destruction is observed.

Monitoring Elements

Conduct appropriate monitoring and survey programs, as funding and staffing permit, to measure our success with respect to our objectives. The results may trigger adjustments to management strategies, such as prescribed fire and herbicide treatments to achieve structural and species diversity of non-tidal herbaceous wetland habitat. Results may trigger a reevaluation or refinement of our objectives. Examples of monitoring or surveys that we may implement include:

1. Prevent new invasive species from becoming established within non-tidal scrub/shrub habitat by utilizing Early Detection Rapid Response Techniques that detect newly established invasive species and immediately address those populations through the appropriate control measure. This strategy will incorporate a combination of plant identification and inventories, maintaining updates of new invasive species present in the region, as well as having knowledge of the appropriate management techniques prior to conducting control efforts.

2. To determine the effectiveness of the white-tailed deer hunting program, evaluate regeneration of native shrubs and forbs by conducting vegetation surveys to gather information on species composition, abundance, and diversity.
3. Work with the State on white-tailed deer control.

Objective 3.3
Freshwater Impoundments

Manage the existing five impoundments, consisting of up to 87 acres, using existing water control structures and up to 5 acres of non-tidal open water impoundments (without water control structures) to enhance habitat available for shorebirds, waterfowl, marsh birds, and wading birds during their peak spring and fall migration periods while maintaining essential habitat for other species of management concern, such as amphibians and dragonflies, through a combination of water level management, wetland restoration, and invasive species control. These measures will include:

- Annually provide high quality foraging habitat for wading and marsh birds, specifically black-crowned night-herons, glossy ibis, least bitterns, snowy egrets, and little blue herons (summer: July-late August). This habitat will consist of open, shallow water (2 to 10 inches water depth) with patches of emergent wetland plants that support fish, invertebrates, and amphibians.
- Annually support migratory shorebirds through a mix of shallow water (<6 inches water depth), mudflat with sparse vegetation (<10 percent cover), and mudflats with no vegetation at times of peak migration (spring: May; and fall: mid-August through September).
- Annually support migratory waterfowl through a mix of shallow (6 to 24 inches water depth) flooded vegetation (*Carex*, *Polygonum*, *Peltandra*) at times of peak migration (spring: late March, and fall: late October).
- Annually support migratory wading birds through a mix of shallow remnant pools (6 to 12 inches water depth) at times of peak migration (spring: late March, and fall: late August).

Rationale

Supawna Meadows NWR's impoundments and emergent wetlands provide important foraging habitats for wading birds nesting on Pea Patch Island, which is the largest wading bird colony in the mid-Atlantic and one of the largest colonies on the East Coast. Managing these wetlands to provide the necessary food for a subset of these birds will result in resources available to a larger suite of wading birds, such as black-crowned night herons, glossy ibis, least bitterns, snowy egrets, and little blue herons, which are priority species within BCR 30. Also, created wetland environments can provide key life cycle components for a variety of birds and aquatic species.

Invasive plant species, such as phragmites, purple loosestrife, Canada thistle, and mile-a-minute weed, are increasingly displacing native species in the impoundments and along the dikes. Water levels are controlled using water control structures. An increase in water levels can occur from allowing tidal water to flow into the impoundment, rainfall, and natural springs. The water levels in impoundments without water control structures are influenced by rainfall, natural springs, and drying conditions such as drought. Prescribed fire can be used to control vegetation in the impoundments. Mowing, prescribed fire, and flooding can be used to reduce overcrowding vegetation.

The Service has a policy emphasizing restoring the biological integrity, diversity, and environmental health of refuges (601 FW 3). We also need to think about creating and restoring natural systems that have resilience (that is, the capacity to absorb disturbance while retaining basic structure and function) to help

address predicted sea level rise and other climate change issues. As sea level rises, management and maintenance of coastal wetland impoundments will become increasingly challenging and expensive. Due to the continued high cost of managing impoundments and maintaining associated infrastructure and coupled with the natural forces that strive to eliminate them, Supawna Meadows NWR will continue to study the feasibility of whether or not to continue individual impoundment management. Returning impoundments to more natural hydrological regimes will result in impoundments and the surrounding habitats becoming slightly brackish.

Strategies

1. For each impoundment, evaluate potential for restoring or reverting to non-impounded natural marsh or forested wetland habitats (natural hydrology) rather than continuing impoundment management. Participate in a Northeast Region structured decisionmaking study to determine the highest conservation value for each impoundment. Where restoring natural processes is not feasible, the refuge will strive to mimic natural processes within impoundments.
 - Begin evaluation with Tract 11C impoundment for potential to restore natural hydrologic conditions.
 - In impoundments without water control structures, evaluate potential for creating vernal pool-like shallow waters for amphibians and implement if feasible.
2. Until the HMP is developed, actively manage Tract 11 and Tract 11D Lighthouse Road Impoundments. Vary water level management schemes on each impoundment year-to-year to benefit priority species, particularly Pea Patch Island wading birds.
3. Develop an Adaptive Management Framework for phragmites control so that treatments are monitored and evaluated for effectiveness. The refuge will be using an integrated approach to phragmites control, which will consider restoration of natural processes, herbicides, prescribed burning, biological control, and other tools as they are developed.
4. Actively manage impoundments using mowing, prescribed fire, flooding, and biological control for purple loosestrife and mile-a-minute weed as needed to achieve objectives.
5. Maintain dike and water control structures as needed. Mow and reduce woody vegetation on Tract 11 dike.
6. Collect data and assess habitat and dikes to determine damage by furbearers, such as muskrat and groundhog. Determine threshold that requires species management. Issue a Special Use Permit if trapping is needed.
7. In impoundments without water control structures, maintain nearby nest boxes for wood ducks and eastern screech owls.
8. In Tract 11D Xmas Tree Lane Impoundment, determine appropriate water level management of impoundment and implement control measures.
9. In Tract 11D Xmas Tree Lane Impoundment, monitor habitat destruction of beaver. Implement beaver population control measures if significant habitat destruction is observed.

Monitoring Elements

Conduct appropriate monitoring and survey programs, as funding and staffing permit, to measure our success with respect to our objectives. The results may trigger adjustments to management strategies, or trigger a reevaluation or refinement of our objectives. Examples of monitoring or surveys that we may implement include:

1. Prevent new invasive species from becoming established within impoundments by utilizing Early Detection Rapid Response Techniques that detect newly established invasive species and immediately address those populations through the appropriate control measure. This strategy will incorporate a combination of plant identification and inventories, maintaining updates of new invasive species present in the region, as well as having knowledge of the appropriate management techniques prior to conducting control efforts.
2. Conduct inventories and monitoring of shorebirds, waterfowl, waterbirds, and wading birds use and abundance within the impoundments. Utilize data to document the ongoing effectiveness of water level management activities and adjust management protocols as necessary.
3. Conduct fish inventories to obtain baseline information of fish species diversity.
4. To evaluate habitat use and monitor overall diversity of anuran species, conduct call count surveys to evaluate impoundment protection and management.
5. In early spring, identify and map areas of concentration of amphibians and impoundments to ensure their conservation and protection.
6. Monitor habitat destruction of Canada goose, mute swan, and beaver, and work with USDA APHIS or other licensed agents to control these species as necessary to protect public safety and refuge resources.

Objective 3.4 Forested Wetlands

Protect up to 346 acres of forested wetland habitat to benefit breeding wood thrush and wood ducks, migrating and wintering rusty blackbird, breeding and wintering eastern screech owls, and other forest-dependent species of conservation concern. Forested wetland habitat is characterized by the following attributes

- understory with 30 to 50 percent cover of native shrubs (3 to 12 feet tall), such as southern arrowwood and sweet pepperbush, with scattered openings containing native herbaceous species, such as New York fern and false nettle;
- <20 percent cover of invasive plants (for example, Japanese stiltgrass) in understory/herbaceous layer; and
- >90 percent canopy cover of native trees (>12 feet tall), such as red maple, willow oak, sweetgum, and sour gum.

Rationale

The wood duck is a refuge focal species because it is a high priority species both within the Atlantic Flyway and at the regional scale, and it is a good representative of forest wetland habitat types. Wood duck populations began declining in the late nineteenth century because of overharvest, deforestation, and loss of wetland habitats. Populations have since stabilized but not recovered, even though harvest rates have declined. Wood ducks prefer quiet inland waters, such as wooded swamps, flooded forest, ponds, marshes, along streams where they nest in holes in large trees in forested wetlands, and in bird boxes, usually within 0.5 kilometers of water and near forest canopy openings. They winter on freshwater and brackish marshes, ponds, streams, and estuaries.

The rusty blackbird breeds in Canada and Alaska and migrates to New Jersey and other Eastern and Central States to winter. During migration and winter, habitat is primarily wooded wetlands and riparian areas but also includes various open woodlands, scrub, pastures, and cultivated lands (American Ornithologists' Union 1983). A significant, range-wide decline of approximately 90 percent over the past four to five decades is indicated by data from the Breeding Bird Survey, Christmas Bird Counts, and Quebec Checklist Program

(Greenberg and Droege 1999, Niven et al. 2004, Savignac 2004, Sauer et al. 2005). Analyses of abundance classifications in bird distribution books and annotated checklists reveal a long-term decline dating back to at least the early part of the 1900s (Greenberg and Droege 1999).

The eastern screech owl, a non-game species of conservation concern in the State of New Jersey (NJDFW 2008a), is common year round at Supawna Meadows NWR. It prefers open woodland, deciduous forest, woodland/forest edge, swamps, scrub, and riparian woodland. It roosts in tree hollows, among foliage close to trunk, in nest boxes, under eaves, or at similar sites.

A large number of bird species, including the wood duck, rusty blackbird, and eastern screech owl, use forested wetlands. Birds use the refuge's forested wetlands for breeding, migration, and wintering. The refuge's mature forested wetland habitat represents an excellent example for the area of great quality and size class diversity. A water control structure is located within forested wetland habitat along the Forest Habitat Trail. Managing the water levels here will provide additional forested wetland habitat, as in a Green-tree Reservoir. The forest has been ditched in some areas, thus altering the original hydrology. Encroachment of invasive species threatens this habitat. Also, the habitat north of the Tract 11 impoundment contains a wooded section within the scrub/shrub habitat that will be converted to forested wetlands for the benefit of short-eared owls. Additional management actions will allow us to better sustain this important habitat type.

Major threats to the refuge's forest health and condition are overbrowse caused by white-tailed deer overabundance and infestation of invasive plant species. White-tailed deer thrive in fragmented non-urban areas, and the resulting overbrowse in forested landscape severely limits forest regeneration (NJDFW 2008c). White-tailed deer selectively browse native vegetation, giving invasive species (for example, mile-a-minute weed, etc.) a competitive edge in the forest understory (NJDFW 2008c). Deer browse pressure significantly impacts the regeneration of native woody species. Regeneration is essential to the success of the development of Supawna Meadow NWR's forest understory. Numerous studies have found when white-tailed deer browse pressure is high, it can alter the growth, reproduction (Knight 2003), diversity (Lathan et al. 2005), and ultimately survival of plants within a specific population (Alverson and Waller 1997, Cote et al. 2004). In areas where deer density exceeds 20 deer per square mile, deer herbivory is related to declines in mid-story bird species (deCalesta 1994).

Strategies

1. Purchase up to 156 additional acres of forested wetlands within the acquisition boundary.
2. Conduct an adaptive management study to determine if natural hydrology should be restored.
3. Remove wood duck nest boxes as boxes fall into disrepair.
4. Expand invasive species control on current and additional acreage of Japanese stiltgrass and other dominant invasive species so that 70 to 80 percent native vegetation cover is achieved. The exact number of acres treated will depend on funding and management capability. Keep records of treated areas in GIS
5. Continue the use of biological control measures to control mile-a-minute weed.
6. Monitor habitat destruction by white-tailed deer and beaver. Implement population control measures on white-tailed deer and beaver if significant habitat destruction is observed.

Monitoring Elements

Conduct appropriate monitoring and survey programs, as funding and staffing permit, to measure our success with respect to our objectives. The results may trigger adjustments to management strategies, or a reevaluation or refinement of our objectives. Examples of monitoring or surveys that we may implement include:

1. Prevent new invasive species from becoming established within forested wetland habitat by utilizing Early Detection Rapid Response Techniques that detect newly established invasive species and immediately address those populations through the appropriate control measure. This strategy will incorporate a combination of plant identification and inventories, maintaining updates of new invasive species present in the region, as well as having knowledge of the appropriate management techniques prior to conducting control efforts.
2. Conduct amphibian and reptile inventories to obtain baseline information on species diversity and habitat utilization.
3. To evaluate habitat use and monitor overall diversity of anuran species, conduct call count surveys to evaluate vernal pool protection and management.
4. In early spring, identify and map areas of concentration of amphibians and vernal pools to ensure their conservation and protection.
5. Monitor habitat destruction of Canada goose, mute swan, and beaver, and work with USDA APHIS or other licensed agents to control these species as necessary to protect refuge resources.

To determine the effectiveness of white-tailed deer hunting program, evaluate regeneration of native trees, shrubs, and forbs by conducting vegetation surveys to gather information on species composition, abundance, and diversity.

Goal 4

Provide opportunities for compatible, high-quality, wildlife-dependent public uses.

Objective 4.1 Hunting

Expand hunting opportunities for deer and waterfowl hunters.

Rationale

Hunting in southern New Jersey is a traditional outdoor past time and is deeply rooted in our American heritage. A quality hunt program helps develop an appreciation for fish and wildlife. It is also a tool to assist in deer population control and habitat management efforts on the refuge.

Opportunities for public hunting are decreasing with increasing private land development. Refuge lands thus become increasingly important in the region as a place to engage in this activity.

We will strive to meet the following guiding principles for a refuge hunting program identified in new Service policy (605 FW 2)

- Manage wildlife populations consistent with Refuge System-specific management plans approved after 1997 and, to the extent practicable, State fish and wildlife conservation plans;
- Promote visitor understanding of and increase visitor appreciation for **America's natural resources**;
- Provide opportunities for quality recreational and educational experiences.
- Encourage participation in this tradition; and
- Minimize conflicts with visitors participating in other compatible wildlife-dependent recreational activities.

The refuge hunt program is implemented consistent with State regulations and additional refuge regulations stipulated in Code of Federal Regulations 50 (50 CFR). Included in our deer hunt plan objectives is the intent to maintain the deer population at a level commensurate with available habitat, in order to maintain the health of the herd, and prevent habitat degradation that accompanies overpopulation. Included in our waterfowl hunt plan objectives is the intent to provide opportunities for compatible wildlife-dependent recreation as required by the National Wildlife Refuge Improvement Act of 1997, permit use of a sustainable natural resource, and permit hunting as a management strategy to meet state, flyway, and national population goals for non-migratory Canada goose and greater snow goose populations.

Our current deer hunt program is archery-only. Our deer and waterfowl hunts follow State seasons. In general, we believe the extent of our current programs meets the needs of our public and provides a quality experience. However, we will continue to evaluate the programs on an annual basis and modify them, as warranted, given new biological or visitor data.

The refuge will rely on State hunting regulations to define hunting safety zones. We believe that State regulations are adequate for ensuring safety. Since the refuge owns a limited amount of upland habitat, this will allow safe hunting on additional lands inhabited by deer. To be consistent with State regulations and management actions at Cape May NWR (which is in the same state and under the same refuge manager) we will not post or maintain signs marking safety areas. To address risks of trespass onto neighboring property, refuge staff will continue to post and maintain refuge boundary signs.

We are proposing some changes to the authorized hunting and fishing areas (map 4.2). The open water in the Tract 11 Impoundment will be closed to hunting as well as all other public use. This will provide undisturbed habitat for waterfowl, while allowing public use in the upland portion of this area, which was previously only open to hunters.

Portions of the Supawna Meadows NWR were designated, acquired, reserved, or set apart as an inviolate sanctuary; therefore, we may only allow hunting of migratory game birds on no more than 40 percent of the refuge. The waterfowl hunting zone will be reconfigured and 1,206 acres will be open to waterfowl hunting. During scoping meetings, the NJDFW asked the refuge to open tidal streams with a 150-foot buffer to allow hunting from the marsh habitat. In order to protect resources of concern while allowing adequate hunting areas, a new waterfowl hunting zone was delineated.

Providing new hunting opportunities on Tract 48 (AID) and any other new properties will be accomplished by updating the 2006 White-Tailed Deer Hunt Management Plan and the 2000 Waterfowl Hunting Plan and conducting additional NEPA analysis.

Strategies

1. Continue deer and waterfowl hunting on the refuge according to State regulations. Only archery deer hunting is allowed on the refuge for all four of New Jersey's bow hunting seasons according to the State Deer Management Zone 63 regulations.
2. Monitor the deer population and its effects on refuge habitats. If the herd needs to be further culled, work with the State to offer a doe-first season, a firearms season, or another method for taking more deer off the refuge. Continue to keep the upland areas of Tract 11 Impoundment open to archery deer hunting according to State seasons. The open water habitat and dike around the open water will be closed to hunters.

3. Remove hunting closure signage; rely on State hunting regulations to define hunting safety zones.
4. Reconfigure the waterfowl hunting zone so that 1,206 acres will be open to hunting. Access will be from the water. No blinds will be allowed to be built on the marsh.
5. Within 3 years of completing the final CCP, conduct additional NEPA analysis to open Tract 48 (AID) property, and any other new properties as identified in the CCP, to deer and waterfowl hunting.

Objective 4.2 Fishing and Crabbing

Expand fishing and crabbing opportunities for the public.

Rationale

Fishing and crabbing are popular recreational activities along the Delaware Estuary and Salem River shorelines, and the refuge can be accessed by an extensive series of tidal channels that support both activities. Fishing and crabbing have been historical, consumptive recreational uses on the refuge that we believe are compatible with our resource objectives.

We will strive to meet these guiding principles for a refuge recreational fishing program identified in Service policy (605 FW3 and 4):

- Effectively maintain healthy and diverse fish communities and aquatic ecosystems through the use of scientific management techniques.
- Promote visitor understanding of, and increase visitor appreciation for, **America's natural resources.**
- Provide opportunities for quality recreational and educational experiences consistent with criteria describing quality as defined in 605 FW 1.6.
- **Encourage participation in this tradition deeply rooted in America's natural heritage and conservation history.**
- Minimize conflicts with visitors participating in other compatible wildlife-dependent activities.

In 2009, approximately 750 fishing and crabbing visits were made to the refuge; however, this number tends to fluctuate with the quality and availability of crabbing. We believe that onsite staff and additional funding will allow us to expand fishing and crabbing on the refuge.

In order to protect resources of concern and set aside 60 percent of the refuge as an inviolate sanctuary to wildlife, fishing and crabbing will occur in the same areas as waterfowl hunting so as to keep the sanctuary areas free of disturbance from fishing and hunting. Also, we will open Tract 11D Xmas Tree Lane impoundment (XTL) to freshwater fishing and conduct additional NEPA analysis, as needed, within 1 year of the final CCP. This will be the only freshwater fishing site available at Supawna Meadows NWR. Finally, we will prohibit fishing at Lighthouse Road due to safety concerns, such as the lack of parking and the lack of suitable habitat for bank fishing.

We will open fishing and crabbing opportunities on Tract 48 (AID), and any other new areas as identified in this CCP, within 3 years of the adoption of this final CCP and only after updating the 2000 Sport Fishing Plan and conducting any additional NEPA analysis.

Strategies

1. Rezone fishing and crabbing to coincide with waterfowl hunting areas. Conduct additional NEPA analysis, as needed, within 3 years of the final CCP. Areas open for saltwater fishing and crabbing will be open in accordance with State regulations. Open Tract 11D XTL impoundment to freshwater fishing and conduct NEPA analysis within 1 year of final CCP.
2. Close fishing at Tract 11D Lighthouse Road impoundment because of safety hazards associated with access.
3. Continue to host the one-day refuge youth fishing event at the Tract 18 impoundment. Seek assistance from the Friends and/or volunteers.

Objective 4.3
Wildlife Observation,
Photography and
Interpretation

Expand wildlife observation, photography, and interpretation opportunities.

Rationale

The refuge's Public Use Plan was approved on August 3, 2000. It states that through the public use program, visitors and local residents will be introduced to the role of the Service as a land management agency. Visitors will be encouraged to visit and learn more about other Service field areas, including refuges in New Jersey, Pennsylvania, and Delaware. Visitors will be introduced to the basic concepts of wildlife management and sustainable public use of natural resources. The public use program will be used to increase visitor understanding of refuge

management objectives and programs and to foster support for fulfilling its mandated mission.

We will strive to meet these guiding principles for refuge wildlife observation and photography programs identified in Service policy (605 FW 4 & 5):

- Provide safe, enjoyable, and accessible wildlife viewing and photography opportunities and facilities.
- Promote visitor understanding of, and increase visitor appreciation for, America's natural resources.
- Provide opportunities for quality recreational and educational experiences consistent with criteria describing quality found in 605 FW 1.6.
- Minimize conflicts with visitors participating in other compatible wildlife-dependent recreation activities.

While our primary mission is to protect wildlife and promote wildlife conservation, the 1997 Refuge Improvement Act directs us to provide six priority wildlife-dependent recreational uses in the Refuge System: hunting, fishing, wildlife observation and photography, and environmental education and interpretation where it is compatible. By providing the public with safe, accessible quality opportunities and well-maintained facilities for those uses, we hope to raise public awareness, understanding, appreciation, and stewardship of the Delaware Estuary ecosystem and the benefits of its conservation for fish, wildlife, and people. Ultimately, these will contribute to the mission of the refuge and the Refuge System. Wildlife observation, photography, and interpretation are major public uses of the refuge throughout the year. Over 15,000 people visit the refuge each year and, given our informal monitoring, most come to the refuge on the land side to view and photograph wildlife. Maintaining quality infrastructure and providing some new facilities will enhance visitor opportunities to view the relationships among resource management, wildlife, habitat, and people. Our facilities for public visitation include parking, information kiosks, nature trails, photo blinds, boardwalks, and interpretive literature/signs.

We will work with partners to facilitate quality wildlife observation and photography opportunities. The boat trail will be eliminated since all of the tidal

creeks are open to public use and there is no need to highlight a specific area for boating. Upland habitat surrounding the Tract 11 impoundment will be opened to the public to permit viewing of this habitat. An observation platform will be constructed so visitors could also view the open water in the impoundment without disturbing the wildlife that utilize the impoundment.

We will open Tract 48 (AID) property to wildlife observation within 3 years of completing the final CCP. This may require additional NEPA analysis.

Strategies

1. Continue to provide wildlife viewing, photography, and interpretation opportunities along existing refuge trails.
2. Continue to provide interpretive signs at all existing refuge public use sites, including the family plot cemetery along the Grassland Trail.
3. Improve the observation blinds along the Grassland Trail.
4. Continue to seasonally close bald eagle area.
5. Install/upgrade signs along Highway 49 directing motorists to the refuge.
6. Consider extending the current trail system onto newly acquired lands and providing observation blinds along new trails. Conduct additional NEPA analysis as necessary.
7. Expand refuge boundary signage on newly acquired lands.
8. Develop new brochures specific to trails.
9. Update Web site.
10. Construct a spur trail from the Grassland Trail into the wetland, with help from the Friends group if needed.
11. Eliminate the designation of a boat trail and remove trail markers, but continue to allow public boat access in the tidal streams.
12. Improve or install additional observation facilities on the refuge, for example:
 - Install an observation platform for wildlife observation and photography at the impoundment at Tract 11 and upgrade the nearby grassy parking area to accommodate 8 to 10 vehicles. The open water portion of the Tract 11 impoundment and the dike surrounding the open water will remain closed to the public all year. Gates will be installed to define the closed area.
 - Construct a wheelchair accessible photo-blind and other amenities to improve facilities for wildlife photographers at the Grassland Trail.
13. Construct a trail linking the FPRRL site to the Grassland Trail to connect visitors to wildlife viewing areas.
14. Use FPRRL to expand opportunities for refuge interpretation with panels and brochures on ground level and in the interior of FPRRL, if approved by SHPO. Take advantage of landscape view from FPRRL to interpret refuge marshlands, invasive plants, and a mosaic of other cover types as well as viewing birds in flight on the refuge.
15. Work with a neighboring private landowner to enhance viewing opportunities at the Sinnickson Landing boat ramp site for eagle viewing.
16. Seek year-round local New Jersey residents for volunteer-based interpretative programs.

Open Tract 48 (AID) property to wildlife observation, photography, and interpretation within 1 year of completing the final CCP. Conduct additional NEPA analysis as necessary.

Objective 4.4
Environmental Education
and Outreach

Expand and enhance environmental education and outreach programs.

Rationale

The refuge offers a unique opportunity to explore, in close proximity, tidal and non-tidal wetlands, grassland, and forested habitats, as well as to learn about managing those landscapes to benefit wildlife. We believe we can facilitate other educators to use the refuge and offer excellent environmental education opportunities without expending significant refuge staff or funding resources.

County school districts at other refuges in the region have curricula that include field trips to the refuge for elementary grade students. In recent years, no staff has been available to assist at Supawna Meadows NWR for these types of visits. Development of environmental education lessons tailored to State curricula will provide programs and activities for schools and other groups while increasing public understanding of wildlife needs, ecosystems, conservation, and habitat management for wildlife. Using our educational partners to assist in this endeavor has many benefits. These partners also act as supporters of the refuge and natural resource conservation, advocates for environmental education, and help us conduct outreach to the local community.

Service policy identifies six guidelines on which to base environmental educational programs. **These guidelines include connecting people's lives to the natural world, strengthening conservation literacy and knowledge, stressing the role of the Refuge System in conservation, and instilling a sense of stewardship and understanding of our conservation history.**

In order to build a stronger base of public understanding, support, and activism beyond the portion of the American public who visit refuges, the Service has actively supported nationwide strategies, partnerships, legislation, and departmental mandates with a strong emphasis on community outreach. These include the 100-On-100 Outreach Campaign, the National Outreach Strategy: A Master Plan for Communicating in the U.S. Fish and Wildlife Service, the Cooperative Alliance for Refuge Enhancement (CARE), the Volunteer and Community Partnership Act, and the Challenge Cost-Share Program.

We are particularly interested in outreach to the local communities in Salem County. Our desire is to be a welcomed and valued asset to these communities. A positive community relationship is a crucial link between public support for refuges and effective management of the Refuge System. We are aware that there are many residents who either do not know that a national wildlife refuge is nearby or do not recognize its regional importance to the Delaware Estuary ecosystem.

We are striving for a well-rounded program of public outreach to enable large and diverse segments of the public to learn about the importance of refuge wetland and upland habitats, species of conservation concern, cultural resources, refuge **management, and the refuge's role in the Refuge System.** An effective public outreach program can also help win friends and proactively deal with controversial refuge management activities. Outreach can be used to anticipate and avoid potential conflicts between the needs of wildlife and other refuge uses.

We believe that regular communications within the community are very important. News articles and personal appearances inform our neighbors about what we are doing and why, which will lead to increased understanding, appreciation, and support of our programs. Feedback we will receive from these

outreach efforts allows us to better understand issues that are important in our communities and how our management may affect them.

We also believe that actively engaging people in meaningful refuge programs or projects will make a more lasting impression. We will offer many opportunities for people to get involved. Partners, volunteers, and members of the Friends of Supawna Meadows NWR are vital to accomplishing our outreach activities. They will assist us in community events and refuge visitor programs as well as support data gathering and maintenance projects. This assistance will support us in meeting the refuge's goals and objectives, supporting the missions of the Refuge System and the Service, and fostering good community relationships.

Visitors will be introduced to the concept of ecosystem management and the role of the refuge in the Delaware River and Bay Ecosystem. The Visitor Services program will be used to enhance local interest in wildlife and to increase understanding of the social and economic benefits that wildlife and open space bring to the area.

Strategies

1. Actively work with schools and other organizations to develop and encourage onsite programs.
2. Refuge staff will actively participate in off-site outreach activities.
3. Expand volunteer base and Friends group programs.
4. Open Tract 48 (AID) property to environmental education and outreach within 3 years of completing the final CCP. Conduct additional NEPA analysis as necessary.

Goal 5

Protect cultural resources on the refuge.

Objective 5.1: Finns Point Rear Range Light

Maintain and protect Finns Point Rear Range Light.

Rationale

We believe it will become feasible and beneficial to retain ownership of the FPRRL and to integrate it into the interpretive program for the refuge. As mentioned in chapter 2, FPRRL is on the National Register of Historic Places and is well-known in the area as an historic resource of interest. It can receive substantial visitation.

Strategies

1. Continue to maintain the FPRRL in compliance with the National Historic Preservation Act.
2. Pursue expanding public access to and interpretative use of the FPRRL to promote refuge values.
3. Prioritize repair/restoration of the FPRRL in SAMMS in concert with recordation and demolition of other deteriorated structures on the refuge.
4. Consider entering an agreement with New Jersey Lighthouse Society (NJLHS) to assist the refuge in supporting the use of FPRRL and associated interpretative programs.
5. Coordinate with Friends of Supawna Meadows NWR to integrate history of FPRRL into interpretive programs.
6. Repair FPRRL catwalk to allow public access.
7. Incorporate history of FPRRL into staff-led interpretive programs.
8. Update FPRRL information and enhance interpretive signage.
9. With assistance from the NJLHS and Friends of Finns Point Lighthouse (FOFPL), seek to stabilize, protect, and interpret FPRRL lens, if possible, in the refuge office.

Objective 5.2 Other Cultural Resources	<p>Maintain and protect cultural sites and artifacts.</p> <p>Rationale Besides FPRRL, there are other cultural resources on the refuge, such as a family cemetery and the Yerkes farmstead. While not actually listed, New Jersey Historical Preservation Office staff determined that the Yerkes farmstead is eligible for listing on the National Register of Historic Places under the National Historic Preservation Act. There may be other historical or archaeological resources that come to light in the course of refuge management in the future. By law, we must consider the effects of our actions on archaeological and historic resources. Service-initiated actions likely to affect archaeological sites are routinely reviewed and assessed under the provisions of Section 106 of the NHPA. To date, projects requiring such review on the refuge have been confined to the location of facilities and impoundments. We will continue to comply with</p> <p>Section 106 of the NHPA before disturbing any ground. Refuge lands have never had a systematic archaeological survey in their entirety.</p> <p>Strategies</p> <ol style="list-style-type: none">1. Allow Friends of Supawna Meadows NWR to continue maintaining the family cemetery located on refuge lands.2. Hire a contractor to conduct a paleo-environmental review of the refuge. This review will include in-depth discussions of the refuge's archaeological sites and past history.
Goal 6	<p>Enhance refuge management through partnerships, friends, volunteers, and community outreach.</p> <p>Citizen involvement is critical to the well-being of the Refuge System and to the natural resources that depend on those lands. Working in partnership with other government agencies, academic institutions, organizations, and individuals is vital to our operations. When local citizens and other stakeholders of a refuge can see firsthand our conservation work, they become an informed constituency on behalf of conservation.</p> <p>Working in partnership with others also provides additional resources with which we can achieve our refuge goals and objectives. Our volunteers, Friends Group, and other conservation partners provide valuable assistance in accomplishing refuge projects in all our program areas.</p>
Objective 6.1: Refuge Partnerships	<p>Maintain active involvement in partnerships among all public land management agencies in South Jersey and the Lower Delaware River and Estuary to achieve refuge habitat and public use management objectives.</p> <p>Rationale Achieving refuge goals in many instances is feasible only through successful partnering with other agencies and groups.</p> <p>Strategies</p> <ol style="list-style-type: none">1. Communicate and coordinate regularly with the other agencies to discuss common goals, issues and concerns, share technical information, and identify opportunities for cooperative management with other agencies.2. Pursue formal Memorandum of Understanding/Memorandum of Agreements (MOU/MOA) and cooperative agreements with partnering agencies, where warranted, to facilitate sharing of resources and implementation of programs.3. Maintain the existing MOU with Salem County to share in law enforcement.

4. Evaluate opportunities for new partnerships with conservation organizations, educators, research and academic institutions, and other State and Federal agencies who share similar missions and goals.
5. With existing and future partners, make a greater effort to highlight our programs, opportunities, and successes through the use of media links (for example, Web sites) and the development of quality outreach materials that contain clear and consistent messages.

Objective 6.2
Refuge Friends Group

Enhance our relationship with the Friends of Supawna Meadows NWR to ensure we have a mutually beneficial working relationship and one that cooperatively promotes an appreciation of natural and cultural resource conservation and facilitates the implementation of priority refuge projects.

Rationale

There are over 50 Friends groups in the Northeast Region of the Service. These groups are private non-profit organizations formed and managed by local citizens to support the mission of a refuge and advocate for their local refuge and the National Wildlife Refuge System. The work these groups do is invaluable to our wildlife mission as well as the public activities that take place on refuges, fish hatcheries, and other Service stations.

Friends group members enjoy a variety of benefits depending on the group. Benefits include interacting with other people who share a common interest in wildlife and conservation, engaging in opportunities to learn more about refuge management and conservation practices, and notification of upcoming Friends and refuge events.

The Friends of Supawna Meadows NWR have been valuable supporters of the refuge purposes and the Refuge System mission. Many important programs and projects get accomplished each year through their hard work, dedication, and fundraising. Since many members live in the local community, they are also very effective in helping us conduct outreach about opportunities on the refuge and in providing us feedback from the community.

Strategies

1. Conduct monthly information and strategy meetings.
2. Contribute information to the **Friends' newsletter and Web site.**
3. **Support the Friends' efforts at sponsoring community events and programs.**
4. Encourage the Friends to work with other local citizens groups as an **extension of the refuge's community outreach program.**
5. Work with the Friends of Supawna Meadows NWR to seek outside support for refuge projects, develop public use programs, coordinate refuge projects, plan and conduct public events, conduct community outreach, promote national Service initiatives as they develop, and respond to public inquiries about the refuge.
6. Appoint a primary liaison between the Friends of Supawna Meadows NWR and the Service.
7. Provide resources, as needed, to help the Friends create and distribute their regular newsletter. Provide photographs illustrating habitat management and visitor services programs to include in the newsletter.
8. Work with the Friends of Supawna Meadows NWR on a regular basis to seek alternative funding sources and partnerships for various projects to benefit the refuge.

Objective 6.3
Refuge Volunteers

Encourage and facilitate an active, quality volunteer program that supports biological, maintenance, and visitor services priorities.

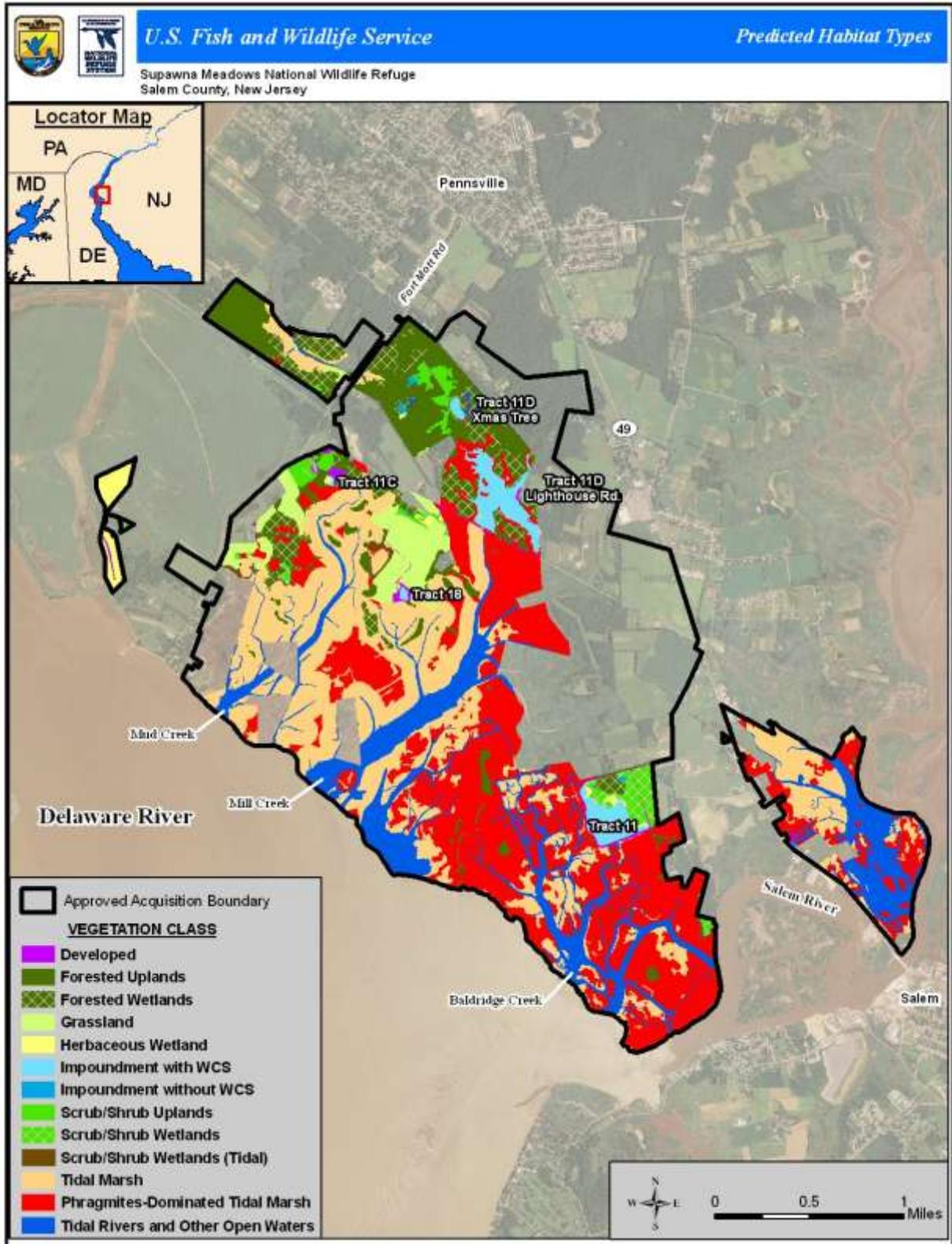
Rationale

The Fish and Wildlife Act of 1956, as amended by the Fish and Wildlife Improvement Act of 1978, and the National Wildlife Refuge System Volunteer and Community Partnership Enhancement Act of 1988 authorize the Service to accept volunteer services. Volunteers help the Service in a variety of ways. Some work full-time, while others assist a few hours per week or month or during a special event. Many volunteers conduct fish and wildlife population surveys, band ducks, lead tours, provide information to school groups and other visitors, work on cultural resources projects, perform clerical and administrative duties, work with computers and other technical equipment, and much more.

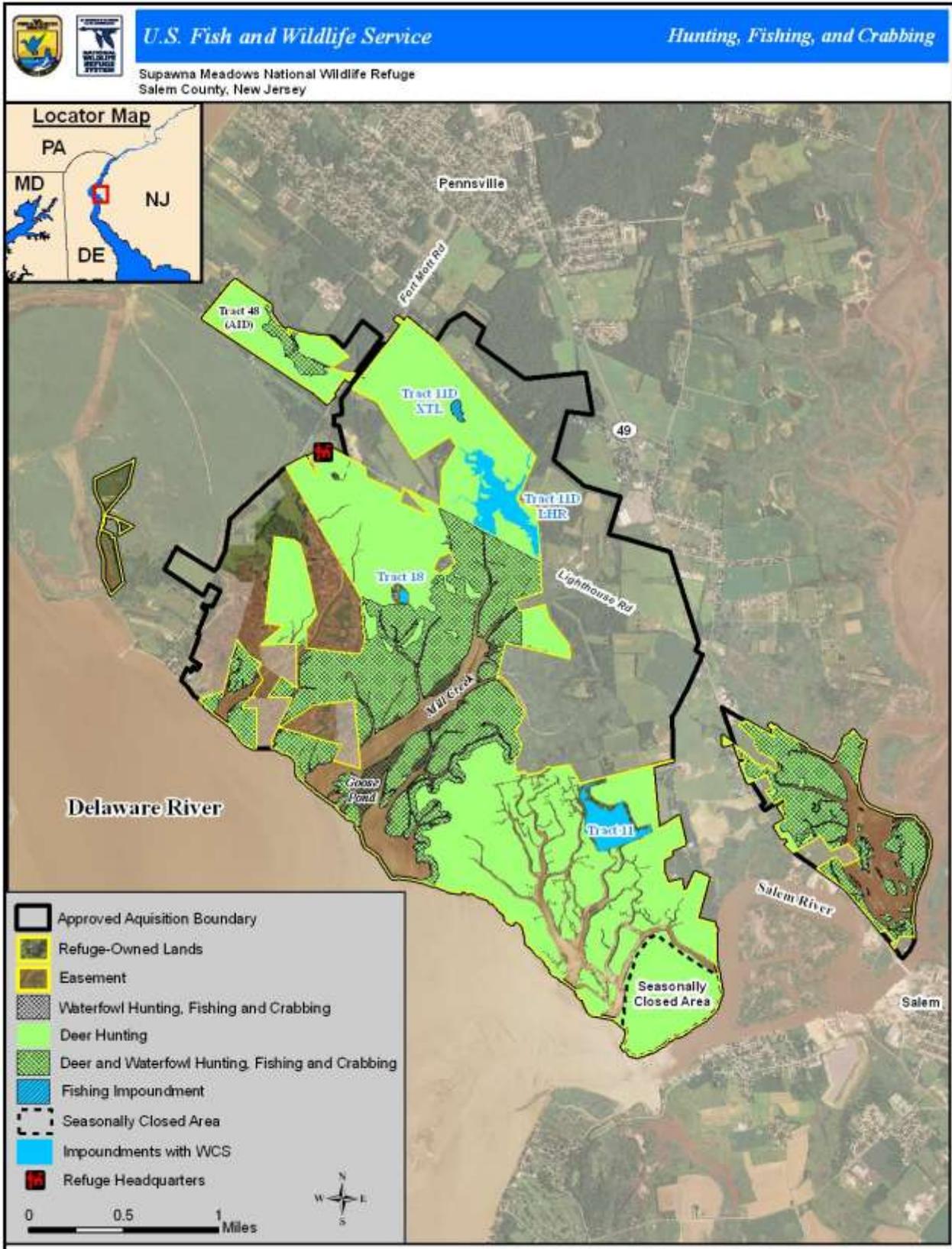
Volunteers are integrated into all aspects of refuge management including maintenance, habitat management, and visitor services and outreach programs. Their hard work and enthusiasm enhances which programs we can offer. In fact, many of the Service's visitor use programs at Supawna Meadows NWR are run by volunteers, thus making it feasible for the refuge to offer these programs at all.

Strategies

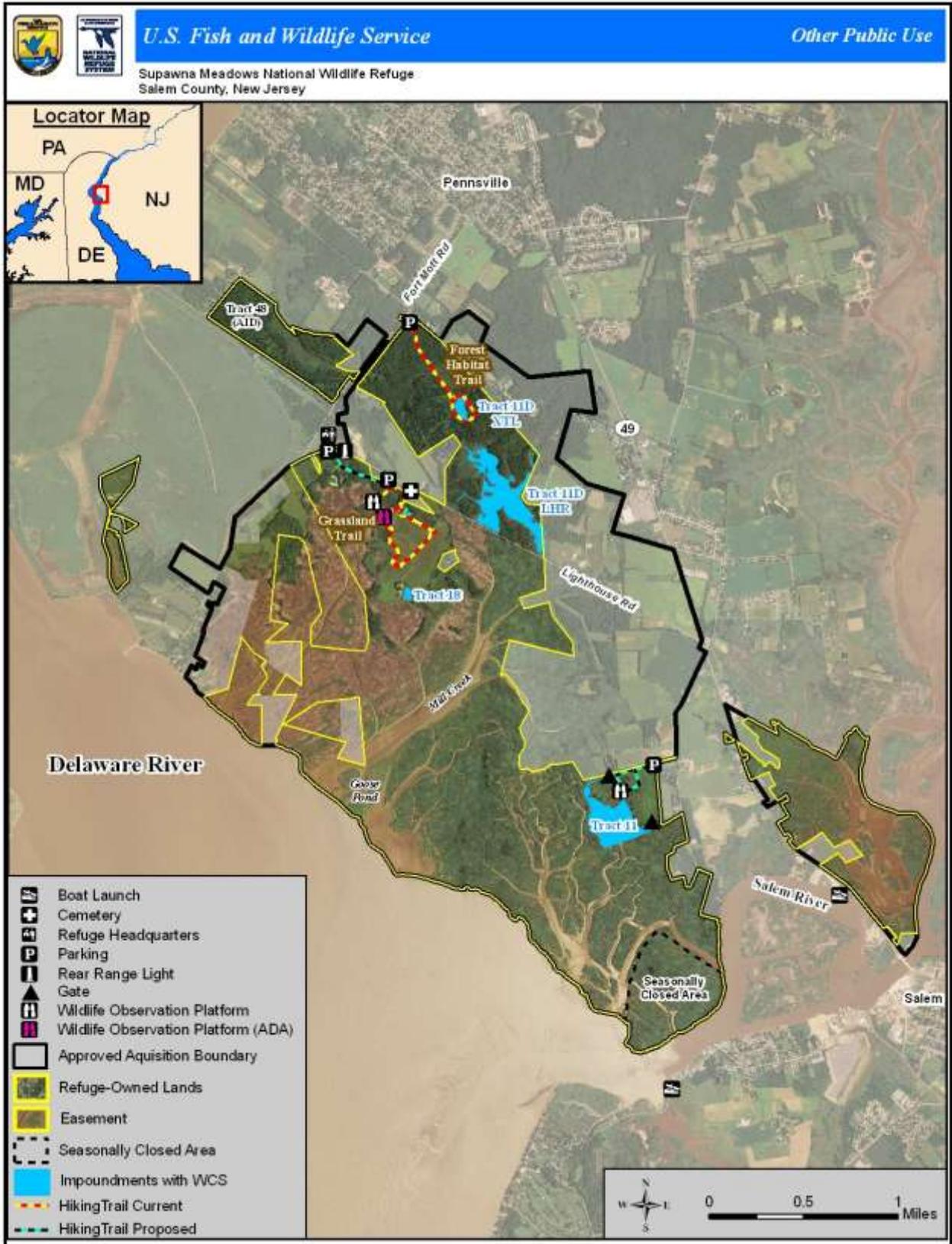
1. Actively recruit volunteers at events, through existing partners, the media, and the refuge Web site.
2. Develop and implement annual volunteer recruitment, training, and appreciation/recognition events.
3. Utilize volunteers in annual community events as deemed necessary and appropriate.
4. Utilize volunteers in meaningful refuge work, such as performing various biological surveys, assisting with maintenance, and visitor services activities.



Map 4.1. Predicted habitat types under proposed habitat management at Supawna Meadows National Wildlife Refuge. Map is for illustrative purposes only.



Map 4.2. Future hunting and fishing areas at Supawna Meadows National Wildlife Refuge.



Map 4.3. Current and proposed trails and other facilities for Supawna Meadows National Wildlife Refuge.

Chapter 5



Mark Wilson

Black Duck

Consultation and Coordination

- Introduction
- Planning to Protect Land and Resources
- Contact Information
- Planning Team
- Assistance from Other Service Personnel

Introduction

This chapter describes how we included others in developing the draft CCP and EA and how we plan to continue consulting and coordinating with others in the future. It details how we first invited, and will continue to encourage the partnership of other Federal and State agencies, civic, public, and private conservation and education organizations, and the affected public in our decisions about managing the refuge.

As we mentioned in chapters 1 through 4, we must comply with NEPA in seeking public input on proposed Federal actions. A 30-day period for public review followed our release of this draft CCP and EA. We encouraged the public and other agencies to give us responses and ideas about the plan. As before, we hosted open houses near the refuge to gather your opinions and answer your questions about its future management. We carefully weighed the responses we received before completing the final CCP.

Planning to Protect Land and Resources

We began the CCP process for Supawna Meadows NWR in May 2007 with a kick-off meeting at the refuge. We discussed the current status of the refuge, important issues to be addressed in the CCP, and the status and sources of data for the analysis. We defined a core team to include refuge managers and staff from Cape May NWR, Service regional planners, and a NJDFW representative.

We held an internal scoping meeting, site visit, and field review in July 2007 to identify issues, concerns, management ideas, and data sources for the development of the CCP and analysis of management strategies.

We published and distributed our first newsletter in August 2007.

On September 7, 2007, we held two public scoping meetings at the Pennsville Public Library to solicit comments from the community and other interested parties on the scope of the CCP and the issues and impacts that should be evaluated in the CCP/EA.

We published an official notice in the Federal Register that we were preparing a CCP/EA on September 24, 2007.

On April 15, 2008, we held a biological workshop with representatives of the Service, the NJDFW and Delaware Division of Parks to discuss management objectives for the array of refuge habitats.

On May 6, 2008, we held a public use objectives meeting that addressed hunting, access to Finns Point Light, and a variety of other public use opportunities, issues, and concerns.

We distributed a second newsletter in July 2008.

We held a review meeting with senior Northeast Region staff in June 2008 and formulated a revised series of biological and public use objectives.

We completed the draft CCP/EA and announced its availability for public review and comment by publishing our NOA in the Federal Register on September 27, 2010. During a 30-day period of public review, we distributed a third newsletter and a press release and held two public meetings to obtain comments. We also received comments by regular mail, electronic mail, and at the refuge. After the comment period expired, we reviewed and summarized all of the substantive comments we have received and prepared our responses. These are presented in appendix H.

We sent copies of the draft CCP/EA to NJDFW, the New Jersey Historic Preservation Office, and the Service's New Jersey Ecological Services field office for review.

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Glossary and Acronyms



Phil Sczerzenie/Mangi Environmental Group

Finns Point Rear Range Light

Glossary and Acronyms

GLOSSARY

accessibility	the state or quality of being easily approached or entered, particularly as it relates to complying with the Americans With Disabilities Act.
adaptive management	<p>focuses on learning and adapting, through partnerships of managers, scientists, and other stakeholders who learn together how to create and maintain sustainable ecosystems.</p> <p>Adaptive management:</p> <ul style="list-style-type: none"> • helps science managers maintain flexibility in their decisions, knowing that uncertainties exist and provides managers the latitude to change direction • will improve understanding of ecological systems to achieve management objectives • is about taking action to improve progress towards desired outcomes. <p>(source: Williams, B. K., R. C. Szaro, and C. D. Shapiro. 2007. Adaptive Management: The U.S. Department of the Interior Technical Guide. Adaptive Management Working Group, U.S. Department of the Interior, Washington, DC.)</p>
aggregate	many parts considered together as a whole.
alternative	a reasonable way to fix an identified problem or satisfy a stated need [40 CFR 1500.2 (cf. “management alternative”).]
appropriate use	<p>a proposed or existing use on a refuge that meets at least one of the following three conditions:</p> <ol style="list-style-type: none"> 1. the use is a wildlife-dependent one; 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 National Wildlife Refuge System Improvement Act was signed into law; or, 3. the use has been determined appropriate as specified in section 1.11 of that act.
approved acquisition boundary	a project boundary that the Director of the U.S. Fish and Wildlife Service approves upon completion of the planning and environmental compliance process. An approved acquisition boundary only designates those lands which the Service has authority to acquire or manage through various agreements. The approval of an acquisition boundary does not grant the Service jurisdiction or control over lands within the boundary, and it does not make lands within the refuge boundary part of the National Wildlife Refuge System. Lands do not become part of the Refuge System until the Service buys them or they are placed under an agreement that provides for their management as part of the System.
anadromous fish	from the Greek, literally “up-running”; fish that spend a large portion of their life cycle in the ocean and return to freshwater to breed.
aquatic	growing in, living in, or dependent upon water.

avian	of or having to do with birds.
basin	the land surrounding and draining into a water body (cf. “watershed”).
best management practices	land management practices that produce desired results. [N.b. Usually describing forestry or agricultural practices effective in reducing non-point source pollution, like reseeding skidder trails or not storing manure in a flood plain. In their broader sense, practices that benefit target species.]
biological diversity or biodiversity	the variety of life and its processes and includes the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur.
biological integrity	biotic composition, structure, and functioning at genetic, organism, and community levels comparable with historic conditions, including the natural biological processes that shape genomes, organisms, and communities.
biota	the plant and animal life of a region.
breeding habitat	habitat used by migratory birds or other animals during the breeding season.
candidate species	plants and animals for which the U.S. Fish and Wildlife Service has sufficient information on their biological status and threats to propose them as endangered or threatened under the Federal Endangered Species Act (ESA), but for which development of a proposed listing regulation is precluded by other higher priority listing activities. (Source: http://www.fws.gov/endangered/esa-library/pdf/candidate_species.pdf , accessed June 2011).
canopy	the layer of foliage formed by the crowns of trees in a stand. For stands with trees of different heights, foresters often distinguish among the upper, middle and lower canopy layers. These represent foliage on tall, medium, and short trees. The uppermost layers are called the overstory.
community	the locality in which a group of people resides and shares the same government.
community type	a particular assemblage of plants and animals, named for its dominant characteristic.
compatibility determination	a required determination for wildlife-dependent recreational uses or any other public uses of a refuge.

compatible use	“The term ‘compatible use’ means a wildlife-dependent recreational use or any other use of a refuge that, in the sound professional judgment of the Director, will not materially interfere with or detract from the fulfillment of the mission of the System or the purposes of the refuge.”—National Wildlife Refuge System Improvement Act of 1997 [Public Law 105-57; 111 Stat. 1253]
Comprehensive Conservation Plan	mandated by the 1997 Refuge Improvement Act, a document that provides a description of the desired future conditions and long-range guidance for the project leader to accomplish purposes of the refuge system and the refuge. CCPs establish management direction to achieve refuge purposes. [P.L. 105-57; FWS Manual 602 FW 1.4]
concern	cf. “issue.”
conservation	managing natural resources to prevent loss or waste. [N.b. Management actions may include preservation, restoration, and enhancement.]
conservation agreement	a written agreement among two or more parties for the purpose of ensuring the survival and welfare of unlisted species of fish and wildlife or their habitats or to achieve other specified conservation goals. Participants voluntarily commit to specific actions that will remove or reduce threats to those species.
conservation easement	a non-possessory interest in real property owned by another imposing limitations or affirmative obligations with the purpose of returning or protecting the property’s conservation values.
conservation status	assessment of the status of ecological processes and of the viability of species or populations in an ecoregion.
consultation	a type of stakeholder involvement in which decision makers ask stakeholders to comment on proposed decisions or actions.
cooperative agreement	a usually long-term habitat protection action, which can be modified by either party, in which no property rights are acquired. Lands under a cooperative agreement do not necessarily become part of the National Wildlife Refuge System.
critical habitat	according to U.S. Federal law, the ecosystems upon which endangered and threatened species depend.
database	a collection of data arranged for ease and speed of analysis and retrieval, usually computerized.

dbh	(diameter at breast height) — the diameter of the stem of tree measure at breast height (usually 4.5 feet above the ground). The term is commonly used by foresters to describe tree size.
degradation	the loss of native species and processes due to human activities such that only certain components of the original biodiversity persist, often including significantly altered natural communities.
desired future condition	the qualities of an ecosystem or its components that an organization seeks to develop through its decisions and actions.
disturbance	any relatively discrete event in time that disrupts ecosystem, community, or population structure and changes resources, substrate availability, or the physical environment.
donation	a citizen or group may wish to give land or interests in land to the Service for the benefit of wildlife. Aside from the cost factor, these acquisitions are no different than any other means of land acquisition. Gifts and donations have the same planning requirements as purchases.
easement	a non-possessory interest in real property that permits the holder to use another's land for a specified purpose. It may also impose limitations or affirmative obligations on the holder of the land subject to the easement. An agreement by which landowners give up or sell one of the rights on their property. [e.g., landowners may donate rights-of-way across their properties to allow community members access to a river (cf. "conservation easement").]
ecological integrity	native species populations in their historic variety and numbers naturally interacting in naturally structured biotic communities. For communities, integrity is governed by demographics of component species, intactness of landscape-level ecological processes (e.g., natural fire regime), and intactness of internal community processes (e.g., pollination).
ecological processes	a complex mix of interactions among animals, plants, and their environment that ensures maintenance of an ecosystem's full range of biodiversity. Examples include population and predator-prey dynamics, pollination and seed dispersal, nutrient cycling, migration, and dispersal.
ecological system	dynamic assemblages of communities that occur together on the landscape at some spatial scale of resolution, are tied together by similar ecological processes, and form a cohesive, distinguishable unit on the ground. Examples are spruce-fir forest, Great Lakes dune and swale complex, Mojave desert riparian shrublands.

ecoregion	an area defined by a combination of biological, social, and geographic criteria, rather than geopolitical considerations; generally, a system of related, interconnected ecosystems.
ecosystem	a natural community of organisms interacting with its physical environment, regarded as a unit.
emergent wetland	wetlands dominated by erect, rooted, herbaceous plants.
endangered species	a federally or state listed protected species in danger of extinction throughout all or a significant portion of its range.
environment	the sum total of all biological, chemical, and physical factors to which organisms are exposed.
Environmental Assessment (EA)	a public document that discusses the purpose and need for an action, its alternatives, and provides sufficient evidence and analysis of its impacts to determine whether to prepare an environmental impact statement or a finding of no significant impact (q.v.) [cf. 40 CFR 1508.9].
environmental education	curriculum-based education aimed at producing a citizenry that is knowledgeable about the biophysical environment and its associated problems, aware of how to help solve those problems, and motivated to work toward solving them.
environmental health	the composition, structure, and functioning of soil, water, air, and other abiotic features comparable with historic conditions, including the natural abiotic processes that shape the environment.
Environmental Impact Statement (EIS)	a detailed, written analysis of 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 [cf. 40 CFR 1508.11].
evaluation	examination of how an organization's plans and actions have turned out — and adjusting them for the future.
exotic species	a species that is not native to an area and has been introduced intentionally or unintentionally by humans; not all exotics become successfully established.

extinction	the termination of any lineage of organisms, from subspecies to species and higher taxonomic categories from genera to phyla. Extinction can be local, in which one or more populations of a species or other unit vanish but others survive elsewhere, or total (global), in which all the populations vanish (Wilson 1992).
fauna	all animal life associated with a given habitat, country, area or period.
Federal land	public land owned by the Federal Government, including national forests, national parks, and national wildlife refuges.
federally listed species	a species listed either as endangered, threatened, or a species at risk (formerly, a “candidate species”) under the Federal Endangered Species Act of 1973, as amended.
fee-title acquisition	the acquisition of most or all of the rights to a tract of land; a total transfer of property rights with the formal conveyance of a title. While a fee-title acquisition involves most rights to a property, certain rights may be reserved or not purchased, including water rights, mineral rights, or use reservation (e.g., the ability to continue using the land for a specified time period, such as the remainder of the owner’s life).
Finding of No Significant Impact	(FONSI) supported by an environmental assessment, a document 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].
fire regime	the characteristic frequency, intensity, and spatial distribution of natural fires within a given ecoregion or habitat.
floodplain	flat or nearly flat land that may be submerged by floodwaters; a plain built up or in the process of being built up by stream deposition.
flora	all the plants found in a particular place.
flyway	any one of several established migration routes of birds.
focal species	a species that is indicative of particular conditions in a system (ranging from natural to degraded) and used as a surrogate measure for other species of particular conditions. An element of biodiversity selected as a focus for conservation planning or action. The two principal types of targets in Conservancy planning projects are species and ecological communities.

focus areas	cf. “special focus areas.”
forested land	land dominated by trees. [For impacts analysis in CCP’s, we assume all forested land has the potential for occasional harvesting; we assume forested land owned by timber companies is harvested on a more intensive, regular schedule.]
fragmentation	the disruption of extensive habitats into isolated and small patches. Fragmentation has two negative components for biota: the loss of total habitat area and the creation of smaller, more isolated patches of habitat remaining.
geographic information system	(GIS) a computerized system to compile, store, analyze and display geographically referenced information [e.g., GIS can overlay multiple sets of information on the distribution of a variety of biological and physical features.]
groundwater	water in the ground that is in the zone of saturation, from which wells and springs and groundwater runoff are supplied.
habitat	the place or type of site where species and species assemblages are typically found and/or successfully reproduce. [N.b. An organism’s habitat must provide all of the basic requirements for life, and should be free of harmful contaminants.]
habitat conservation	protecting an animal or plant habitat to ensure that the use of that habitat by the animal or plant is not altered or reduced.
historic conditions	the composition, structure, and functioning of ecosystems resulting from natural processes that we believe, based on sound professional judgment, were present prior to substantial human-related changes to the landscape.
hydrology	the science of waters of the earth: their occurrences, distributions, and circulations; their physical and chemical properties; and their reactions with the environment, including living beings.
impoundment	a body of water, such as a pond, confined by a dam, dike, floodgate, or other barrier, which is used to collect and store water for future use.
indigenous	native to an area.

indigenous species	a species that, other than a result as an introduction, historically occurred or currently occurs in a particular ecosystem.
interjurisdictional fish	populations of fish that are managed by two or more states or national or Tribal governments because of the scope of their geographic distributions or migrations.
invasive species	an alien species whose introduction causes or is likely to cause economic or environmental harm or harm to human health.
inventory	a list of all the assets and liabilities of an organization, including physical, financial, personnel, and procedural aspects.
invertebrate	any animal lacking a backbone or bony segment that encloses the central nerve cord.
issue	any unsettled matter that requires a management decision. [e.g., a Service initiative, an opportunity, a management problem, a threat to the resources of the unit, a conflict in uses, a public concern, or the presence of an undesirable resource condition.] [N.b. A CCP should document, describe, and analyze issues even if they cannot be resolved during the planning process (FWS Manual 602 FW 1.4).]
Land Protection Plan	(LPP) a document that identifies and prioritizes lands for potential Service acquisition from a willing seller and also describes other methods of providing protection. Landowners within project boundaries will find this document, which is released with environmental assessments, most useful.
Land trusts	organizations dedicated to conserving land by purchase, donation, or conservation easement from landowners.
landform	the physical shape of the land reflecting geologic structure and processes of geomorphology that have sculpted the structure.
landscape	a heterogeneous land area composed of a cluster of interacting ecosystems that are repeated in similar form throughout.

large patch	communities that form large areas of interrupted cover. Individual occurrences of this community type typically range in size from 50 to 2,000 hectares. Large patch communities are associated with environmental conditions that are more specific than those of matrix communities, and that are less common or less extensive in the landscape. Like matrix communities, large-patch communities are also influenced by large-scale processes, but these tend to be modified by specific site features that influence the community.
long-term protection	mechanisms like fee title acquisition, conservation easements, or binding agreements with landowners that ensure land use and land management practices will remain compatible with maintaining species populations over the long term.
management alternative	a set of objectives and the strategies needed to accomplish each objective. [FWS Manual 602 FW 1.4]
management concern	cf. “issue.”
management plan	a plan that guides future land management practices on a tract. [N.b. In the context of an environmental impact statement, management plans may be designed to produce additional wildlife habitat along with primary products like timber or agricultural crops (cf. “cooperative agreement”).]
management strategy	a general approach to meeting unit objectives. [N.b. A strategy may be broad, or it may be detailed enough to guide implementation through specific actions, tasks, and projects (FWS Manual 602 FW 1.4).]
marshlands	areas interspersed with open water, emergent vegetation (hydrophytes), and terrestrial vegetation (phreatophytes).
mitigation	actions to compensate for the negative effects of a particular project. [E.g., wetland mitigation usually restores or enhances a previously damaged wetland or creates a new wetland].
mosaic	an interconnected patchwork of distinct vegetation types.
National Environmental Policy Act of 1969	(NEPA) requires all Federal agencies to examine the environmental impacts of their actions, incorporate environmental information, and use public participation in planning and implementing environmental actions. [Federal agencies must integrate NEPA with other planning requirements, and prepare appropriate NEPA documents to facilitate better environmental decision-making (cf. 40CFR1500).]

National Wildlife Refuge System	(Refuge System) all lands and waters and interests therein administered by the Service as wildlife refuges, wildlife ranges, wildlife management areas, waterfowl production areas, and other areas managed to preserve a national network for the conservation and management of fish, wildlife, and plant resources of the United States, for the benefit of present and future generations (National Wildlife Refuge System Improvement Act, 16 U.S.C. 668dd).
native	a species that, other than as a result of an introduction, historically occurred or currently occurs in a particular ecosystem.
native plant	a plant that has grown in the region since the last glaciation, and occurred before European settlement.
Neotropical migrant	birds, bats, or invertebrates that seasonally migrate between the Nearctic and Neotropics.
non-consumptive, wildlife-oriented recreation	wildlife observation and photography and environmental education and interpretation (cf. “wildlife-oriented recreation”).
nonnative species	See “exotic species.”
non-point source pollution	a diffuse form of water quality degradation in which wastes are not released at one specific, identifiable point but from a number of points that are spread out and difficult to identify and control.
nonpoint source	a diffuse form of water quality degradation produced by erosion of land that causes sedimentation of streams, eutrophication from nutrients and pesticides used in agricultural and silvicultural practices, and acid rain resulting from burning fuels that contain sulfur.
objective	cf. “unit objective.”
partnership	a contract or agreement among two or more individuals, groups of individuals, organizations, or agencies, in which each agrees to furnish a part of the capital or some service in kind (e.g., labor) for a mutually beneficial enterprise.
passive management	protecting, monitoring key resources, and conducting baseline inventories to improve our knowledge of the ecosystem.

point source	a source of pollution that involves discharge of waste from an identifiable point, such as a smokestack or sewage-treatment plant.
population	an interbreeding group of plants or animals. The entire group of organisms of one species.
prescribed fire	the application of fire to wildland fuels, either by natural or intentional ignition, to achieve identified land use objectives. [FWS Manual 621FW1.7]
priority general public use	a compatible wildlife-dependent recreational use of a refuge involving hunting, fishing, wildlife observation and photography, or environmental education and interpretation.
private land	land owned by a private individual or group or non-government organization.
private organization	any non-government organization.
protection	mechanisms like fee title acquisition, conservation easements, or binding agreements with landowners that ensure land use and land management practices will remain compatible with maintaining species populations at a site (cf. “long-term ~”).
public	individuals, organizations, and non-government groups; officials of Federal, state, and local government agencies; Native American Tribes, and foreign nations—includes anyone outside the core planning team, those who may or may not have indicated an interest in the issues, and those who do or do not realize that our decisions may affect them.
public involvement	offering an opportunity to interested individuals and organizations whom our actions or policies may affect to become informed; soliciting their opinions. We thoroughly study public input, and give it thoughtful consideration in shaping decisions about managing refuges.
public land	land owned by the local, state, or Federal Government.
rare species	species identified for special management emphasis because of their uncommon occurrence within a watershed.
refuge goals	“descriptive, open-ended, and often broad statements of desired future conditions that convey a purpose but do not define measurable units.” (Writing Refuge Management Goals and Objectives: A Handbook, FWS January 2004)

refuge lands	lands in which the Service holds full interest in fee title or partial interest like an easement.
refuge purposes	“the terms ‘purposes of the refuge’ and ‘purposes of each refuge’ mean 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 subunit.” (National Wildlife Refuge System Improvement Act of 1997)
relatively stable	the conservation status category between vulnerable and relatively intact in which extensive areas of intact habitat remain, but local species declines and disruptions of ecological processes have occurred.
restoration	management of a disturbed or degraded habitat that results in the recovery of its original state. [e.g., restoration may involve planting native grasses and forbs, removing shrubs, prescribed burning, or reestablishing habitat for native plants and animals on degraded grassland.]
riparian	referring to the interface between freshwater habitats and the terrestrial landscape.
riparian habitat	habitat along the banks of a stream or river [cf. note above].
runoff	water from rain, melted snow, or agricultural or landscape irrigation that flows over a land surface into a water body (cf. “urban runoff”).
scale	the magnitude of a region or process. Refers to both spatial size—for example, a (relatively small-scale) patch or a (relatively large-scale) landscape; and a temporal rate—for example, (relatively rapid) ecological succession or (relatively slow) evolutionary speciation.
shrublands	habitats dominated by various species of shrubs, often with many grasses and forbs.
small patch	communities that form small, discrete areas of vegetation cover. Individual occurrences of this community type typically range in size from 1 to 50 hectares. Small patch communities occur in very specific ecological settings, such as on specialized landform types or in unusual microhabitats. The specialized conditions of small patch communities, however, are often dependent on the maintenance of ecological processes in the surrounding matrix and large patch communities. In many ecoregions, small patch communities contain a proportionately large percentage of the total flora, and also support a specific and restricted set of associated fauna (e.g., invertebrates or herpetofauna) dependent on specialized conditions.

special focus area	<p>an area of high biological value. [N.b., We normally direct most of our resources to special focus areas that were delineated because of</p> <ol style="list-style-type: none"> 1. the presence of federally listed endangered and threatened species, species at risk (formerly, “candidate species”), rare species, concentrations of migrating or wintering waterfowl, or shorebird stopover habitat; 2. their importance as migrant landbird stopover or breeding habitat; 3. the presence of unique or rare communities; or, 4. the presence of important fish habitat.]
species	<p>the basic category of biological classification intended to designate a single kind of animal or plant. Any variation among the individuals may be regarded as not affecting the essential sameness which distinguishes them from all other organisms.</p>
species assemblage	<p>the combination of particular species that occur together in a specific location and have a reasonable opportunity to interact with one another.</p>
species at risk	<p>A general term referring to species listed under the Federal Endangered Species Act (ESA), as well as for unlisted species that are declining in population. Sometimes the term is used interchangeably with “species of concern.” Such species, unless already listed under ESA, receive no legal protection and use of the term does not necessarily imply that a species will eventually be proposed for listing (Source: http://www.fws.gov/endangered/about/glossary.html, accessed June 2011).</p>
species diversity	<p>usually synonymous with “species richness,” but may also include the proportional distribution of species.</p>
species of concern	<p>an informal term referring to a species that might be in need of conservation action. This may range from a need for periodic monitoring of populations and threats to the species and its habitat, to the necessity for listing as threatened or endangered under the Endangered Species Act. Such species receive no legal protection and use of the term does not necessarily imply that a species will eventually be proposed for listing (Source: http://www.fws.gov/endangered/about/glossary.html, accessed June 2011).</p>
species richness	<p>a simple measure of species diversity calculated as the total number of species in a habitat or community (Fiedler and Jain 1992).</p>
state agencies	<p>natural resource agencies of state governments.</p>
state land	<p>state-owned public land.</p>
state-listed species	<p>cf. “federally listed species.”</p>

step-down management plan	a plan for dealing with specific refuge management subjects, strategies, and schedules, e.g., cropland, wilderness, and fire. [FWS Manual 602FW1.4]
stopover habitat	habitat where birds rest and feed during migration.
strategy	a specific action, tool, technique, or combination of actions, tools, and techniques for meeting unit objectives.
strategic management	the continual process of inventorying, choosing, implementing, and evaluating what an organization should be doing.
structure	the horizontal and vertical arrangement of trees and other vegetation having different sizes, resulting in different degrees of canopy layering, tree heights, and diameters within a stand.
succession	the natural, sequential change of species composition of a community in a given area.
surface water	all waters whose surface is naturally exposed to the atmosphere, or wells or other collectors directly influenced by surface water.
terrestrial	living on land.
threatened species	a federally listed, protected species that is likely to become an endangered species in all or a significant portion of its range.
trust resource	a resource that the Government holds in trust for the people through law or administrative act. [N.b., A Federal trust resource is one for which responsibility is given wholly or in part to the Federal Government by law or administrative act. Generally, Federal trust resources are nationally or internationally important no matter where they occur, like endangered species or migratory birds and fish that regularly move across state lines. They also include cultural resources protected by Federal historic preservation laws, and nationally important or threatened habitats, notably wetlands, navigable waters, and public lands like state parks and national wildlife refuges.]
understory	the lower layer of vegetation in a stand, which may include short trees, shrubs, and herbaceous plants.

unit objective	desired conditions that must be accomplished to achieve a desired outcome. [N.b., Objectives are the basis for determining management strategies, monitoring refuge accomplishments, and measuring their success. Objectives should be attainable, time-specific, and stated quantitatively or qualitatively (FWS Manual 602 FW 1.4).]
upland	dry ground (i.e., other than wetlands).
urban runoff	water from rain, melted snow, or landscape irrigation flowing from city streets and domestic or commercial properties that may carry pollutants into a sewer system or water body.
vernal pool	a type of seasonal wetland formed by isolated depressions in the landscape that hold water in the winter and spring and are usually dry by midsummer or fall. There are no permanent surface connections to flowing water. Water sources include rainfall, snowmelt, and elevated water tables. Although fish are usually absent, vernal pools in riparian floodplains may contain fish periodically. Vernal pools are important breeding sites for amphibians. The woody debris and emergent grasses provide attachment sites for egg masses. (Source: Mitchell, J.C., A.R. Breisch, and K.A. Buhlmann. 2006. Habitat Management Guidelines for Amphibians and Reptiles of the Northeastern U.S. Partners in Amphibian and Reptile Conservation, Technical Publication HMG-3, Montgomery, Alabama, 108 pp)
vision statement	a concise statement of what the unit could achieve in the next 10 to 15 years.
watershed	the geographic area within which water drains into a particular river, stream, or body of water. A watershed includes both the land and the body of water into which the land drains.
wetlands	lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. These areas are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted to life in saturated soil conditions. “Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water.”—Cowardin et al. 1979
wilderness	cf. “designated wilderness.” an area designated by Congress as part of the National Wilderness Preservation System. [FWS Manual 610 FW 1.5 (draft)]

wilderness study areas	lands and waters identified by inventory as meeting the definition of wilderness and being evaluated for a recommendation they be included in the Wilderness System (cf. “recommended wilderness”). [N.b.A wilderness study area must meet these criteria 1. generally appears to have been affected primarily by the forces of nature, with the imprint of man’s work substantially unnoticeable ; 2. has outstanding opportunities for solitude or a primitive and unconfined type of recreation; 3. has at least 5,000 contiguous, roadless acres, or sufficient size to make practicable its preservation and use in an unimpaired condition. (FWS Manual 610FW1.5 (draft)).]
wildfire	a free-burning fire requiring a suppression response; all fire other than prescribed fire that occurs on wildlands. [FWS Manual 621FW1.7]
wildlife-dependent recreational use	a use of a national wildlife refuge involving hunting, fishing, wildlife observation and photography, or environmental education and interpretation (National Wildlife Refuge System Administration Act of 1966).
wildlife management	manipulating wildlife populations, either directly by regulating the numbers, ages, and sex ratios harvested, or indirectly by providing favorable habitat conditions and alleviating limiting factors.
wildlife-oriented recreation	recreational activities in which wildlife is the focus of the experience. [“The terms ‘wildlife-dependent recreation’ and ‘wildlife-dependent recreational use’ mean a use of a refuge involving hunting, fishing, wildlife observation and photography, or environmental education and interpretation.”—National Wildlife Refuge System Improvement Act of 1997]

Acronyms

ACJV	= Atlantic Coast Joint Venture
AID	= Tract 48
ARPA	= Archaeological Resources Protection Act of 1960
ATV	= All-terrain vehicle
BCC	= Birds of Conservation Concern
BCR	= Bird Conservation Region
CCMP	= Comprehensive Conservation and Management Plan
CCP	= Comprehensive Conservation Plan
CFR	= Code of Federal Regulations
CWD	= Chronic Wasting Disease
DRBC	= Delaware River Basin Commission
EA	= Environmental Assessment
EIS	= Environmental Impact Statement
ENSP	= Endangered and Nongame Species Program
EPA	= U.S. Environmental Protection Agency
ESA	= Federal Endangered Species Act
FONSI	= Finding of No Significant Impact
FPRRL	= Finns Point Rear Range Light
GIS	= Geographic information system
HMP	= Habitat Management Plan
IPCC	= Intergovernmental Panel on Climate Change
LWCF	= Land and Water Conservation Fund
MANEM	= Mid-Atlantic/New England/Maritimes Region
MOA	= Memorandum of Agreement
MOU	= Memorandum of Understanding
NABCI	= North American Bird Conservation Initiative
NAWCP	= North American Waterbird Conservation Plan
NAWMP	= North American Waterfowl Management Plan
NEPA	= National Environmental Policy Act of 1969
NHCR	= National-State Agency Herpetological Conservation Report
NHPA	= National Historic Preservation Act of 1966
NJDEP	= New Jersey Department of Environmental Protection
NJDFW	= New Jersey Division of Fish and Wildlife
NJLHS	= New Jersey Light House Society
NJWAP	= New Jersey Wildlife Action Plan
NMFS	= National Marine Fisheries Service
NOA	= Federal Register Notice of Availability
NOAA	= National Oceanic and Atmospheric Administration
NWR	= National Wildlife Refuge
NWRS	= National Wildlife Refuge System
PARC	= Partners in Amphibian and Reptile Conservation
PIF	= Partners in Flight

Acronyms

RONs	= Refuge Operations Needs System
SAMMS	= Service Assist Maintenance System
SAMP	= Special Area Management Plan
SHPO	= State Historic Preservation Office
SLAMM	= Sea Level Affecting Marshes Model
SMA	= Special Management Area
SWG	= State Wildlife Grant programs
USDA	= U.S. Department of Agriculture
USDA APHIS	= USDA Agriculture Animal and Plant Health Inspection Services
USFWS	= U.S. Fish and Wildlife Service
USGS	= U.S. Geological Survey
WAP	= Wildlife Action Plan
WCS	= Water Control Structure
WMA	= Watershed Management Area
XTL	= Xmas Tree Lane

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Interpretive sign on the refuge

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Appendix A



Gary Zahn/USFWS

American Bittern

Species of Conservation Concern at
Supawna Meadows NWR

Species	Potential Seasons on Refuge ¹	Global Rank ²	Federal Rank ³	NJ State Rank ⁴	BCR 30 ⁵	PIF Area 44 ⁶
WATERBIRDS						
American Bittern (<i>Botaurus lentiginosus</i>)	YR,B	G4		BE,NC	M	
Black-crowned Night-heron (<i>Nycticorax nycticorax</i>)	YR,B	G5		BT	M	
Black Tern (<i>Chlidonias niger</i>)	SM	G4		NC		
Bonaparte's Gull (<i>Chroicocephalus philadelphia</i>)	YR	G5				
Caspian Tern (<i>Hydroprogne caspia</i>)	SM	G5		BC		
Cattle Egret (<i>Bubulcus ibis</i>)	SM,B	G5		X		
Clapper Rail (<i>Rallus longirostris</i>)	YR,B	G5		G	H	1A
Common Tern (<i>Sterna hirundo</i>)	M	G5		BC	M	
Double-crested Cormorant (<i>Phalacrocorax auritus</i>)	YR	G5				
Forster's Tern (<i>Sterna forsteri</i>)	SM,B	G5		X	H	2B
Glossy Ibis (<i>Plegadis falcinellus</i>)	YR,B	G5		X	H	
Great Black-backed Gull (<i>Larus marinus</i>)	YR	G5				
Great Blue Heron (<i>Ardea Herodias</i>)	YR,B	G5		BC		
Great Cormorant (<i>Phalacrocorax carbo</i>)	WM	G5				
Great Egret (<i>Ardea alba</i>)	YR,B	G5		X		
Green Heron (<i>Butorides virescens</i>)	SM,B	G5		X		
Herring Gull (<i>Larus argentatus</i>)	YR	G5				
Horned Grebe (<i>Podilymbus auritus</i>)	M	G5		X	H	
King Rail (<i>Rallus elegans</i>)	SM,B	G4G5		BC	M	
Laughing Gull (<i>Leucophaeus atricilla</i>)	YR	G5				
Least Bittern (<i>Ixobrychus exilis</i>)	SM,B	G5		BC	M	
Least Tern (<i>Sternula antillarum</i>)	M	G4		E	H	
Lesser Black-backed Gull (<i>Larus fuscus</i>)	WM	G5				
Little Blue Heron (<i>Egretta caerulea</i>)	YR,B	G5		C	M	
Pied-billed Grebe (<i>Podilymbus podiceps</i>)	YR,B	G5		BE,NC		
Red-throated Loon (<i>Gavia stellata</i>)	WM	G5			HH	
Ring-billed Gull (<i>Larus delawarensis</i>)	YR	G5				
Snowy Egret (<i>Egretta thula</i>)	YR,B	G5		X	M	
Sora (<i>Porzana carolina</i>)	SM,B	G5		G	M	
Tricolored Heron (<i>Egretta tricolor</i>)	SM,B	G5		BC	M	

Table A.1. Species of Conservation Concern at Supawna Meadows NWR						
Species	Potential Seasons on Refuge ¹	Global Rank ²	Federal Rank ³	NJ State Rank ⁴	BCR 30 ⁵	PIF Area 44 ⁶
Virginia Rail (<i>Rallus limicola</i>)	YR,B	G5		G		2A
Yellow-crowned Night-heron (<i>Nyctanassa violacea</i>)	SM,B	G5		T	M	
WATERFOWL						
American Black Duck (<i>Anas rubripes</i>)	YR,B	G5		G	HH	1A
American Wigeon (<i>Anas americana</i>)	WM	G5			M	
Atlantic Canada Goose (<i>Branta canadensis canadensis</i>)	WM	G5		G	HH	
Black Scoter (<i>Melanitta nigra</i>)	WM	G5		G	H	
Blue-winged Teal (<i>Anas discors</i>)	YR,B	G5				
Bufflehead (<i>Bucephala albeola</i>)	WM	G5		G	H	
Canvasback (<i>Aythya valisineria</i>)	WM	G5		G	H	
Common Goldeneye (<i>Bucephala clangula</i>)	WM	G5			M	
Common Merganser (<i>Mergus merganser</i>)	WM	G5				
Gadwall (<i>Anas strepera</i>)	YR,B	G5			M	
Greater Scaup (<i>Aythya marila</i>)	WM	G5		G	H	
Green-winged Teal (<i>Anas crecca</i>)	YR	G5			M	
Hooded Merganser (<i>Lophodytes cucullatus</i>)	WM	G5			M	
Lesser Scaup (<i>Aythya affinis</i>)	WM	G5		G	H	
Long-tailed Duck (<i>Clangula hyemalis</i>)	WM	G5		G	H	
Mallard (<i>Anas platyrhynchos</i>)	YR,B	G5			H	
North Atlantic Canada Goose (<i>Branta canadensis</i>)	M	G5			H	
Northern Pintail (<i>Anas acuta</i>)	YR	G5		G	M	
Northern Shoveler (<i>Anas clypeata</i>)	WM	G5				
Red-breasted Merganser (<i>Mergus serrator</i>)	WM	G5			M	
Red-throated Loon (<i>Gavia stellata</i>)	WM	G5		X		
Redhead (<i>Aythya americana</i>)	WM	G5				
Ring-necked Duck (<i>Aythya collaris</i>)	WM	G5				
Ross's Goose (<i>Chen rossii</i>)	WM	G5				
Ruddy Duck (<i>Oxyura jamaicensis</i>)	YR	G5			M	
Surf Scoter (<i>Melanitta perspicillata</i>)	WM	G5		G	H	
Tundra Swan (<i>Cygnus columbianus</i>)	WM	G5			H	

Table A.1. Species of Conservation Concern at Supawna Meadows NWR						
Species	Potential Seasons on Refuge ¹	Global Rank ²	Federal Rank ³	NJ State Rank ⁴	BCR 30 ⁵	PIF Area 44 ⁶
White-winged Scoter (<i>Melanitta fusca</i>)	WM	G5		G	H	
Wood Duck (<i>Aix sponsa</i>)	YR,B	G5		G	M	
SHOREBIRDS						
American Golden-Plover (<i>Pluvialis dominica</i>)	M	G5		X	H	
American Woodcock (<i>Scolopax minor</i>)	YR,B	G5		G	HH	1A
Baird's Sandpiper (<i>Calidris bairdii</i>)	M	G5				
Black-bellied Plover (<i>Pluvialis squatarola</i>)	M	G5			H	
Buff-breasted Sandpiper (<i>Tryngites subruficollis</i>)	M	G4			H	
Dunlin (<i>Calidris alpina</i>)	WM	G5			H	
Greater Yellowlegs (<i>Tringa melanoleuca</i>)	YR	G5		X	H	
Killdeer (<i>Charadrius vociferous</i>)	YR,B	G5			M	
Least Sandpiper (<i>Calidris minutilla</i>)	M	G5			M	
Lesser Yellowlegs (<i>Tringa flavipes</i>)	YR	G5			M	
Long-billed Dowitcher (<i>Limnodromus scolopaceus</i>)	M	G5				
Pectoral Sandpiper (<i>Calidris melanotos</i>)	M	G5				
Purple Sandpiper (<i>Calidris maritima</i>)	M	G5		X	H	
Red Knot (<i>Calidris canutus</i>)	M	G5		NT	HH	
Ruddy Turnstone (<i>Arenaria interpres</i>)	M	G5		X	HH	
Sanderling (<i>Calidris alba</i>)	M	G5		NC	HH	
Semipalmated Plover (<i>Charadrius semipalmatus</i>)	SM	G5			M	
Semipalmated Sandpiper (<i>Calidris pusilla</i>)	M	G5		X	H	
Short-billed Dowitcher (<i>Limnodromus griseus</i>)	M	G5			H	
Solitary Sandpiper (<i>Tringa solitaria</i>)	M	G5			H	
Spotted Sandpiper (<i>Actitis macularius</i>)	SM,B	G5		BC	M	
Stilt Sandpiper (<i>Calidris himantopus</i>)	M	G5				
Upland Sandpiper (<i>Bartramia longicauda</i>)	SM,B	G5		E	M	2C
Western Sandpiper (<i>Calidris mauri</i>)	M	G5			M	
White-rumped Sandpiper (<i>Calidris fuscicollis</i>)	SM	G5			H	
Willet (<i>Tringa semipalmata</i>)	SM	G5		X	H	2B
Wilson's Phalarope (<i>Phalaropus tricolor</i>)	M	G5		X	H	
Wilson's Snipe (<i>Gallinago delicata</i>)	MW	G5			M	

Table A.1. Species of Conservation Concern at Supawna Meadows NWR						
Species	Potential Seasons on Refuge ¹	Global Rank ²	Federal Rank ³	NJ State Rank ⁴	BCR 30 ⁵	PIF Area 44 ⁶
LANDBIRDS						
Acadian Flycatcher (<i>Empidonax virescens</i>)	SM,B	G5		X		2B
American Kestrel (<i>Falco sparverius</i>)	YR,B	G5		BC		
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	YR,B	G4		BE, NT	M	
Baltimore Oriole (<i>Icterus galbula</i>)	YR,B	G5		X	H	
Barred Owl (<i>Strix varia</i>)	YR,B	G5		T		
Bay-breasted Warbler (<i>Dendroica castanea</i>)	M	G5			H	
Black-and-white Warbler (<i>Mniotilta varia</i>)	SM,B	G5		X	H	
Black-billed Cuckoo (<i>Coccyzus erythrophthalmus</i>)	SM,B	G5		X		
Black-throated Blue Warbler (<i>Dendroica caerulescens</i>)	M	G5		X		
Black-throated Green Warbler (<i>Dendroica virens</i>)	M	G5		BC		
Blackburnian Warbler (<i>Dendroica fusca</i>)	M	G5		X	M	
Blue-headed Vireo (<i>Vireo solitaries</i>)	M	G5		C		
Blue-winged Warbler (<i>Vermivora pinus</i>)	SM,B	G5		X		
Bobolink (<i>Dolichonyx oryzivorus</i>)	SM,B	G5		BT		
Broad-winged Hawk (<i>Buteo platypterus</i>)	SM,B	G5		BC	H	
Brown Thrasher (<i>Toxostoma rufum</i>)	YR,B	G5		X	H	2A
Canada Warbler (<i>Wilsonia canadensis</i>)	M	G5		BC	M	
Carolina Chickadee (<i>Poecile carolinensis</i>)	YR,B	G5				2A
Cerulean Warbler (<i>Dendroica cerulean</i>)	M	G4		C	M	1B
Chimney Swift (<i>Chaetura pelagica</i>)	SM,B	G5		X	H	2A
Chuck-will's Widow (<i>Caprimulgus carolinensis</i>)	SM,B	G5		X		
Cliff Swallow (<i>Petrochelidon pyrrhonota</i>)	M	G5		BC		
Coastal Plain Swamp Sparrow (<i>Melospiza georgiana nigrescens</i>)	SM,B	G5			M	
Common Barn Owl (<i>Tyto alba</i>)	YR,B	G5		C		
Common Nighthawk (<i>Chordeiles minor</i>)	M	G5		BC		
Cooper's Hawk (<i>Accipiter cooperii</i>)	YR,B	G5		BT, NC		
Dickcissel (<i>Spiza americana</i>)	YR,B	G5		X		
Eastern Kingbird (<i>Tyrannus tyrannus</i>)	SM,B	G5		X	H	2A
Eastern Meadowlark (<i>Sturnella magna</i>)	YR,B	G5		BC		

Species	Potential Seasons on Refuge ¹	Global Rank ²	Federal Rank ³	NJ State Rank ⁴	BCR 30 ⁵	PIF Area 44 ⁶
Eastern Screech-owl (<i>Megascops asio</i>)	YR,B	G5		X		
Eastern Towhee (<i>Pipilo erythrophthalmus</i>)	YR,B	G5		X	H	2A
Eastern Wood-pewee (<i>Contopus virens</i>)	SM,B	G5		X		2A
Field Sparrow (<i>Spizella pusilla</i>)	YR,B	G5		X	H	1A
Golden-winged Warbler (<i>Vermivora chrysoptera</i>)	M	G4		C	M	
Grasshopper Sparrow (<i>Ammodramus savannarum</i>)	YR,B	G5		BT,NC	M	2C
Gray Catbird (<i>Dumetella carolinensis</i>)	YR,B	G5		X	M	2A
Gray-cheeked Thrush (<i>Catharus minimus</i>)	M	G5		NC		
Great-crested Flycatcher (<i>Myiarchus crinitus</i>)	SM,B	G5		X	H	
Hooded Warbler (<i>Wilsonia citrine</i>)	SM,B	G5		X		1A
Horned Lark (<i>Eremophila alpestris</i>)	YR,B	G5		BC		
Indigo Bunting (<i>Passerina cyanea</i>)	SM,B	G5		X		
Kentucky Warbler (<i>Oporornis fromosus</i>)	SM,B	G5		C	H	1A
Least Flycatcher (<i>Empidonax minimus</i>)	M	G5		BC		
Loggerhead Shrike (<i>Lanius ludovicianus</i>)	WM	G5		E	M	
Long-eared Owl (<i>Asio otus</i>)	WM	G5		T		
Louisiana Waterthrush (<i>Seiurus motacilla</i>)	SM,B	G5		X	H	
Marsh Wren (<i>Cistothorus palustris</i>)	YR,B	G5		X	H	2A
Northern Bobwhite (<i>Colinus virginianus</i>)	YR,B	G5		G	H	2A
Northern Flicker (<i>Colaptes auratus</i>)	YR,B	G5		X	H	
Northern Goshawk (<i>Accipiter gentilis</i>)	WM	G5		BE		
Northern Harrier (<i>Circus cyaneus</i>)	YR,B	G5		BE, NC		
Northern Parula (<i>Parula americana</i>)	M	G5		BC		
Olive-sided Flycatcher (<i>Contopus cooperi</i>)	M	G4				
Osprey (<i>Pandion haliaetus</i>)	YR,B	G5		BT		
Peregrine Falcon (<i>Falco peregrinus</i>)	YR,B	G4		E		
Pine Warbler (<i>Dendroica pinus</i>)	YR,B	G5		X		2B
Prairie Warbler (<i>Dendroica discolor</i>)	SM,B	G5		X	HH	1A
Prothonotary Warbler (<i>Protonotaria citrea</i>)	SM,B	G5		X	H	1A
Purple Finch (<i>Carpodacus purpureus</i>)	WM	G5		X		
Red-headed Woodpecker (<i>Melanerpes erythrocephalus</i>)	WM	G5		T	M	
Red-shouldered Hawk (<i>Buteo lineatus</i>)	YR,B	G5		BE, NT		

Table A.1. Species of Conservation Concern at Supawna Meadows NWR						
Species	Potential Seasons on Refuge ¹	Global Rank ²	Federal Rank ³	NJ State Rank ⁴	BCR 30 ⁵	PIF Area 44 ⁶
Rose-breasted Grosbeak (<i>Pheucticus ludovicianus</i>)	M	G5		X		
Rusty Blackbird (<i>Euphagus carolinus</i>)	WM	G4			H	
Savannah Sparrow (<i>Passerculus sandwichensis</i>)	YR,B	G5		BT		
Scarlet Tanager (<i>Piranga olivacea</i>)	SM,B	G5		X	H	1A
Seaside Sparrow (<i>Ammodramus maritimus</i>)	YR,B	G4		X	HH	1A
Sedge Wren (<i>Cistothorus platensis</i>)	YR,B	G5		E	M	2C
Sharp-shinned Hawk (<i>Accipiter striatus</i>)	WM	G5		BC		
Short-eared Owl (<i>Asis flammeus</i>)	YR,B	G5		BE, NC	M	2C
Summer Tanager (<i>Piranga rubra</i>)	SM	G5		X		
Swainson's Hawk (<i>Buteo swainsoni</i>)	M	G5				
Veery (<i>Catharus fuscescens</i>)	M	G5		BC		
Vesper Sparrow (<i>Pooecetes gramineus</i>)	WM	G5		BE, NT		
Whip-poor-will (<i>Caprimulgus vociferus</i>)	SM,B	G5		X	H	1A
Willow Flycatcher (<i>Empidonax traillii</i>)	SM,B	G5		X	H	
Winter Wren (<i>Troglodytes troglodytes</i>)	WM	G5		BC		
Wood Thrush (<i>Hylocichla mustelina</i>)	SM,B	G5		X	HH	1A
Worm-eating Warbler (<i>Helmitheros vermivorum</i>)	M	G5		X	H	1A
Yellow-bellied Sapsucker (<i>Sphyrapicus varius</i>)	WM	G5		X		
Yellow-billed Cuckoo (<i>Coccyzus americanus</i>)	SM,B	G5		X		2A
Yellow-breasted Chat (<i>Icteria virens</i>)	YR,B	G5		C		
Yellow-throated Vireo (<i>Vireo flavifrons</i>)	M	G5		X	H	1A
MAMMALS						
Eastern red bat (<i>Lasiurus borealis</i>)		G5		X		
Eastern small-footed myotis (<i>Myotis eibii</i>)		G3		X		
Hoary bat (<i>Lasiurus cinereus</i>)		G5		X		
Marsh rice rat (<i>Oryzomys palustris</i>)		G5		X		
River Otter (<i>Lontra canadensis</i>)	YR,B	G5		G		
Silver-haired bat (<i>Lasionycteris noctivagans</i>)		G5		X		
Southern bog lemming (<i>Synaptomys cooperi</i>)		G5		X		
AMPHIBIANS						

Table A.1. Species of Conservation Concern at Supawna Meadows NWR						
Species	Potential Seasons on Refuge ¹	Global Rank ²	Federal Rank ³	NJ State Rank ⁴	BCR 30 ⁵	PIF Area 44 ⁶
Carpenter frog (<i>Rana virgatipes</i>)	YR,B	G5		X		
Eastern Mud Salamander (<i>Pseudotriton m. montanus</i>)	YR,B	G5		T		
Eastern Tiger Salamander (<i>Ambystoma t. tigrinum</i>)	YR,B	G5		E		
Fowler's Toad (<i>Bufo woodhousii fowleri</i>)	YR,B	G5		C		
Pine Barrens Treefrog (<i>Hyla andersonii</i>)	YR,B	G4		T		
REPTILES						
Coastal Plains Milk Snake intergrade (<i>Lampropeltis triangulum temporalis</i>)	YR,B			C		
Eastern Box Turtle (<i>Terrapene c. carolina</i>)	YR,B	G5		C		
Eastern Kingsnake (<i>Lampropeltis g. getula</i>)	YR,B	G5		C		
Northern Diamondback Terrapin (<i>Malaclemys t. terrapin</i>)	YR,B	G4		C		
Northern Pine Snake (<i>Pituophis m. melanoleucus</i>)	YR,B	G4		T		
Spotted Turtle (<i>Clemmys insculpta</i>)	YR,B	G5		C		
FISH						
Alewife (<i>Alosa pseudoharengus</i>)	YR,B	G5				
American Brook Lamprey (<i>Lampetra appendix</i>)	YR	G4		X		
American Eel (<i>Anguilla rostrata</i>)	YR	G4				
American Shad (<i>Alosa sapidissima</i>)	SM	G5				
Atlantic Croaker (<i>Micropogonias undulatus</i>)	YR	G5				
Atlantic Menhaden (<i>Brevoortia tyrannus</i>)	YR	G5				
Atlantic Sturgeon (<i>Acipenser oxyrinchus</i>)	YR,B	G3		C		
Bay Anchovy (<i>Anchoa mitchilli</i>)	YR	G5				
Blueback Herring (<i>Alosa aestivalis</i>)	YR,B	G5				
Bluefish (<i>Pomatomus saltatrix</i>)	SM	G5				
Hickory Shad (<i>Alosa mediocris</i>)	SM	G5		X		
Ironcolor Shiner (<i>Notropis chalybaeus</i>)	YR	G4		X		
Rainbow Smelt (<i>Osmerus mordax</i>)	YR	G5		X		
Shortnose Sturgeon (<i>Acipenser brevirostrum</i>)	YR	G3	E	E		
Spot (<i>Leiostomus xanthurus</i>)	YR	G5				

Table A.1. Species of Conservation Concern at Supawna Meadows NWR						
Species	Potential Seasons on Refuge ¹	Global Rank ²	Federal Rank ³	NJ State Rank ⁴	BCR 30 ⁵	PIF Area 44 ⁶
Striped Bass (<i>Morone saxatilis</i>)	YR	G5				
Summer Flounder (<i>Paralichthys dentatus</i>)	SM	GNR				
Weakfish (<i>Cynoscion regalis</i>)	SM,B	GNR				
Winter Flounder (<i>Pleuronectes americanus</i>)	YR	G5				
MOLLUSKS						
Creeper (<i>Strophitus undulatus</i>)	YR,B	G5		X		
Eastern Lampmussel (<i>Lampsilis radiate</i>)	YR,B	G5		T		
Tidewater Mucket (<i>Leptodea ochracea</i>)	YR,B	G3G4		T		
Triangle Floater (<i>Alasmidonta undulata</i>)	YR,B	G4		T		
Yellow Lampmussel (<i>Lampsilis cariosa</i>)	YR,B	G3G4		T		
INSECTS						
Bronze Copper (<i>Lycaena hyllus</i>)	YR,B	G5		E		
<i>Chytonix sensilis</i> (A Noctuid Moth)	YR,B	G4		X		
<i>Cucullia alfarata</i> (A Noctuid Moth)	YR,B	G4		X		
Doll's merolonche (<i>Merolonche dolli</i>)	YR,B	G3G4		X		
Dotted skipper(<i>Hesperia attalus</i>)	YR,B	G3G4		X		
Frosted Elfin (<i>Callophrys irus</i>)	YR,B	G3		T		
<i>Itame sp 1</i> (A Spanworm)	YR,B	G3		X		
Lemmer's Pinion Moth (<i>Lithophane lemmeri</i>)	YR,B	G3G4		X		
<i>Macrochilo louisiana</i> (a Noctuid moth)	YR,B	G4		X		
<i>Macrochilo santerivalis</i> (a Noctuid moth)	YR,B	G3G4		X		
<i>Macrochilo sp 1</i> (A Noctuid Moth)	YR,B	G3		X		
<i>Monoleuca semifascia</i> (A Slugmoth)	YR,B	G4G5		X		
Pink Streak (<i>Faronta rubripennis</i>)	YR,B	G3G4		X		
Precious Underwing (<i>Catocala pretiosa pretiosa</i>)	YR,B	G4		X		
Rare Skipper (<i>Problema bulenta</i>)	YR,B	G2G3		X		
Scarlet bluet (<i>Enallagma pictum</i>)	YR, B	G3		X		
<i>Zanclognatha sp 1</i>	YR,B	G3G4		X		
PLANTS						

Table A.1. Species of Conservation Concern at Supawna Meadows NWR						
Species	Potential Seasons on Refuge ¹	Global Rank ²	Federal Rank ³	NJ State Rank ⁴	BCR 30 ⁵	PIF Area 44 ⁶
Coast Flat Sedge (<i>Cyperus polystachyos</i> var. <i>texensis</i>)	YR	G5				
Floating Marsh-Pennywort (<i>Hydrocotyle ranunculoides</i>)	YR	G5				
New England Bulrush (<i>Schoenoplectus novae-angliae</i>)	YR	G5				
Sensitive joint-vetch (<i>Aeschynomene virginica</i>)	YR	G2				
<p>¹Potential Seasons on Refuge: W=Winter, S=Summer, M=Migration, YR=Year-round, B=Breeds or formerly bred in Salem County</p>						
<p>²Global Rank G1: Critically imperiled globally because of extreme rarity (five or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction. G2: Imperiled globally because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extinction throughout its range. G3: Either very rare and local throughout its range or found locally (even abundantly at some of the locations) in a restricted range (e.g., a single western state, a physiographic region in the East) or because of other factors making it vulnerable to extinction throughout its range; with the number of occurrences in the range of 21-100. G4: Apparently secure globally; although it may be quite rare in parts of its range, especially at the periphery. G5: Demonstrably secure globally; although it may be quite rare in parts of its range, especially at the periphery GNR: Unranked—Global rank not yet assessed. Source: NatureServe Explorer: http://www.natureserve.org/explorer/</p>						
<p>³Federal Rank=Federal Endangered Species List: E=Endangered, T=Threatened</p>						
<p>⁴NJ State Rank as of August 2005: E=Endangered, T=Threatened, C=Conservation Concern, X=Priority Nongame Species that are not State-listed as endangered, threatened, or conservation concern, G=Priority Game Species, B=Breeding Population, N=Non-breeding Population</p>						
<p>⁵BCR 30=December 6-9, 2004, Cape May, New Jersey. Bird Conservation Region 30 Meeting: HH=Highest Priority, H=High Priority, M=Moderate Priority</p>						
<p>⁶PIF Area 44=Brian D. Watts. 1999. Partners in Flight Bird Conservation Plan for the Mid-Atlantic Coastal Plain (Physiographic Area 44), Version 1.0. Updated table can be found at: http://www.blm.gov/wildlife/table_44.htm : IA=High Continental Priority and High Regional Responsibility, IB=High Continental Priority and Low Regional Responsibility, IIA=High Regional Priority and High Regional Concern, IIB= High Regional Priority and High Regional Responsibility, IIC= High Regional Priority and High Regional Threats</p>						

Appendix B



John Mossesso, Jr./NBI

White-tailed Deer

Findings of Appropriateness and Compatibility Determinations

Findings of Appropriateness and Compatibility Determinations

Findings of Appropriateness

- Bicycling
- Dog Walking
- Geocaching
- Horseback Riding
- Jogging
- Non-wildlife Dependent Group Gatherings
- Organized or Facility-supported Picnicking

Findings of Appropriateness/Compatibility Determinations

- Finns Point Rear Range Light Visitation
- Scientific Research
- Release of *Rhynoncomimus latipes* weevil for the Biological Control of Mile-a-minute Weed (*Polygonum perfoliatum*).

Compatibility Determinations

- Wildlife Observation, Photography, Environmental Education, and Interpretation
- Fishing and Crabbing
- Public Hunting of Waterfowl
- White-tailed Deer Archery Hunt

Finding of Appropriateness of a Refuge Use

Refuge Name: Supawna Meadows NWR

Use: BICYCLING

This exhibit is not required for wildlife-dependent recreational uses, forms of 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. 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 would 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: *Howard J. DeLeon* Date: 12/9/2010

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: *John M. Kennedy* Date: 5/13/11

A compatibility determination is required before the use may be allowed.

Justification for a Finding of Appropriateness of a Refuge Use

Refuge Name: Supawna Meadows NWR

Use: **BICYCLING**

Narrative

Bicycling is not identified as a priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57). Bicycling on unimproved roads and trails on the refuge has been found to be not appropriate for Supawna Meadows NWR. Bicycling causes conflicts with existing uses and requires increased maintenance duties.

Biking is not allowed on the two existing refuge trails, the Forest Habitat Trail and the Grassland Trail, or any other portions of currently owned refuge lands or future lands acquired as part of the refuge. Biking on these trails and roads is not required to experience priority public uses.

Current trail and road maintenance is based on staff time availability. There is currently no assigned staff at Supawna Meadows NWR. All maintenance and law enforcement support is provided by staff located at Cape May National Wildlife Refuge (Cape May NWR). These areas are monitored by volunteers (when available) and deficiencies are noted and reported to refuge staff. Instances of downed trees and erosion due to inclement weather occur occasionally and staff response may take days and, in some cases, weeks before repairs can be initiated.

Bicycling was not an activity in which the public expressed interest during the public scoping meetings. This use is not a historical or traditional use of the refuge.

Finding of Appropriateness of a Refuge Use

Refuge Name: Supawna Meadows NWR

Use: DOG WALKING

This exhibit is not required for wildlife-dependent recreational uses, forms of 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. 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 ___ No X

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:

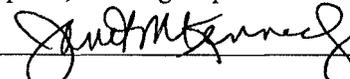
Not Appropriate X Appropriate

Refuge Manager:  Date: 12/9/2010

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: 5/13/11

A compatibility determination is required before the use may be allowed.

Justification for a Finding of Appropriateness of a Refuge Use

Refuge Name: Supawna Meadows NWR

Use: **DOG WALKING**

Narrative

Dog walking is not identified as a priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57). Dog walking has been found to not be appropriate for Supawna Meadows NWR.

The two trails at Supawna Meadows NWR are unsuitable for dog walking. Walking dogs (on and off leashes) can increase disturbance to wildlife, often causing reduction in abundance and diversity of migratory birds. The refuge does not provide receptacles for animal waste, which if left along refuge trails may increase the potential of disease and decrease the quality of priority public uses permitted on the refuge.

Finding of Appropriateness of a Refuge Use

Refuge Name: Supawna Meadows NWR

Use: GEOCACHING

This exhibit is not required for wildlife-dependent recreational uses, forms of 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. 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 would 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: *Thomas J. [Signature]* Date: 12/9/2010

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: *John M. [Signature]* Date: 5/13/11

A compatibility determination is required before the use may be allowed.

Justification for a Finding of Appropriateness of a Refuge Use

Refuge Name: Supawna Meadows NWR

Use: **GEOCACHING**

Narrative

Geocaching that involves burying or leaving a cache is not a priority public use of the National Wildlife Refuge System Improvement Act of 1966 (16 U.S.C. 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57). Geocaching (with the exception of virtual Geocaching) has been found to be not appropriate for Supawna Meadows NWR. This activity involves burying items in the ground or placing objects on the refuge, both of which are actions that can disturb or damage habitat and increase instances of refuge violations.

The placement of any object on a national wildlife refuge is a violation of several Federal regulations including, but not limited to, the following:

- 16USC668dd, 50 CFR 26.21a, Trespass
- 16USC668dd, 50 CFR 27.63, Search for and removal of other valued objects
- 16USC668dd, 50 CFR 27.93, Abandonment of Property
- 16USC668dd, 50 CFR 27.97, Private Operations

This use is not a historical or traditional use of the Refuge.

Finding of Appropriateness of a Refuge Use

Refuge Name: Supawna Meadows NWR

Use: HORSEBACK RIDING

This exhibit is not required for wildlife-dependent recreational uses, forms of 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. 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 would 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: *Howard J. ...* Date: 12/9/2010

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: *Janet M. Kennedy* Date: 5/13/11

A compatibility determination is required before the use may be allowed.

Justification for a Finding of Appropriateness of a Refuge Use

Refuge Name: Supawna Meadows NWR

Use: **HORSEBACK RIDING**

Narrative

Horseback riding is not identified as a priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57). Horseback riding, used as a means to conduct priority public uses, has been found to be not appropriate for Supawna Meadows NWR.

The refuge does not have parking space to support trailers in our designated parking areas. Trails and roads are unable to safely accommodate horses in conjunction with other public use activities. The refuge does not have the staff resources to manage the use properly. Horseback riding would add significantly to the workload of law enforcement (LE), visitor services, and maintenance staff because of the need to highly manage and monitor activities; trails would need continual maintenance.

Potential impacts of horseback travel include: soil compaction and erosion, trampling and mortality of fragile plant communities, habitat loss/deterioration, a shift in plant communities along trails, and the introduction of invasive plant species.

Current trail and road maintenance is based on staff time availability. There is currently no assigned staff at Supawna Meadows NWR. All maintenance and law enforcement support are provided from staff located at Cape May NWR. These areas are monitored by volunteers (when available) and deficiencies are noted and reported to refuge staff. Instances of downed trees and erosion due to inclement weather occur occasionally and staff response may take days and, in some cases, weeks before repairs can be initiated. Trails used for public use at Supawna Meadows NWR were constructed with the intention of foot traffic only.

Horseback riding is not a wildlife-dependent public use, nor is it necessary to support a priority public use, and it may decrease the enjoyment of the refuge for other visitors. Horseback riding on the refuge was not an activity in which the public expressed interest during the public scoping meetings.

Finding of Appropriateness of a Refuge Use

Refuge Name: Supawna Meadows NWR

Use: JOGGING

This exhibit is not required for wildlife-dependent recreational uses, forms of 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. 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 would 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: [Signature] Date: 12/9/2010

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: [Signature] Date: 5/13/11

A compatibility determination is required before the use may be allowed.

Justification for a Finding of Appropriateness of a Refuge Use

Refuge Name: Supawna Meadows NWR

Use: **JOGGING**

Narrative

Jogging is not identified as a priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57). Jogging has been found to be not appropriate for Supawna Meadows NWR.

Foot travel is allowed on established trails so that visitors may experience the priority public uses of wildlife observation, photography, interpretation, and environmental education. Jogging is not required to experience these uses. Furthermore, portions of the trails are uneven and contain loose gravel. Joggers attempting to run along these portions may endanger themselves and other visitors.

Current trail and road maintenance is based on staff time availability. There is currently no assigned staff at Supawna Meadows NWR. All maintenance and law enforcement support are provided from staff located at Cape May NWR. These areas are monitored by volunteers (when available) and deficiencies are noted and reported to refuge staff. Instances of downed trees and erosion due to inclement weather occur occasionally and staff response may take days and, in some cases, weeks before repairs can be initiated.

Jogging is not a wildlife-dependent public use, nor is it necessary to support a priority public use, and it may decrease the enjoyment of the refuge for other visitors. Jogging on the refuge was not an activity in which the public expressed interest during the public scoping meetings. This use is not a historical or traditional use of the refuge.

Finding of Appropriateness of a Refuge Use

Refuge Name: Supawna Meadows NWR

Use: NON-WILDLIFE DEPENDENT GROUP GATHERINGS

This exhibit is not required for wildlife-dependent recreational uses, forms of 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. 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 would 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: [Signature] Date: 12/9/2010

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: [Signature] Date: 5/13/11

A compatibility determination is required before the use may be allowed.

Justification for a Finding of Appropriateness of a Refuge Use

Refuge Name: Supawna Meadows NWR

Use: **NON-WILDLIFE DEPENDENT GROUP GATHERINGS**

Narrative

Non-wildlife dependent group gatherings such as, but not limited to, ceremonies, weddings, memorial services, family reunions, etc., are not priority public uses of the National Wildlife Refuge System Improvement Act of 1966 (16 U.S.C. 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57).

These types of uses do not support a refuge purpose, objective or goal and would not benefit the natural or cultural resources present within the refuge. Non-wildlife dependent group gatherings have been found to be not appropriate for Supawna Meadows NWR.

Finding of Appropriateness of a Refuge Use

Refuge Name: Supawna Meadows NWR

Use: ORGANIZED OR FACILITY-SUPPORTED PICNICKING

This exhibit is not required for wildlife-dependent recreational uses, forms of 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. 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 would 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: [Signature] Date: 12/9/2010

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: [Signature] Date: 5/13/11

A compatibility determination is required before the use may be allowed.

Justification for a Finding of Appropriateness of a Refuge Use

Refuge Name: Supawna Meadows NWR

Use: **ORGANIZED OR FACILITY-SUPPORTED PICNICKING**

Narrative

Picnicking is not identified as a priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57). Picnicking has been found to be not appropriate for Supawna Meadows NWR.

The refuge does not provide the amenities for picnicking activities, such as picnic tables, shelters, trash containers, grills, etc. In addition, we do not have the resources to manage a picnic area or program. The workload for the maintenance and other staff would increase. Law enforcement duties would also increase to ensure compliance.

Although organized picnicking is prohibited, this does not preclude visitors from bringing food with them for nutrition or safety while they participate in other appropriate and compatible activities on the refuge.

Prohibiting picnicking may positively impact wildlife and wildlife habitat by, for example, reducing soil compaction and vegetation trampling, minimizing the frequency and extent of wildlife disturbance, and reducing trash and food waste which could result in wildlife conflicts, feeding of wildlife, and potential death to wildlife that ingest trash and food waste.

Finding of Appropriateness of a Refuge Use

Refuge Name: Supawna Meadows NWR

Use: FINNS POINT REAR RANGE LIGHT PUBLIC VISITATIONS

This exhibit is not required for wildlife-dependent recreational uses, forms of 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. 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 would 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: *Howard D. Kellogg* Date: 12/9/2010

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: *Justin M. Kennedy* Date: 5/13/11

A compatibility determination is required before the use may be allowed.

Justification for a Finding of Appropriateness of a Refuge Use

Refuge Name: Supawna Meadows NWR

Use: **FINNS POINT REAR RANGE LIGHT PUBLIC VISITATIONS**

Narrative

Public visitation of the Finns Point Rear Range Light occurs almost on a daily basis by individuals stopping at the lighthouse to take photographs and read interpretative information regarding the historic importance the lighthouse served as a navigational aid to shipping in the Delaware River. The New Jersey Lighthouse Society has a strong interest in having the lighthouse open to the public during their annual Lighthouse Challenge weekend. Public visitation of the Finns Point Rear Range Lighthouse has been found to be an appropriate use for Supawna Meadows NWR.

It is anticipated visitation to the lighthouse could be used as a means to increase public awareness of Supawna Meadows NWR and the habitat values the refuge provides to migratory birds and other wildlife species. In this way, this use contributes to all of the habitat management and public use goals in the draft CCP/EA. Through interpretive signs located within the lighthouse and surrounding the lighthouse grounds, visitors to the lighthouse would gain a greater appreciation for the resource values of the refuge and create a greater interest to participate in the refuge's priority public use activities.

Compatibility Determination

Use: FINNS POINT REAR RANGE LIGHT PUBLIC VISITATIONS

Refuge Name: Supawna Meadows National Wildlife Refuge (NWR)

Establishing Authority: Supawna Meadows NWR was originally established by Executive Order 6582 on February 3, 1934, as the Goose Pond addition to the Killcohook National Wildlife Refuge (currently termed Killcohook Coordination Area). The refuge was renamed Supawna Meadows National Wildlife Refuge and officially separated from Killcohook on April 10, 1974, by the Service. On October 30, 1998, the Service's jurisdiction over Killcohook was revoked.

Refuge Purposes: Supawna Meadows NWR purposes:

- "... as a refuge and breeding ground for wild birds and animals," (Executive Order 6582, dated Feb. 3, 1934);
- "... particular value in carrying out the national migratory bird management program," (16 U.S.C. § 667b);
- "... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds," (16 U.S.C. § 715d); and
- "... suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species," (16 U.S.C. § 460k-1).

National Wildlife Refuge System Mission: ...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 Improvement Act of 1997, Public Law 105-57).

Description of Use:

(a) What is this use? Is it a priority public use?

People visit the exterior of the Finns Point Rear Range Light (FPRRL) almost on a daily basis to take photographs and read interpretative information regarding the historic importance of the lighthouse as a navigational aid to shipping in the Delaware River. The interior of the lighthouse is open to the public during the annual New Jersey Lighthouse Challenge and may be open to visitors at other times pending availability of additional staffing and funding. Visitors may also have access to the catwalk after necessary repairs have been made and it is deemed safe for the public.

(b) Where would the use be conducted?

During the Lighthouse Challenge the Friends of Supawna Meadows NWR and the New Jersey Lighthouse Society will set up informational tables immediately adjacent to the lighthouse to discuss the lighthouse, the refuge, and refuge habitats and their importance to wildlife. Daily access will occur to the exterior of the FPRRL. Additional access pending staffing and funding increases will occur in the interior of the lighthouse and to the repaired catwalk.

(c) When would the use be conducted?

The New Jersey Lighthouse Challenge occurs one weekend per year (Saturday and Sunday) in October. Visitation to the exterior of the FPRRL is almost daily. Access to the interior of the lighthouse and catwalk is seasonal or year-round pending staffing, funding, and completed repairs.

(d) How would the use be conducted?

Through cooperative efforts between the Friends of Supawna Meadows NWR and the New Jersey Lighthouse Society, the refuge will continue to support the Society's Lighthouse Challenge. Public access to the lighthouse is limited to no more than six individuals at any one time. Using professional judgment, as long as there is no significant negative impact to historic resources, violation of refuge regulations, or public safety issues, a special use permit will be issued to the New Jersey Lighthouse Society and the Friends of Supawna Meadows NWR outlining the framework in which this use can be conducted. Refuge staff will ensure compliance with the permit.

Access to the interior of the FPRRL at other times of year may be conducted with additional staffing and funding. No more than six individuals will be allowed inside FPRRL at any one time. Staff will monitor the impact to the historic resources and public safety issues to determine if any minor adjustments to those numbers will be needed.

(e) Why is this use being proposed?

From as early as 1984 through 2005, the lighthouse had been opened to the public on the third Sunday of each month, April through October, from noon to 4 p.m. In addition, approximately six times a year the lighthouse will be opened by special arrangement to school groups and other organized groups, as requested and approved. In 2006, with reduced funding and staffing at Supawna Meadows NWR and because of safety concerns, the lighthouse was closed to the public. In 2007, the lighthouse was again opened to the public after a safety inspection was conducted in cooperation with the Friends of Supawna Meadows NWR and the New Jersey Lighthouse Society. This non-wildlife dependent activity provides the public with an opportunity to view a large portion of the refuge's various habitats at the same time they are learning about historical resources in the area. There was an estimated 2,000 visitors at the FPRRL during the 2007 Lighthouse Challenge weekend.

Daily access to the exterior and interior of FPRRL provides important opportunities for the public to learn about this historic building. This will also provide opportunities to increase awareness of the refuge's resources and build understanding and support for the refuge and the Refuge System.

Availability of Resources:

As long as the Friends of Supawna Meadows NWR continues to actively support this activity, permitting this use does not significantly impact current refuge staffing levels and resources. The Cape May NWR law enforcement officer will provide limited support during the one-weekend annual Lighthouse Challenge. The time spent during this period will fall within the routine law enforcement patrols on the refuge. Less than 1 hour per year will be spent for administration costs for developing and managing the special use permit. The continuation of this program and/or proposed expansion of this activity and providing additional public access to FPRRL is dependent on the structural integrity of the lighthouse and the future development of the refuge's environmental education and outreach programs.

Anticipated Impacts of the Use:

In addition to the FPRRL, there are several improvements located on the grounds that are part of the refuge's infrastructure. In 2006, a two-story office facility was constructed between the lighthouse and a four-bay garage/storage building. The office was closed in 2007 due to the elimination of onsite staff. The gravel parking area associated with the office, garage and lighthouse is of a sufficient size to accommodate up to 13 cars. Immediately across from the office and lighthouse parking lot is a large grass recreational field which accommodates a significant number of vehicles. Past traffic counts along

Lighthouse Road indicated approximately 800 vehicles traveled the road in a 24-hour period. An additional 750 cars during the 2-day Lighthouse Challenge will add to the vehicle traffic, but it is anticipated the use will not significantly impact local traffic patterns and parking areas. There may be minor increases in vehicle traffic and subsequent impacts associated with additional public access, but these are expected to be minimal.

Public Review and Comment:

As part of the Supawna Meadows NWR CCP process, this compatibility determination has been through extensive public review, including a 30-day comment period following the release of the draft CCP/EA.

Determination:

Use is not compatible

Use is compatible, with the following stipulations

Stipulations Necessary to Ensure Compatibility:

The Friends of Supawna Meadows NWR will continue to provide direct cooperative support to the New Jersey Lighthouse Society. A special use permit will be provided to the New Jersey Lighthouse Society with the following stipulations:

- A booth and display for public enjoyment on refuge land adjacent to the FPRRL will be permitted.
- The permittee will set up the booth on the Saturday of the event weekend. The booth will be completely disassembled after the close of the event on Sunday.
- The permittee will remove any trash left on the site as a result of the event and its participants.
- Representatives of the New Jersey Lighthouse Society will coordinate with refuge personnel at least one week prior to the New Jersey Lighthouse Challenge to determine logistics of the event.
- The permittee is authorized to sell items related to its organization and the New Jersey Lighthouse Challenge.
- All donations made by event participants will be directed to the Friends of Supawna Meadows NWR, Inc.
- The permittee will report any unusual observations requiring environmental action or law enforcement directly to the onsite law enforcement officer, if available, and/or to the refuge manager at Cape May National Wildlife Refuge.

Justification:

Activities that are not considered priority public uses, such as the public visitation of a historic structure, are conducted by means of a compatible use. Although this use does not directly contribute to the achievement of the refuge purposes or the National Wildlife Refuge System mission, it does provide for an interpretive, wildlife observation, and/or environmental education opportunity, thereby contributing to the public's understanding and appreciation of the refuge's natural resources. Therefore, this activity can be compatible as long as it is appropriate, conducted safely, and does not conflict with priority uses on the refuge. This activity will not materially interfere with or detract from the mission of the National Wildlife Refuge System or purposes for which the refuge was established.

Signature: Refuge Manager Howard H. Kelly 12/2/2010
(Signature) (Date)

Concurrence: Regional Chief [Signature] 5/20/11
(Signature) (Date)

Mandatory 10-year re-evaluation date 5/20/2011

Finding of Appropriateness of a Refuge Use

Refuge Name: Supawna Meadows NWR

Use: SCIENTIFIC RESEARCH

This exhibit is not required for wildlife-dependent recreational uses, forms of 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. 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 would 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: [Signature] Date: 12/9/2010

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: [Signature] Date: 5/13/11

A compatibility determination is required before the use may be allowed.

Justification for a Finding of Appropriateness of a Refuge Use

Refuge Name: Supawna Meadows NWR

Use: **SCIENTIFIC RESEARCH**

Narrative

The use is research conducted by non-Service personnel on Supawna Meadows NWR. It is not a priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57). Research has been found to be appropriate for Supawna Meadows NWR.

Supawna Meadows NWR does not have the resources to conduct all the necessary surveys and studies to manage all resources. Therefore, we encourage research by outside entities to assist us in collecting and providing data for our wise use. All research proposals are evaluated for their benefits to the refuge mission and are issued a special use permit if found beneficial. All research projects require the principal investigator to provide summary reports of findings and acknowledge Supawna Meadows NWR for their participation.

Compatibility Determination

Use: **SCIENTIFIC RESEARCH**

Refuge Name: Supawna Meadows NWR

Establishing Authority: Supawna Meadows NWR was originally established by Executive Order 6582 on February 3, 1934, as the Goose Pond addition to the Killcohook National Wildlife Refuge (currently termed Killcohook Coordination Area). The refuge was renamed Supawna Meadows National Wildlife Refuge and officially separated from Killcohook on April 10, 1974, by the Service. On October 30, 1998, the Service's jurisdiction over Killcohook was revoked.

Refuge Purposes: Supawna Meadows NWR purposes:

- "... as a refuge and breeding ground for wild birds and animals," (Executive Order 6582, dated Feb. 3, 1934);
- "... particular value in carrying out the national migratory bird management program," (16 U.S.C. § 667b);
- "... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds," (16 U.S.C. § 715d); and
- "... suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species," (16 U.S.C. § 460k-1).

National Wildlife Refuge System Mission: ...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 Improvement Act of 1997, Public Law 105-57).

Description of Use:

(a) What is the use? Is the use a priority public use?

The use is research conducted by non-Service personnel. Research conducted by non-Service personnel is not a priority public use of the Refuge System.

(b) Where would the use be conducted?

The location of the research will vary depending on the individual research project that is being conducted. An individual research project is usually limited to a particular habitat type, plant or wildlife species. On occasion, research projects will encompass an assemblage of habitat types, plants or wildlife. The research location will be limited to areas of the refuge that are absolutely necessary to conduct the research project.

(c) When would the use be conducted?

The timing of the research will depend entirely on the individual research project that is being conducted. Scientific research will be allowed to occur on the refuge throughout the year. An individual research project could be short-term in design, requiring one or two visits over the course of a few days. Other research projects could be multiple year studies that require daily visits to the study site. The timing of each individual research project will be limited to the minimum required to complete the project. If a research project occurs during any refuge hunting season, special precautions will be required and enforced to ensure public health and safety.

(d) How would the use be conducted?

The mechanics of the research will depend entirely on the individual research project that is conducted. The methods of each research project will be scrutinized well before it will be allowed to occur on the refuge. No research project will be allowed to occur if it does not have an approved scientific method or if it compromises public health and safety.

(e) Why is this use being proposed?

Research by non-Service personnel is conducted by colleges, universities, Federal, state, and local agencies, non-governmental organizations, and qualified members of the general public to further the understanding of the natural environment and to improve the management of the refuge's natural resources. Much of the information generated by the research is applicable to management on and near the refuge.

The Service will encourage and support research and management studies on refuge lands that will improve and strengthen natural resource management decisions. The refuge manager will encourage and seek research relative to approved refuge objectives that clearly improves land management and promotes adaptive management. Priority research addresses information that will better manage the Nation's biological resources and are generally considered important to: Agencies of the Department of the Interior; the U.S. Fish and Wildlife Service; the National Wildlife Refuge System; and State Fish and Game Agencies; and that address important management issues or demonstrate techniques for management of species and/or habitats. The refuge will also consider research for other purposes which may not be directly related to refuge-specific objectives, but contribute to the broader enhancement, protection, use, preservation and management of native populations of fish, wildlife and plants, and their natural diversity within the region or flyway. These proposals must comply with the Service's compatibility policy.

Refuge support of research directly related to refuge objectives may take the form of funding, in-kind services such as vehicles, housing or use of other facilities, direct staff assistance with the project in the form of data collection, provision of historical records, conducting of management treatments, or other assistance as appropriate.

Availability of Resources:

The bulk of the cost for research is incurred in staff time to review research proposals, coordinate with researchers and write special use permits. In some cases, a research project may only require one day of staff time to write a special use permit. In other cases, a research project may take an accumulation of weeks, as the refuge biologist must coordinate with students and advisors and accompany researchers on site visits. The refuge biologist spends an average of one week a year working full time on research projects conducted by outside researchers.

Anticipated Impacts of the Use:

The Service encourages approved research to further the understanding of natural resources. Research by non-Service personnel adds greatly to the information base for refuge managers to make proper decisions.

Disturbance to wildlife and vegetation by researchers could occur when researchers are accessing project locations. Research activities may disturb fish and wildlife through observation, a variety of wildlife capture techniques, banding, and accessing the study area by foot or vehicle. For example, the presence of researchers may cause disruption of birds on nests or breeding territories, or increase predation on nests. Efforts to capture birds may cause disturbance, injury, or death to groups or to individual birds. The energy cost of disturbance may be appreciable in terms of disruption of feeding, displacement from preferred habitat, and the added energy expended to avoid disturbance. It is possible that direct or

indirect mortality could result as a by-product of research activities. Mist-netting or other wildlife capture techniques, for example, may cause mortality directly through the capture method or in-trap predation, and indirectly through capture injury or stress caused to the organism. Even if such mortalities to individual birds do occur, there would be no impact to the overall population. To minimize disturbance, all research must be approved through the refuge's special use permit process.

Allowing research to be conducted by non-Service personnel will have very little impact on Service interests. If the research project is conducted with professionalism and integrity, potential adverse impacts far outweigh the knowledge gained about an entire species.

Public Review and Comment:

As part of the Supawna Meadows NWR CCP process, this compatibility determination has been through extensive public review, including a 30-day comment period following the release of the draft CCP/EA.

Determination:

Use is not compatible

Use is compatible, with the following stipulations

The Following Stipulations are required to Ensure Compatibility:

- All researchers will be required to submit a detailed research proposal following Service policy (Fish and Wildlife Service Refuge Manual chapter 4 section 6).
- The proposal will be reviewed and, if necessary, conditions and/or restrictions will be placed in the special use permit, the Cooperative Agreement, or Memorandum of Understanding, which will ensure that any identified negative impacts towards the Service's interest will be addressed and minimized.
- Refuge staff must be given at least 45 days to review proposals before initiation of research. If collection of wildlife is involved, refuge staff must be given 60 days to review the proposal.
- Proposals will be prioritized and approved based on need, benefit, compatibility, and funding required. Regional biologists, other Service divisions, and/or state agencies may be asked to review and comment on proposals.
- All researchers will be required to obtain appropriate state and Federal permits.

Justification:

The Service encourages approved research to further explore the complex nature and understanding of refuge natural resources. Research by non-Service personnel adds greatly to the information base for refuge managers to make proper decisions. Research conducted by non-Service personnel will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the refuge was established.

Signature: Refuge Manager Howard H. Kysel 12/2/2010
(Signature) (Date)

Concurrence: Regional Chief [Signature] 5/20/11
(Signature) (Date)

Mandatory 10-year re-evaluation date 5/20/2021

Literature Cited:

U.S. Fish and Wildlife Service. 1985 Refuge Manual. Washington, D.C.: U.S. Government Printing Office.

Finding of Appropriateness of a Refuge Use

Refuge Name: Supawna Meadows NWR

Use: Release of *Rhinocomimus latipes* weevil for the biological control of mile-a-minute weed (*Polygonum perfoliatum*) by the State of New Jersey Department of Agriculture

This exhibit is not required for wildlife-dependent recreational uses, forms of 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. 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 would 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: *Howard F. ...* Date: 12/9/2010

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: *John M. Kennedy* Date: 5/13/11

A compatibility determination is required before the use may be allowed.

Justification for a Finding of Appropriateness of a Refuge Use

Refuge Name: Supawna Meadows NWR

Use: **RELEASE OF *RHINONCOMIMUS LATIPES* WEEVIL FOR THE BIOLOGICAL CONTROL OF MILE-A-MINUTE WEED (*POLYGONUM PERFOLIATUM*) BY THE STATE OF NEW JERSEY DEPARTMENT OF AGRICULTURE**

Narrative

Mile-a-minute weed is a non-native, invasive plant that has infested portions of Supawna Meadows National Wildlife Refuge. The *Rhinocomimus latipes* weevil has been studied for 6 years by the University of Delaware both in the laboratory and the field. The weevils have had a significant impact on reduction of the advancement of the mile-a-minute weed. Based on that research and an Environmental Assessment prepared by the United States Department of Agriculture, it has been determined that introduction of the *R. latipes* weevil will not have an adverse impact on Refuge lands and wildlife, and that the use is compatible with Refuge purposes. The State of New Jersey Department of Agriculture release of *R. latipes* weevil for the biological control of mile-a-minute weed will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the Refuge was established.

Compatibility Determination

Use: RELEASE OF *RHINONCOMIMUS LATIPES* WEEVIL FOR THE BIOLOGICAL CONTROL OF MILE-A-MINUTE WEED (*POLYGONUM PERFOLIATUM*) BY THE STATE OF NEW JERSEY DEPARTMENT OF AGRICULTURE.

Refuge Name: Supawna Meadows NWR

Establishing and Acquisition Authority(ies): Supawna Meadows NWR was originally established by Executive Order 6582 on February 3, 1934, as the Goose Pond addition to the Killcohook National Wildlife Refuge (currently termed Killcohook Coordination Area). The refuge was renamed Supawna Meadows National Wildlife Refuge and officially separated from Killcohook on April 10, 1974, by the Service. On October 30, 1998, the Service's jurisdiction over Killcohook was revoked.

Refuge Purpose(s): Supawna Meadows NWR purposes:

- "... as a refuge and breeding ground for wild birds and animals," (Executive Order 6582, dated Feb. 3, 1934);
- "... particular value in carrying out the national migratory bird management program," (16 U.S.C. § 667b);
- "... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds," (16 U.S.C. § 715d); and
- "... suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species," (16 U.S.C. § 460k-1).

National Wildlife Refuge System Mission: ... 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.

Description of Use:

(a) What is the Use? Is the use a priority use?

The use is the release of *Rhinocomimus latipes* weevil for the biological control of mile-a-minute weed by the State of New Jersey Department of Agriculture. Release of *R. latipes* weevil for the biological control is not a priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57).

(b) Where would the use be conducted?

The release will occur on Supawna Meadows NWR. The initial release is being coordinated with the New Jersey Ecological Services Office and the State of New Jersey Department of Agriculture as part of a Partners for Fish and Wildlife restoration project on a newly acquired 130-acre tract of land on the refuge. Release sites will be close to LeHigh Road along the refuge boundary where mile-a-minute weed is most pervasive. If the release is successful, in that the weevils have a significant impact on growth and expansion of mile-a-minute stands, the weevil may be released in other areas of the refuge infested with the weed.

(c)When would the use be conducted?

The release of the weevil initially occurred in spring 2006. However, future releases of the weevil may occur if the initial release is deemed successful. Primary areas targeted for future releases will include refuge lands in the Xmas Tree Lane area (along the Forest Habitat Trail) and near the Tract 11 impoundment in the vicinity of the Public Service Electric and Gas Company right-of-way.

(d)How would the use be conducted?

The release will occur with the assistance of the Biological Pest Control Program in the Division of Plant Industry of the New Jersey Department of Agriculture. They will provide the weevils and conduct the releases. Approximately 3,000 to 5,000 weevils will be released. The release takes a matter of minutes.

(e)Why is the use being proposed?

New Jersey Department of Agriculture and the Service's Partners for Fish and Wildlife Program requested permission to release weevils as a biological control agent for mile-a-minute weed. Supawna Meadows NWR has a severe invasive species problem. Mile-a-minute weed is an herbaceous trailing vine that is native to India and Eastern Asia. It was introduced to the United States at York, Pennsylvania on nursery stock in the late 1930s and is now established throughout the northeastern part of the country. It is an aggressive plant that grows over and blocks sunlight to native vegetation. This reduced photosynthesis capability may kill native plants (Okay 2005).

The *R. latipes* weevil is from China and has been studied since 2000 at the University of Delaware for its specificity to mile-a-minute and for its value as a biological control agent. Based on results of host-range tests, a limited amount of native foliage was consumed by weevils (between 0.1 and 2.3 centimeter² over 30 days). However, none of the non-target plant species were consumed when the weevils were given a choice between them and mile-a-minute weed. Additionally, no eggs were laid on non-target plant species (Colpetzer 2003).

Subsequent field work done at release sites in the Northeast has resulted in additional information. Small-scale releases in New Jersey and Delaware in summer 2004 indicated the weevils could survive the winter. More than 10,000 weevils were released in 2 New Jersey sites in 2005. All plants were killed due to adult feeding at one of the sites. About 450 weevils released at a Chester County, Pennsylvania site in June 2005 were studied. Weevils reproduced and dispersed up to 200 meters from the release site, but most stayed within 25 meters. Weevils increased due to reproduction throughout the summer (Hough-Goldstein 2006).

The conclusions from field studies indicate the weevil establishes easily, produces multiple generations per year, and that adults can kill mile-a-minute plants through foraging. Work continues to determine the level of impact the weevils may have in the future to help control mile-a-minute weed. The intention of the release is that the weevils will consume mile-a-minute weed stems and leaves, which will result in reducing the spread of and, eventually, killing the plants.

Availability of Resources:

The release of the weevil is a Partners for Fish and Wildlife project. The restoration plan was prepared by U.S. Fish and Wildlife Service biologists at the New Jersey Field Office (about \$1,200 of staff time). The Biological Pest Control Program in the Division of Plant Industry of the New Jersey Department of Agriculture reproduced and will release the weevils (\$5,000). Preparation of a special use permit, a Finding of No Significant Impact, and the Compatibility Determination required about 10 hours of refuge staff time (\$350). Outreach to adjacent landowners required about 8 hours of refuge staff time (\$280).

The annual costs associated with the administration of release of *R. latipes* on Supawna Meadows NWR are estimated below:

Planning and supervising staff to monitor the use and its effects on environment and other visitors. Also, coordination, budgeting, issuance of special use permit [SUP], public relations.

GS-12 Deputy Refuge Manager for two work days/year = \$560

Monitoring impacts of release on environment, review proposals, coordinate with researchers, public outreach, monitoring.

GS-9 Wildlife Biologist for 5 work days/year = \$460

Total annual projected weevil release program cost = \$1,020

Anticipated Impacts of the Use:

Habitat: Based on results of both laboratory and field study to date, spread of the non-native, invasive mile-a-minute weed may be halted. At best, the existence of the plant on the refuge would be eliminated. Regardless, reduction of this plant will allow native habitat to rebound and provide wildlife habitat values to refuge wildlife. As stated above, in laboratory tests minor consumption of native plant species occurred when no mile-a-minute was present. It is anticipated that the weevil damage to native plants will be minimal.

Wildlife: The primary wildlife species of concern at the refuge are migratory birds and resident wildlife. Improvement of habitat through reduction of the mile-a-minute weed will benefit refuge wildlife. The weevil is not known to compete with native insect life. As noted in the July 2004 Environmental Assessment, there is not total assurance that the release of *R. latipes* will be reversible. However, there is no evidence that the weevil will cause any adverse environmental effects (Firko 2004). Additionally, no negative interaction with native fauna is anticipated.

A complete discussion of potential effects is available in the Environmental Assessment (EA) prepared by the United States Department of Agriculture (Firko 2004).

Public Review and Comment:

As part of the Supawna Meadows NWR CCP process, this compatibility determination has been through extensive public review, including a 30-day comment period following the release of the draft CCP/EA.

Determination:

Use is Not Compatible

Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

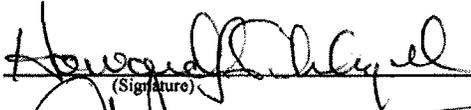
The release of *R. latipes* weevil for biocontrol will occur in areas of the refuge with uncontrollable mile-a-minute weed populations that threaten the survival of native wildlife habitat.

The following stipulations will help ensure the release is compatible with refuge purposes:

- Refuge staff will monitor progress of weevil release and impact on mile-a-minute population.
- Refuge staff will continually coordinate with the New Jersey State Beneficial Insect Laboratory

Justification:

Mile-a-minute weed is a non-native, invasive plant that has infested portions of Supawna Meadows NWR. It has been studied for 6 years by the University of Delaware both in the laboratory and the field. The weevils have had a significant impact on slowing the advancement of mile-a-minute weed. Based on that research and an EA prepared by the United States Department of Agriculture, it has been determined that introduction of the *R. latipes* weevil will not have an adverse impact on refuge lands and wildlife, and that the use is compatible with refuge purposes. The release of *R. latipes* weevil for the biological control of mile-a-minute weed will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the refuge was established.

Signature: Refuge Manager  12/0/2010
(Signature) (Date)

Concurrence: Regional Chief  5/20/11
(Signature) (Date)

Mandatory 10-year re-evaluation date 5/20/2011

Literature Cited:

Colpetzer, K. 2003. An evaluation of the Asian weevil, *Homorosoma chinense* Wagner (Coleoptera: Curculionidae), a potential biological control agent of mile-a-minute weed, *Polygonum perfoliatum* L. (Polygonales: Polygonaceae). MS. Thesis, University of Delaware, Newark.

Firko, Michael. 2004. Field Release of *Rhinocomimus latipes* (Coleoptera: Curculionidea), a Weevil for Biological Control of Mile-a-minute Weed (*Polygonump erfoliatum*), in the Continental United States - Final Environmental Assessment. U.S. Department of Agriculture.

Hough-Goldstein, Judy. 2006. "Biological Control of Mile-a-minute." College of Agriculture and Natural Resources, University of Delaware. URL: <http://ag.udel.edu/enwc/research/biocontrol/mileaminute.htm>. Date: April 4, 2006.

Okay, J.A.Gerlach. 2006. "Mile-A-Minute Weed." Plant Conservation Alliance. URL: <http://www.nps.gov/plants/alien/fact/pope1.htm>. Date: April 5, 2006.

Compatibility Determination

Use: WILDLIFE OBSERVATION, PHOTOGRAPHY, ENVIRONMENTAL EDUCATION, AND INTERPRETATION

Refuge Name: Supawna Meadows NWR

Establishing Authority: Supawna Meadows NWR was originally established by Executive Order 6582 on February 3, 1934, as the Goose Pond addition to the Killcohook National Wildlife Refuge (currently termed Killcohook Coordination Area). The refuge was renamed Supawna Meadows National Wildlife Refuge and officially separated from Killcohook on April 10, 1974, by the Service. On October 30, 1998, the Service's jurisdiction over Killcohook was revoked.

Refuge Purposes: Supawna Meadows NWR purposes:

- "... as a refuge and breeding ground for wild birds and animals," (Executive Order 6582, dated Feb. 3, 1934);
- "... particular value in carrying out the national migratory bird management program," (16 U.S.C. § 667b);
- "... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds," (16 U.S.C. § 715d); and
- "... suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species," (16 U.S.C. § 460k-1).

National Wildlife Refuge System Mission: ...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 Improvement Act of 1997, Public Law 105-57).

Description of Use:

(a) What is this use? Is it a priority public use?

The uses are wildlife-oriented recreational activities including: wildlife observation, photography, environmental education and interpretation, including special self-led groups participating in these activities. These are priority public uses of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57).

(b) Where would the use be conducted?

Except for closed areas and where legal access is inadequate or absent, wildlife observation, photography, environmental education and interpretive activities will be permitted on all currently owned refuge tracts, as well as on newly acquired properties as they are acquired by the Service and made part of the refuge ownership. Currently there are two maintained walking trails on the refuge, one located along Lighthouse Road (Grassland Trail) and the other located off of Xmas Tree Lane (Forest Habitat Trail).

(c) When would the use be conducted?

The uses will be conducted year round during the hours when the refuge is open to the public, which is dawn to dusk.

(d) How would the use be conducted?

Currently the refuge is open to the public for wildlife observation, photography, environmental education and interpretation. Wildlife observation and photography occur on individual or group bases on refuge lands open to the public. Horseback riding, bicycling, jogging, and motorized vehicles are prohibited on the refuge. Interpretive signs are located along the two existing trails providing limited environmental education and interpretive information. The refuge has no facilities or staffing for conducting specific environmental education programs.

The final Comprehensive Conservation Plan for Supawna Meadows NWR proposes to expand or enhance these four public uses using a variety of strategies including, but not limited to:

A. Wildlife Observation, Photography, and Interpretation

- Extend trail system on newly acquired lands to include new observation platforms where deemed appropriate.
- Work with the Friends group to improve or install additional observation platforms on the refuge to include: installing an observation platform at the Tract 11 impoundment; and converting one or more old deer hunting platforms for use as an observation and photography blind.
- Expand refuge signage on newly acquired lands.
- Develop a brochure specific to trails.
- Develop a new Web site.
- Construct a wheelchair accessible photography blind or other amenities to improve facilities for wildlife photographers.
- Evaluate the use of the FPRRL as a locus of refuge interpretation with panels and brochures on ground-level and in the interior of FPRRL. Take advantage of landscape view from FPRRL to interpret refuge marshlands, invasive plants, and mosaic of other cover types as well as viewing birds in flight on the refuge.

B. Environmental Education

- Provide onsite nature walks arranged and sponsored by the Friends of Supawna Meadows NWR. Staff will fill occasional requests to lead tours on the refuge.
- The majority of off-site outreach activities will be conducted by the Friends of Supawna Meadows NWR. These include 2 or 3 events the Friends group use as an opportunity to educate the public about the refuge. When refuge staff is available, they will actively participate in off-site outreach activities as well.
- Implementation of the above strategies will depend on staffing and funding levels.

(e) Why is the use being proposed?

Wildlife observation and photography, and environmental education and interpretation are four of the six priority public uses of the National Wildlife Refuge System. If compatible, they are to receive enhanced consideration over other secondary public uses.

Availability of Resources:

In 2004, Supawna Meadows NWR was made part of the administrative operations of Cape May NWR. With substantial reductions in staffing and funding, Supawna Meadows NWR was identified in the 2006 Regional Strategy Plan as an unstaffed satellite refuge of Cape May NWR. Funding and staffing support for the current level of these non-consumptive public use activities is administered from Cape May NWR. Supplemental support for specific activities is provided by the Friends of Supawna Meadows NWR and volunteers. At current levels the annual operating cost is expected to be approximately \$12,000. A breakdown of estimated expenses follows:

Annual Costs

Document Preparation and Review	\$ 700
Road, Parking Lot, Equip., Maintenance	\$ 500
Supplies	\$ 700
Law Enforcement and Responding to Public	\$9,400
<u>Miscellaneous Expenses</u>	<u>\$ 500</u>
Total	\$11,800

Expanded public use activities, as outlined in the final Comprehensive Conservation Plan (refer to paragraph (d) above), will best be met by adding a full-time public use/outreach professional to the Cape May NWR staff.

Anticipated Impacts on Service Lands, Waters, or Interest:

Wildlife observation, photography, environmental education, and interpretation can affect wildlife resources positively or negatively. Public involvement in these priority public uses would positively result in a better appreciation and more complete understanding of refuge wildlife and habitats, which in turn, translates into more widespread, stronger support for Supawna Meadows NWR, the Refuge System, and the Service. Wildlife observation and photography have the potential of impacting waterfowl, marshbirds, and other migratory bird populations feeding and resting near the trails, utilized access roads, and on other refuge lands. Use of upland trails is more likely to impact songbirds than other migratory birds. The disturbance of migratory birds by humans is documented in many studies in different locations.

Onsite activities by teachers and students using trails and environmental education sites may impose low-level impacts, such as trampling of vegetation, removing vegetation, littering, and temporary disturbance to wildlife. In the event of persistent disturbance to habitat or wildlife, the activity will be restricted or discontinued.

Placement of kiosks may affect small areas of vegetation. Kiosks will be placed where minimal disturbance will occur.

Providing additional interpretive and educational brochures, as well as increasing involvement with local groups in the area, may result in increased knowledge of the refuge and its resources. This awareness and knowledge may improve the willingness of the public to support refuge programs, resources, and compliance with regulations.

We predict the impacts of wildlife observation and photography uses will be minimal. Possible impacts include disturbing wildlife, removing or trampling of plants, littering, vandalism and entrance into closed areas. There will be some removal of vegetation to place the observation platforms and photo blinds. In the event of persistent disturbance to habitat or wildlife, the activity will be restricted or discontinued.

Human disturbance to migratory birds has been documented in many studies in different locations. Conflicts arise when migratory birds and humans are present in the same areas (Boyle and Samson 1985). The responses of wildlife to human activities include departure from the site (Burger 1981), the use of sub-optimal habitat (Erwin 1980), altered behavior (Burger 1981), and an increase in energy expenditure (Belanger and Bedard 1990).

Disturbance can cause shifts in habitat use, abandonment of habitat, and increase energy demands on affected wildlife since wildlife expend energy leaving areas of disturbance (Knight and Cole, 1991). Flight in response to disturbance can lower nesting productivity and cause disease and death. Hammitt and Cole (1998) conclude that the frequent presence of humans in “wild land” areas can dramatically change the normal behavior of wildlife mostly through “unintentional harassment.”

Public Review and Comment:

As part of the Supawna Meadows NWR CCP process, this compatibility determination has been through extensive public review, including a 30-day comment period following the release of the draft CCP/EA.

Determination:

Use is not compatible

Use is compatible, with the following stipulations

Stipulations Necessary to Ensure Compatibility:

- All-terrain vehicles, bicycles, jogging and horseback riding will be prohibited on all refuge lands.
- Refuge brochures and the refuge’s internet site will provide information regarding the refuge and maintained trails.
- A law enforcement program will ensure public use activity compliance and will protect refuge resources.

Justification:

These four priority public uses will provide compatible educational and recreational opportunities for visitors to enjoy the refuge resources, and improve their understanding and appreciation of fish and wildlife, ecology, refuge management practices, and the relationship of plant and animal populations in the ecosystem. Visitors will better understand the Service role in conservation and opportunities, issues, and concerns faced in management of our natural resources. Further, they will understand the impact that human presence, disturbance, and/or consumption can cause to these resources. Likewise, these four priority uses will provide opportunities for visitors to observe wildlife habitats firsthand, and learn about wildlife and wild lands at their own pace in an unstructured environment. Authorization of these uses will result in a greater constituency for achieving individual refuge goals, and, ultimately, the Service mission. These activities will not materially interfere with or detract from the mission of the National Wildlife Refuge System or purposes for which Supawna Meadows NWR was established.

Signature: Refuge Manager Howard J. Kelly 12/0/2010
(Signature) (Date)

Concurrence: Regional Chief [Signature] 5/20/11
(Signature) (Date)

Mandatory 15-year re-evaluation date 5/20/2026

Literature Cited:

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Compatibility Determination

Use: FISHING AND CRABBING

Refuge Name: Supawna Meadows NWR

Establishing Authority: Supawna Meadows NWR was originally established by Executive Order 6582 on February 3, 1934, as the Goose Pond addition to the Killcohook National Wildlife Refuge (currently termed Killcohook Coordination Area). The refuge was renamed Supawna Meadows National Wildlife Refuge and officially separated from Killcohook on April 10, 1974, by the Service. On October 30, 1998, the Service's jurisdiction over Killcohook was revoked.

Refuge Purposes: Supawna Meadows NWR purposes:

- "... as a refuge and breeding ground for wild birds and animals," (Executive Order 6582, dated Feb. 3, 1934);
- "... particular value in carrying out the national migratory bird management program," (16 U.S.C. § 667b);
- "... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds," (16 U.S.C. § 715d); and
- "... suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species," (16 U.S.C. § 460k-1).

National Wildlife Refuge System Mission: ...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 Improvement Act of 1997, Public Law 105-57).

Description of the Use:

(a) What is the use? Is the use a priority public use?

The use is fishing and crabbing within designated areas of the refuge. Fishing is a priority public use of the National Wildlife Refuge System (Refuge System) under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Improvement Act).

(b) Where would the use be conducted?

Areas currently open for saltwater fishing and crabbing will continue to be open. The 1-day refuge youth fishing event at the Tract 18 impoundment will continue to be held. Boats will be prohibited on the freshwater ponds. All other freshwater ponds and impoundments will be closed to these activities. See map B-1 for an illustration of where fishing and crabbing will be conducted on the refuge.

(c) When would the use be conducted?

All fishing will follow applicable State fishing seasons, except where the refuge administers further restrictions to ensure compatibility. Fishing will be prohibited in the refuge portions of tidal creeks and marshes that are closed to the public during the State migratory waterfowl seasons (generally, September through the first week of January). Night fishing will be permitted in tidal areas, but prohibited on all other areas of the refuge.

The marshland area surrounding a known bald eagle nesting site, located at the southern portion of the refuge along the Salem River is closed to the public during the nesting season (December 15 – July 31). Anglers and boaters are prohibited from anchoring, landing, and/or accessing the marshlands during this period (map B-1).

(d) How would the use be conducted?

Tidal creeks and streams will be accessed by boat. There are no boat launching sites on the refuge. Boat access is available from various public and private boat ramps located in the Pennsville and Salem areas. Access to the pond along the Forest Habitat Trail is available by foot from a parking area off of Xmas Tree lane.

A step-down fishing plan describes the details of the fishing program. Each year the plan will be reviewed and any changes will be incorporated into an annual fishing program. All fishing will be planned and operated with the refuge's primary objectives, habitat management requirements and goals as the guiding principles. All fishing activities will follow applicable State laws, except where refuge-specific regulations are needed to ensure compatibility with the refuge's primary mission. Changes to the refuge-specific regulations will be published in the *Federal Register*. Fishing activities will only occur in designated areas. Fishing activities are intended to meet goals of the National Wildlife Refuge System Improvement Act and some of the refuge objectives and management goals without adversely affecting the primary objectives and mission of the refuge. Completing this activity under a fishing plan allows the refuge to accomplish its management goals and provide needed safety levels for citizens of the area without adversely affecting refuge habitats and wildlife populations. Refuge staff will coordinate with the New Jersey Division of Fish and Wildlife on matters of law enforcement and fishing regulations.

The U.S. Fish and Wildlife Service (Service) law enforcement officer(s) will conduct patrols during the fishing season. Assistance will also be provided by the State Conservation Officers.

(e) Why is the use being proposed?

This traditional support has been recognized in statutory authority for the Refuge System, including most recently the Improvement Act amendment to the Wildlife Refuge System Administration Act of 1966. This law, which also provides the Refuge System its mission, clearly states that six wildlife-dependent recreational uses, including both hunting and fishing as well as wildlife observation and photography and environmental education and interpretation, when compatible, are the priority general public uses of the Refuge System. Furthermore, these uses are to receive "enhanced consideration over other general public uses in planning and management within the Refuge System..." The Improvement Act also directs the Service to provide "increased opportunities for families to experience compatible wildlife-dependent recreation, particularly opportunities for parents and their children to safely engage in traditional outdoor activities, such as fishing..." From this statutory language, Congress' intent is clear that the Service provide opportunities for compatible fishing on the Refuge System.

Availability of Resources:

In 2004, Supawna Meadows NWR was made part of the administrative operations of Cape May NWR. With substantial reductions in staffing and funding, Supawna Meadows NWR was identified in the 2006 Regional Strategy Plan as an unstaffed satellite refuge of Cape May NWR. Funding and staffing support for the current level of this activity is administered from Cape May NWR. At current levels, the annual operating cost for accommodating all priority public uses combined is expected to be approximately \$6,000. A breakdown of estimated expenses follows:

Annual Costs

Document Preparation and Review	\$ 700
Road, Parking Lot, Equip., Maintenance	\$ 500
Supplies	\$ 700
Law Enforcement and Responding to Public	\$3,500
<u>Miscellaneous Expenses</u>	<u>\$ 500</u>
Total	\$5,900

There are sufficient funds within the regular Operations and Maintenance budget of Cape May NWR to support the public waterfowl hunt at Supawna Meadows NWR.

Anticipated Impacts of the Use:

Recreational fishing should not have any adverse impacts on the fisheries resources at the refuge. Adverse impacts to the federally listed, endangered shortnose sturgeon are not anticipated. Problems associated with site compaction and denuding of vegetation can be addressed by area closures as necessary to protect sensitive areas. Problems associated with littering can be countered through an effective law enforcement program and through public education.

The areas open to fishing and crabbing will be open to water-based wildlife observation as well. Fishermen and crabbers do not actively approach wildlife and generally anchor for short periods of time. Conflicts between fishermen or crabbers and individuals engaged in wildlife observation are expected to be minor and infrequent.

Some of the areas open to fishing and crabbing will be open to waterfowl hunting. Waterfowl hunting seasons extend from September through the first week in January. Fishing and crabbing activities occur year-round. While conflicts are expected to be infrequent, refuge maps and guidelines provided to the public will identify the areas open to hunting. No hunting is permitted on Sundays in New Jersey, which will reduce the potential for conflict.

Waterfowl, wading birds, shorebirds, and other wildlife may be disturbed by human activities. Klein (1993), in a study conducted at J. N. "Ding" Darling National Wildlife Refuge, observed that individuals fishing and crabbing showed the lowest disturbance of wildlife compared to other refuge visitors presumably because they did not attempt to approach wildlife.

Morton et al. (1989) suggested that human disturbance of wintering black ducks impairs their physiological conditions, thereby reducing winter survival and nutrient reserves carried to the breeding grounds. Because of the cold climate, little fishing activity occurs on the refuge from the middle of November through the middle of March. Additionally, about 60 percent of the refuge will be closed during waterfowl season during the majority of the time black ducks are wintering there.

Several species of frogs and turtles that use the refuge are experiencing population declines. Conserving these species achieves refuge purposes, addresses the general concern about these population declines, and also increases the likelihood that more wildlife will be available for viewing at Watchable Wildlife sites. By closing most of the freshwater ponds to fishing, amphibians and turtles will not be impacted by fishing activity. The upland areas of the refuge will be closed to all uses between dusk and dawn. Prohibiting night fishing in freshwater areas will decrease illegal and unauthorized activities on the refuge.

The federally listed, endangered shortnose sturgeon is found in larger rivers, estuaries, and nearshore sea environments (Dadswell et al. 1984). Individuals from the Delaware River population spawn in the freshwater section of the Delaware River from mid-winter to early spring and spend the summer near the

mouth of Delaware Bay (Hastings and O’Herron 1987, NMFS 1998). Because this species prefers larger rivers, sturgeons are not expected to occur in waters passing through the refuge. Individuals may be present in the Delaware River bordering the refuge. Fishing and crabbing within the Delaware River is controlled by the States of New Jersey and Pennsylvania, both of which prohibit sturgeon fishing (NJDFW 2009b, PFBC 2010), and is not under the Service’s jurisdiction. Adult sturgeon may forage in shallow water areas near the refuge (Dadswell et al. 1984). However, accidental hook and line catches of shortnose sturgeon in the proposed refuge fishing areas are unlikely because sturgeon are bottom feeders, feeding on small clams, amphipods, and juvenile crabs in the bottom sediment (Dadswell et al. 1984). Prey is not considered to be a limiting resource (NMFS 1998), therefore it is unlikely that the limited, localized crabbing in refuge waters will affect the sturgeon’s prey base. Lastly, fishing and crabbing on the refuge are conducted in accordance with applicable State regulations to help protect sensitive species, including the shortnose sturgeon.

Recreational fishermen on the refuge are a potential audience for refuge outreach and information efforts. The minor impacts to vegetation and wildlife which may occur are a worthwhile trade-off for informing visitors about refuge natural and cultural resources.

Fishermen may impact wildlife and the habitat by leaving their trash, old bait, and fishing line behind. This refuse may negatively impact wildlife if they ingest the trash or get tangled in the fishing line.

Public Review and Comment:

As part of the Supawna Meadows NWR CCP process, this compatibility determination has been through extensive public review, including a 30-day comment period following the release of the draft CCP/EA.

Determination (check one below):

Use is Not Compatible

Use is Compatible With the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

- All anglers must comply with State regulations regarding possession of fishing licenses. Seasons and creel limits will conform to State regulations.
- Night fishing will only be permitted on tidal marshes within the refuge boundary.
- Fishing will be prohibited in the tidal marshes closed to waterfowl hunting during the State migratory waterfowl seasons (September through the first week of January)
- The marshland area surrounding a known bald eagle nesting site, located at the southern portion of the refuge along the Salem River (map B-1) is closed to the public during the nesting season (December 15 – July 31). Users are prohibited from accessing the marshlands around the nesting site during this period.
- Access to the fishing pond along the Forest Habitat Trail at Xmas Tree Lane will be by foot only.
- Boats are prohibited in all the refuge ponds and impoundments.
- Fishermen will be required to clean up all garbage and bait prior to leaving an area.

Justification:

The National Wildlife Refuge System Improvement Act of 1997 (P.L. 105-57) identifies six priority public uses of wildlife refuges: hunting, environmental education, interpretation, fishing, wildlife observation, and wildlife photography. These priority public uses are dependent upon healthy wildlife populations. Where these uses are determined to be compatible, they are to receive enhanced consideration over other uses in planning and management.

Fishing is recognized by the Service as a traditional form of outdoor recreation and is not expected to adversely impact the target species. Fishing is a traditional form of outdoor recreation on the refuge and in the region. Permitting fishing on the refuge will provide substantial recreational opportunities to the public.

This activity will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the refuge was established.

Signature: Refuge Manager  12/2/2010
(Signature) (Date)

Concurrence: Regional Chief  5/20/14
(Signature) (Date)

Mandatory 15-year re-evaluation date 5/20/2024

Literature Cited:

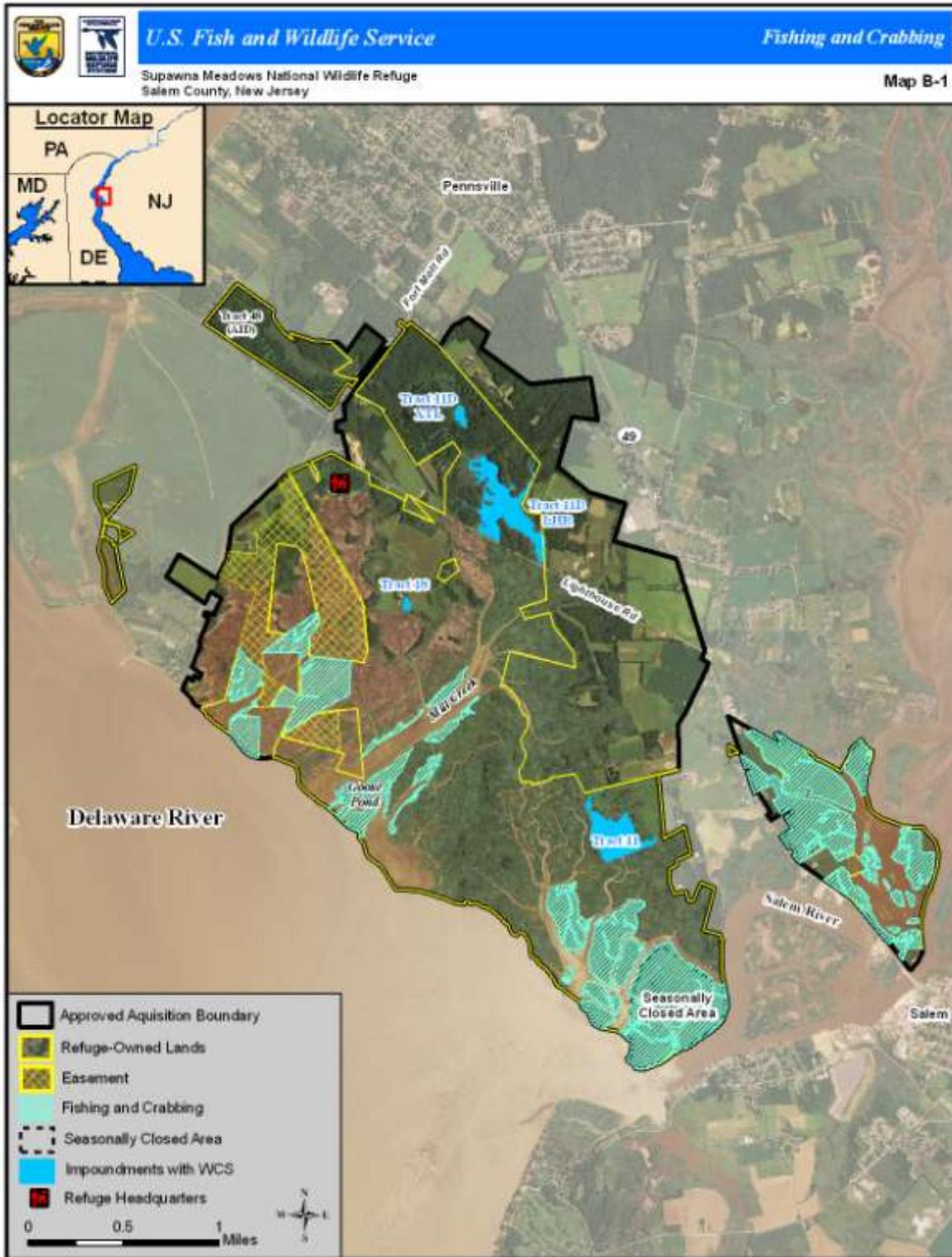
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Map B-1: Public fishing and crabbing areas within Supawna Meadows National Wildlife Refuge



Compatibility Determination

Use: PUBLIC HUNTING OF WATERFOWL

Refuge Name: Supawna Meadows National Wildlife Refuge (NWR)

Establishing Authority: Supawna Meadows NWR (refuge) was originally established by Executive Order 6582 on February 3, 1934, as the Goose Pond addition to the Killcohook National Wildlife Refuge (currently termed Killcohook Coordination Area). The refuge was renamed Supawna Meadows NWR and officially separated from Killcohook on April 10, 1974, by the Service. On October 30, 1998, the Service's jurisdiction over Killcohook was revoked.

Refuge Purposes: Supawna Meadows NWR purposes:

- "... as a refuge and breeding ground for wild birds and animals," (Executive Order 6582, dated Feb. 3, 1934);
- "... particular value in carrying out the national migratory bird management program," (16 U.S.C. § 667b);
- "... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds," (16 U.S.C. § 715d); and
- "... suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species," (16 U.S.C. § 460k-1).

National Wildlife Refuge System Mission: ...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 Improvement Act of 1997, Public Law 105-57).

Description of the Use:

(a) What is the use? Is the use a priority public use?

The use is public hunting of waterfowl (ducks, coots, geese and swans) at designated times on designated areas within the refuge boundary within the framework of State and Federal regulations. This use is a public priority use of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57).

(b) Where would the use be conducted?

As specified in the Refuge Purposes, Supawna Meadows NWR has been specified as set apart as an inviolate sanctuary and therefore is subject to permitting waterfowl hunting on up to 40 percent of the refuge in accordance with (16 U.S.C. 668dd(d)(1)(A), National Wildlife Refuge System Administration Act, (16 U.S.C. 703-712), Migratory Bird Treaty Act and (16 U.S.C. 715a-715r), Migratory Bird Conservation Act. (map B-2) below represents that portion of the refuge which public hunting of waterfowl will be allowed. All other areas of the refuge will be closed to waterfowl hunting. See map B-1 for an illustration of where waterfowl hunting will be conducted on the refuge.

(c) When would the use be conducted?

The proposed use is to provide public hunting of waterfowl (ducks, coots, geese and swans) by foot or by boat in designated areas within the refuge in accordance with State and Federal regulations. Hunting

will take place within the open waterfowl seasons established by the New Jersey Division of Fish and Wildlife.

(d) How would the use be conducted?

State game laws and regulations including season dates, bag limits, and weapon restrictions will follow the New Jersey Division of Fish and Wildlife (NJDFW) Guidelines to the greatest extent possible, and will be coordinated with them annually. In addition to State regulations, hunters must follow Federal regulations. More restrictive regulations may be implemented, as necessary, to conserve wildlife populations and to provide for safe, quality wildlife-dependent recreation.

Hunting seasons on the refuge will be the same as those set by the State. Refuge staff will coordinate with the New Jersey Division of Fish and Wildlife on matters of law enforcement and hunting seasons.

The refuge law enforcement officer will conduct patrols during the hunting season. Assistance will also be provided by the State Conservation Officers, and the area special agent currently located in Pleasantville, New Jersey.

(e) Why is the use being proposed?

Hunting is one of the six priority public uses of the National Wildlife Refuge System and, as such, is to receive enhanced consideration over other secondary public uses.

Availability of Resources:

In 2004, Supawna Meadows NWR was made part of the administrative operations of Cape May NWR. With substantial reductions in staffing and funding, Supawna Meadows NWR was identified in the 2006 Regional Strategy Plan as an unstaffed satellite refuge of Cape May NWR. Funding and staffing support for the current level of this activity is administered from Cape May NWR. The annual operating cost for accommodating all priority public uses combined is expected to be approximately \$6,000. A breakdown of estimated expenses follows:

Annual Costs

Document Preparation and Review	\$ 700
Road, Parking Lot, Equip., Maintenance	\$ 500
Supplies	\$ 700
Law Enforcement and Responding to Public	\$3,500
<u>Miscellaneous Expenses</u>	<u>\$ 500</u>
Total	\$5,900

There are sufficient funds within the regular Operations and Maintenance budget of Cape May NWR to support the public waterfowl hunt at Supawna Meadows NWR.

Anticipated Impacts of the Use:

The Supplemental Environmental Impact Statement (SEIS) for Waterfowl Hunting in the United States (1988) concluded that waterfowl hunting was an acceptable use of a renewable natural resource and established guidelines for establishment of seasons and bag limits. Waterfowl seasons and bag limits are revised each year based on winter and breeding ground surveys to ensure the maintenance of viable waterfowl populations. Waterfowl hunting is recognized by the Service as a traditional form of wildlife related outdoor recreation (a primary purpose for which the refuge was established).

The refuge is located within the Atlantic Flyway Black Duck Joint Venture area which has a goal of increasing the black duck population. The primary species harvested are mallard, American black duck, green-winged teal, and Canada goose.

Heusmann (1974) concluded that “During the past 100 years, the status of the mallard (*Anas platyrhynchos*) in the Northeast has changed from that of rare migrant to major game bird..... The close relationship between mallards and black ducks (*Anas rubripes*) is leading to increasing hybridization as the species come in contact, particularly in inland park situations. The black duck possesses few traits to prevent hybridization, and its continued existence as a distinct species is threatened.” Ankney, et al. (1987) suggest that increased mallards in an area cause a decline in black ducks through introgressive hybridization and, or competitive exclusion. Removal of drake mallards during hunting season in areas where black ducks and mallards interact may decrease hybridization.

Wood duck nesting and roosting areas on the non-tidal waters of the refuge are not open to waterfowl hunting. Many of the refuge’s breeding and juvenile wood ducks have dispersed or migrated by the opening of the waterfowl season in mid-October. The hunting of waterfowl in the designated areas within the federally and State prescribed seasons and bag limits should have little or no affect on the refuge’s wood duck breeding population or national populations.

New Jersey, northern Delaware, and southeastern Pennsylvania are currently experiencing a population explosion of non-migratory Canada geese. City parks, industrial parks, water supply reservoirs and private landowners are experiencing problems resulting from these birds. Rexstad (1992) found a high intrinsic survival rate of the Canada goose in Utah in the absence of hunting. Current regulations, focused on harvesting non-migratory Canada geese, allow hunting during the month of September. Hunting during late winter has the potential to disturb wintering ducks, particularly black ducks, and decrease the value of the refuge as wintering habitat. Hunting of Canada geese on designated areas of the refuge may be permitted after the close of the duck season for the southern zone of New Jersey when necessary to achieve population and damage control goals for non-migratory Canada geese.

The greater snow goose population in the Atlantic flyway has increased significantly over the past decade and continues to increase. Damage to winter grain and salt hay fields and marsh areas in New Jersey is increasing. The refuge marshes are currently used by greater snow geese. Refuge marshes and impoundments provide valuable late winter habitat for black ducks and pintails. Hunting during late winter has the potential to disturb wintering ducks, particularly black ducks, and decrease the value of the refuge as wintering habitat. As snow goose use of the refuge increases, hunting of greater snow geese on designated areas of the refuge may be permitted after the close of the duck season for the southern zone of New Jersey to achieve population goals for greater snow geese or reduce damage to refuge habitats and surrounding marsh and agricultural areas.

Other species which share refuge habitat with waterfowl include shorebirds, wading birds, osprey, and bald eagle. Most shorebirds and wading birds have commenced or completed migration by the opening of the waterfowl hunting season.

Bald eagles feed in the tidal and non-tidal areas of the refuge. Since 1998, an eagle nest has been located on the refuge in an area outside the designated waterfowl hunting areas. This area is closed to all public entry between December 15 and July 31.

Hunters benefit from the harvesting of game for personal consumption. Hunters who come from outside the local area also contribute to the local economy by staying at local hotels and eating in local restaurants.

Public Review and Comment:

As part of the Supawna Meadows NWR CCP process, this compatibility determination has been through extensive public review, including a 30-day comment period following the release of the draft CCP/EA.

Determination:

Use is Not Compatible

Use is Compatible With the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

- All hunters must obtain all necessary State and Federal permits. Hunters must abide by all applicable refuge, State, and Federal regulations. Refuge brochures and publication of hunt information in the New Jersey Fish and Wildlife Digest will inform hunters of State and refuge regulations.
- The hunting program will be reviewed annually to ensure compatibility with Service and refuge purposes and compliance with Federal and State waterfowl hunting regulations.
- Disturbance of other wildlife, especially migratory birds, will be monitored and changes will be made in the hunt program as necessary to minimize disturbance.
- A law enforcement program will ensure hunt regulation compliance and will protect refuge resources.

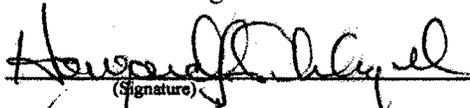
Justification:

The National Wildlife Refuge System Improvement Act of 1997 (P.L. 105-57) identifies six priority public uses of wildlife refuges: hunting, environmental education, interpretation, fishing, wildlife observation, and wildlife photography. These priority public uses are dependent upon healthy wildlife populations. Where these uses are determined to be compatible, they are to receive enhanced consideration over other uses in planning and management.

Hunting of waterfowl on Supawna Meadows NWR is justified within refuge objectives by providing wildlife-oriented recreation and promoting appreciation of wildlife and the outdoors. Recreational hunting is also a valid means of population control and can serve to keep wildlife populations in check.

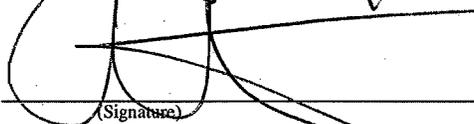
These activities will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the refuge was established.

Signature: Refuge Manager


(Signature)

12/2/2010
(Date)

Concurrence: Regional Chief


(Signature)

5-27-11
(Date)

Mandatory 15-year re-evaluation date

5/21/2026

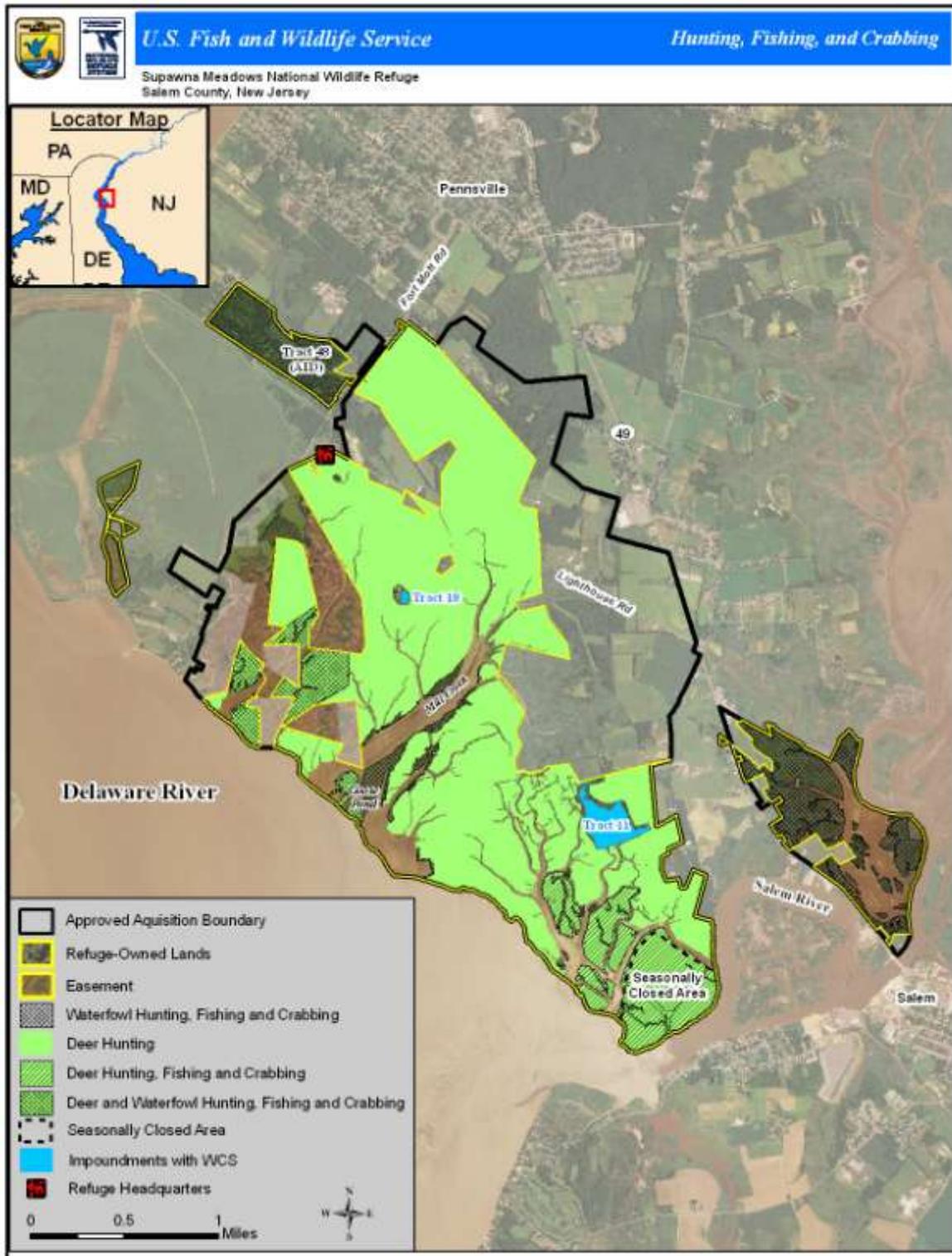
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Map B-2: Current public hunting areas within Supawna Meadows National Wildlife Refuge



Compatibility Determination

Use: WHITE-TAILED DEER ARCHERY HUNT

Refuge Name: Supawna Meadows National Wildlife Refuge

Establishing Authority: Supawna Meadows NWR (refuge) was originally established by Executive Order 6582 on February 3, 1934, as the Goose Pond addition to the Killcohook National Wildlife Refuge (currently termed Killcohook Coordination Area). The refuge was renamed Supawna Meadows NWR and officially separated from Killcohook on April 10, 1974, by the Service. On October 30, 1998, the Service's jurisdiction over Killcohook was revoked.

Refuge purposes: Supawna Meadows NWR purposes:

- "... as a refuge and breeding ground for wild birds and animals," (Executive Order 6582, dated Feb. 3, 1934);
- "... particular value in carrying out the national migratory bird management program," (16 U.S.C. § 667b);
- "... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds," (16 U.S.C. § 715d); and
- "... suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species," (16 U.S.C. § 460k-1).

National Wildlife Refuge System Mission: ...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 Improvement Act of 1997, Public Law 105-57)

Description of Use:

(a) What is the use? Is the use a priority public use? The use is an archery hunt for white-tailed deer. Hunting is a priority public use. Archery would be the only acceptable means of taking deer on Supawna Meadows NWR. Only portable stands are allowed and no tree spiking is allowed. Open seasons will adhere to New Jersey State deer hunting regulations for bow hunting only. Access to the refuge for this activity is achieved through walking.

(b) Where would the use be conducted? Deer hunting will be permitted on all refuge tracts except for New Jersey State safety zones, Tract 11c (location of the old refuge headquarters and residence), and where legal access is inadequate or absent. Optimum deer habitat is found on Tracts 11, 11b, and 11d, which contain the majority of refuge uplands. Marsh tracts are included in the hunting area because deer often seek shelter in phragmites-dominated marshes during hunting seasons. Upland islands in the marsh also support deer, primarily Tracts 11e, 11g, and 11r.

(c) When would the use be conducted? Refuge deer hunting will follow the bow seasons set by the State of New Jersey, Division of Fish and Wildlife (NJDFW) in Zone 63. Bow hunting will be maximized to include fall bow, permit bow, youth bow, and winter bow seasons.

(d) How would the use be conducted? State game laws and regulations including season dates, bag limits, safety zones, and weapon restrictions will follow the NJDFW guidelines to the greatest extent

possible, and will be coordinated with them annually. In addition to State regulations, hunters must follow Federal regulations including no baiting, no use of a spotlight, and no use of nails, wire, screws, or bolts to attach a tree stand. Refuge regulations also must be followed, including the prohibition of motorized vehicles. More restrictive regulations may be implemented, as necessary, to conserve wildlife populations and to provide for safe, quality wildlife-dependent recreation.

All hunters must be in possession of all required State permits while hunting on the refuge. The number of bow hunters is not limited and there is no lottery. Hunters will be allowed to select their own sites within the posted deer hunting areas, on a first-come, first-serve basis. There are four elevated stands located in Tract 18 where the vegetation is not sufficient to support portable tree stands. These stands will be available to hunters on a first-come, first-serve basis. The refuge will remain open to the public during the hunting season.

Optimum deer habitat is found on Tracts 11, 11b, and 11d, which contain the majority of refuge uplands. Marsh tracts are included in the hunting area because deer often seek shelter in phragmites-dominated marshes during hunting seasons. Upland islands in the marsh also support deer. Refuge lands open to hunting can be found on the refuge hunting map, map B-3.

Refuge staff will coordinate with the NJDFW on matters of law enforcement and hunting seasons. The refuge law enforcement officer will conduct patrols during the hunting season. Assistance will also be provided by the State Conservation Officers, and the area Special Agent currently located in Pleasantville, New Jersey. Harvested deer will be checked at the State check stations. These are identified in the New Jersey Fish and Wildlife Hunting Digest.

(e) Why is this use being proposed? Hunting is one of the priority uses outlined in the Refuge System Improvement Act of 1997. The Service supports and encourages priority public uses when they are appropriate and compatible on national wildlife refuge lands. Hunting is also used in some instances to manage wildlife populations, and it is a traditional form of wildlife-oriented recreation.

Availability of Resources:

The annual operating cost is expected to be approximately \$6,000. A breakdown of estimated expenses follows:

Annual Costs

Document Preparation and Review	\$ 700
Road, Parking Lot, Equip., Maintenance	\$500
Supplies	\$700
Law Enforcement and Responding to Public	\$3,500
<u>Miscellaneous Expenses</u>	<u>\$500</u>
Total	\$5,900

There are sufficient funds within the regular Operations and Maintenance budget of Cape May NWR to conduct an annual deer hunt at Supawna Meadows NWR.

Anticipated Impacts of the Use:

Deer hunting is currently the most effective tool we have to manage the health of the deer population and sustain the integrity, diversity, and health of forest habitats on the refuge. We implement a hunt program in coordination with NJDFW to sustain healthy deer populations and forest habitat conditions. Hunting would benefit vegetation by keeping resident deer populations in balance with the carrying capacity of the habitat.

If allowed to progress unchecked by natural predators or management, deer reproductive potential can be very high. For example, just one mating pair can grow to 1,000 in 10 years, including natural mortality (Yarrow and Yarrow 1999). Overabundance of deer can produce long-term negative effects such as potential disease epidemics (Demarais et al. 2000); increase in automobile accident rates; browsing pressure on landscapes, vegetation, and crops; and severe habitat degradation (Cypher and Cypher 1988).

All State bow hunting seasons will be permitted on the refuge. Based on previous NJDFW harvest data, this should allow sufficient numbers of deer to be harvested to control the refuge's deer population (see USFWS 2007 for additional information). We will monitor the refuge's deer population and its effects on refuge habitats and will work with the State to implement additional methods for taking deer if needed. This would require additional analysis under the National Environmental Policy Act, as amended (NEPA).

We will also remove the existing, refuge-specific hunt safety zones and will follow State regulations. This will decrease the ability of deer to avoid hunters on the refuge and will assist hunters by being consistent with State regulations and regulations at other national wildlife refuges in New Jersey.

By allowing deer hunting, the refuge provides a wildlife-dependent recreational opportunity that is in decline within the urbanizing setting of southern New Jersey. Providing this opportunity helps preserve the cultural heritage of the refuge area, where people have hunted for generations, and allows people to connect with nature in an outdoor natural setting in an area where it is becoming increasingly difficult to find access to undeveloped lands.

Negative impacts on refuge resources from allowing hunting may include disturbance of non-target species in the course of tracking deer, trampling of vegetation, possible creation of unauthorized trails by hunters and subsequent erosion, littering, and possible vandalism. Disturbance to non-target species and habitat is expected to be minimal. By having the refuge open to all State archery seasons, the number of hunters is spread out over the hunt season, minimizing the number of hunters on any given day. This reduces the daily disturbance to wildlife and habitat. In addition, archery hunting is generally a solitary sport and hunters will be scattered throughout the refuge hunting areas, also decreasing disturbance to habitat and non-target species. Lastly, bow hunting is much quieter than firearms and bow hunters must usually be quiet when hunting to get close enough to harvest deer. These also minimize potential disturbance to wildlife associated with this activity. Refuge law enforcement patrols, posted signs, and hunting brochures and information would help educate hunters about potential negative effects and avoidance measures as well as refuge regulations. We will periodically evaluate these activities to determine any effects they may have. If evidence of unacceptable adverse impacts appears, the location(s) of activities will be curtailed or discontinued as needed.

Despite efforts to control the deer population, there may continue to be complaints of crop damage and there would likely continue to be deer/vehicle collisions.

The proposed action would not likely affect any cultural resources that may be located on the refuge.

The refuge will remain open to all other approved public uses during the hunting season, thereby concurrently allowing other priority public uses. Non-hunting visitors may be in the hunt area at the same time as recreational hunters. Conflicts may arise if non-hunting visitors disturb deer or hunters or if a hunter disturbs deer or other wildlife that a non-hunting visitor was watching or photographing.

Hunt safety zones will be consistent with New Jersey State regulations restricting hunting around occupied properties. Removing the refuge-specific safety zones may result in additional user conflicts between refuge neighbors, non-hunters, and hunters. User conflicts are minimized because, according to State regulations, it is illegal for archery hunters to have a nocked arrow within the designated safety

zone around an occupied building. It is also illegal for bow hunters to shoot an arrow across highways or roads or to shoot into a safety zone. Hunting safety and regulations are a major component of the State's hunter education program, which includes the completion of a written exam and field session attendance prior to obtaining an initial license. Therefore, all hunters should be aware of these requirements. Non-hunting visitors may still be uncomfortable using areas of the refuge in which archery hunters are present. State law prohibiting hunting on Sunday provides an opportunity for non-consumptive users to visit the refuge on a non-hunting day during the hunting season.

All or part of the refuge may be closed to hunting at any time, if necessary, for public safety, to provide wildlife sanctuary, or for other urgent reasons. All seasons would be coordinated with and within the framework of the New Jersey Division of Fish and Wildlife. Some hunting regulations may be more restrictive than State regulations to meet refuge objectives. If necessary, modifications may be made to refuge-specific regulations and/or the hunt program based on harvest data and/or public use issues.

The hunt program, along with all other management programs, relates directly to the overall mission of the Service. Additionally, the National Wildlife Refuge System Improvement Act of 1997 identifies six priority public uses that are appropriate on national wildlife refuges, including hunting, fishing, wildlife observation, wildlife photography, and environmental interpretation and education. Development and enhancement of a quality and biologically sound hunt program that 1) leads to enjoyable recreation experiences and 2) maintains the deer population to promote a healthy environment is the overall goal for the hunt program at Supawna Meadows NWR.

Public Review and Comment:

A draft Environmental Assessment was prepared for the archery-only deer hunt and made available for public comment from December 5, 2006 to January 3, 2007. Comments were received from local residents and hunters and addressed in that format. A public notice was printed in the Today's Sunbeam newspaper on August 31, 2007 to announce the review period for the draft Compatibility Determination (CD) for the archery-only hunt. Additionally, a copy of the draft CD was posted at the refuge office and Grassland Trail kiosk. The public review and comment period ended on September 14, 2007. No public comments were received on the initial draft CD, so it was finalized on September 26, 2007. We have modified the September 26, 2007 CD by removing the refuge-specific hunting safety zones and using the State's hunting safety zones. This change was proposed during the Supawna Meadows NWR CCP process, and has been through extensive public review, including a 30-day comment period following the release of the draft CCP/EA. Comments on this change were received from local residents and hunters and addressed in the Supawna Meadows NWR Final CCP (see appendix H, Response to Public Comments).

Determination:

- Use is not compatible
- Use is compatible, with the following stipulations

Stipulations Necessary to Ensure Compatibility:

- All hunters must obtain all necessary State, Federal, and refuge permits.
- Hunters must abide by all applicable refuge, State, and Federal regulations.
- Deer hunting will be allowed on the upland and marshland areas of the refuge, except within posted closed areas. Concurrently, the public will have access to the refuge for non-consumptive public uses.

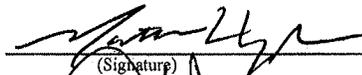
- All-terrain vehicles and other motorized vehicles will be prohibited on all refuge lands except for designated roads and parking areas.
- Refuge brochures and publication of hunt information in local newspapers and the New Jersey Fish and Wildlife Digest will inform hunters of refuge regulations.
- A law enforcement program will ensure hunt regulation compliance and will protect refuge resources.
- The current refuge-specific safety zones will remain in effect until the change to State safety zones is published in the Code of Federal Regulations (CFR).

Justification: The National Wildlife Refuge System Improvement Act of 1997 (P.L. 105-57) identifies six priority public uses of national wildlife refuges: hunting, environmental education, interpretation, fishing, wildlife observation, and wildlife photography. This act requires that, where the Service determines these uses are compatible, they are to receive enhanced consideration over other uses in planning and management.

Hunting of white-tailed deer on Supawna Meadows NWR is justified within refuge objectives by providing a priority public use and promoting appreciation of wildlife and the outdoors. Hunting is a traditional and well established activity on the refuge. Hunting on national wildlife refuges is also an important, proactive management action that can benefit wildlife and habitat by maintaining healthy deer populations and avoiding over browsing.

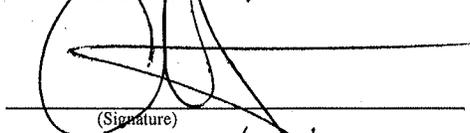
This use would not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the refuge was established. It will not cause an undue administrative burden. Annual adjustments can be made in the hunting program to ensure its continued compatibility.

Signature: Refuge Manager


(Signature)

5/6/11
(Date)

Concurrence: Regional Chief


(Signature)

5/20/11
(Date)

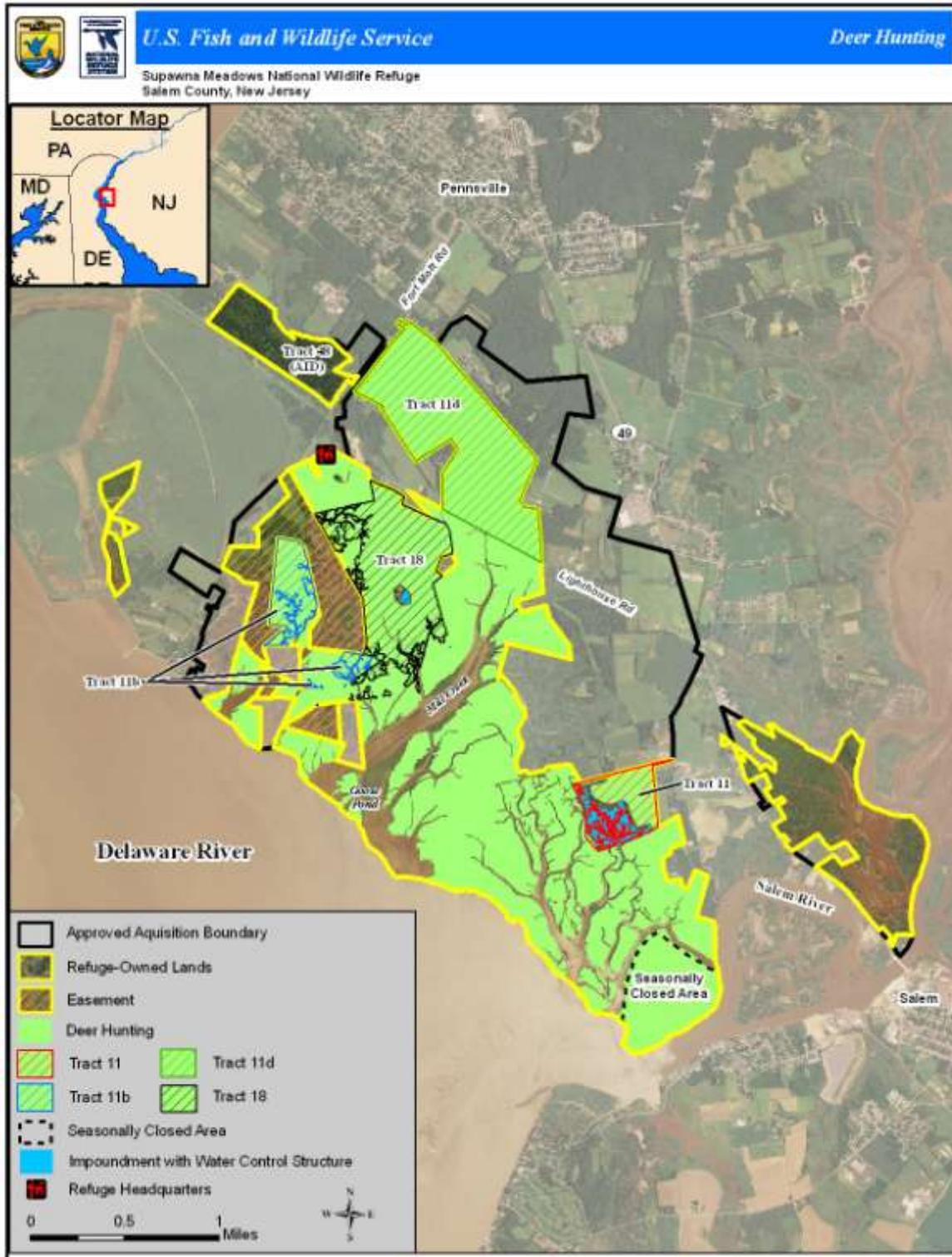
Mandatory 15-year re-evaluation date

5/20/2026

Literature Cited:

- Cypher, B. L., and E. A. Cypher. 1988. Ecology and management of white-tailed deer in northern coastal habitats: a synthesis of the literature pertinent to National Wildlife Refuges from Maine to Virginia. U.S. Fish and Wildlife Service, Biological Report 88-15. 52 pp.
- United States Fish and Wildlife Service (USFWS). 2007. Final Environmental Assessment, Supawna Meadows National Wildlife Refuge Deer Hunting Program. 27 p. Available from USFWS, 24 Kimbles Beach Road, Cape May Court House, New Jersey 08210.
- Yarrow, G. K. and D. T. Yarrow. 1999. Managing wildlife on private lands in Alabama and the Southeast. Alabama Wildlife Federation. Sweetwater Press. Birmingham, AL. 588 p.

Map B-3: Current public deer hunting areas within Supawna Meadows National Wildlife Refuge



Appendix C



John Mossesso, Jr./NBI

Eastern Box Turtle

Refuge Operations Needs System (RONS) and
Service Asset Maintenance Management System (SAMMS)

Table C.1. Refuge Operations and Needs System (RONS).

Project #	Project Title	Regional Rank	Station Rank	Budget Category	Year 1 Cost	Recurring Cost	FTE's	Alternatives		
								A	B	C
	Improve refuge operations (Assistant Refuge Manager stationed at Supawna Meadows)			People			1		X	
	Improve inventories and monitoring of refuge biological program (Wildlife Biologist stationed at Supawna Meadows)			People			1		X	
	Improve visitor services and volunteer coordination (Outdoor Recreation Planner stationed at Cape May)			People			.4		X	
	Improve and maintain refuge facilities and equipment (Maintenance Worker stationed at Supawna Meadows)			People			1		X	
	Improve refuge resource protection, facility security and public safety Park Ranger-Law Enforcement Officer stationed at Supawna Meadows)			People			1		X	
	Conduct surveys and develop comprehensive inventories of all flora and fauna on refuge									
	Conduct long-term marsh monitoring and restoration									
	Conduct secretive marshbird and seaside sparrow surveys to evaluate impacts of Phragmites control									
	Conduct pilot studies of Phragmites control measures									

Project #	Project Title	Regional Rank	Station Rank	Budget Category	Year 1 Cost	Recurring Cost	FTE's	Alternatives		
								A	B	C
	Conduct surveys to establish baseline population of coastal plain swamp sparrow and research use of habitat RONS and SAMMS									
	Conduct comprehensive surveys for bat species of conservation concern									
	Conduct survey of pond use by birds, fish, reptiles, amphibians, and insects.									
	Hire contractor to conduct paleo-environmental review of refuge									

Table C.2. Service Asset Management Maintenance System (SAMMS).

Project #	Project Title	Regional Rank	Station Rank	Budget Category	Year 1 Cost	Recurring Cost
	Construct signage on newly acquired lands					
	Construct spur trail off Grassland Trail					
	Install (or upgrade) observation blind on impoundment 11 off Grassland Trail					
	Upgrade Grass parking area nearby the observation blind on impoundment 11 to accommodate 10 vehicles					
	Construct a wheelchair-accessible photo-blind and other amenities to improve facilities for wildlife photography at the Grassland trail					
	Repair Finn's Point Rear Range Light catwalk to allow for public access					
	Install and upgrade signage along Highway 49 to direct motorists to refuge					
	Construct trail linking the Finn's Point Rear Range Light site to the Grasslands Trail					
	Demolish old headquarters, Yerkes House, staff quarters behind new office, and small outbuildings					
	Expand new maintenance shop					
	Remove hunting closure signage					
	Repair/restore Finn's Point Rear Range Light					

Appendix D



USFWS

Forest on Supawna Meadows NWR

Wilderness Review

DOCUMENTATION OF WILDERNESS INVENTORY

The wilderness review process consists of three phases: inventory, study, and recommendation. The purposes of the wilderness inventory phase are:

- to identify areas of System lands and waters with wilderness character and establish those areas as Wilderness Study Areas (WSAs);
- to identify areas of Refuge System lands and waters that do not qualify as WSAs; and
- to document the inventory findings for the planning record.

INVENTORY CRITERIA

WSAs are areas that meet the criteria in the Wilderness Act. Section 2(c) provides the following definition:

A wilderness, in contrast with those areas where man and his works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural condition, and which generally:

- 1) appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable;
- 2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation;
- 3) has at least 5,000 acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and
- 4) may also contain ecological, geological or other features of scientific, educational, scenic, or historical value.

Section 4(c) of the act prohibits permanent roads in wilderness, so WSAs also must be roadless. For the purposes of the wilderness inventory, a "roadless area" is defined as "A reasonably compact area of undeveloped Federal land that possesses the general characteristics of a wilderness and within which there is no improved road that is suitable for public travel by means of four-wheeled, motorized vehicles intended primarily for highway use. A route maintained solely by the passage of vehicles does not constitute a road."

In summary, the inventory to identify WSAs is based on an assessment of the following criteria: absence of roads (roadless); size; naturalness; and either outstanding opportunities for solitude or primitive and unconfined recreation.

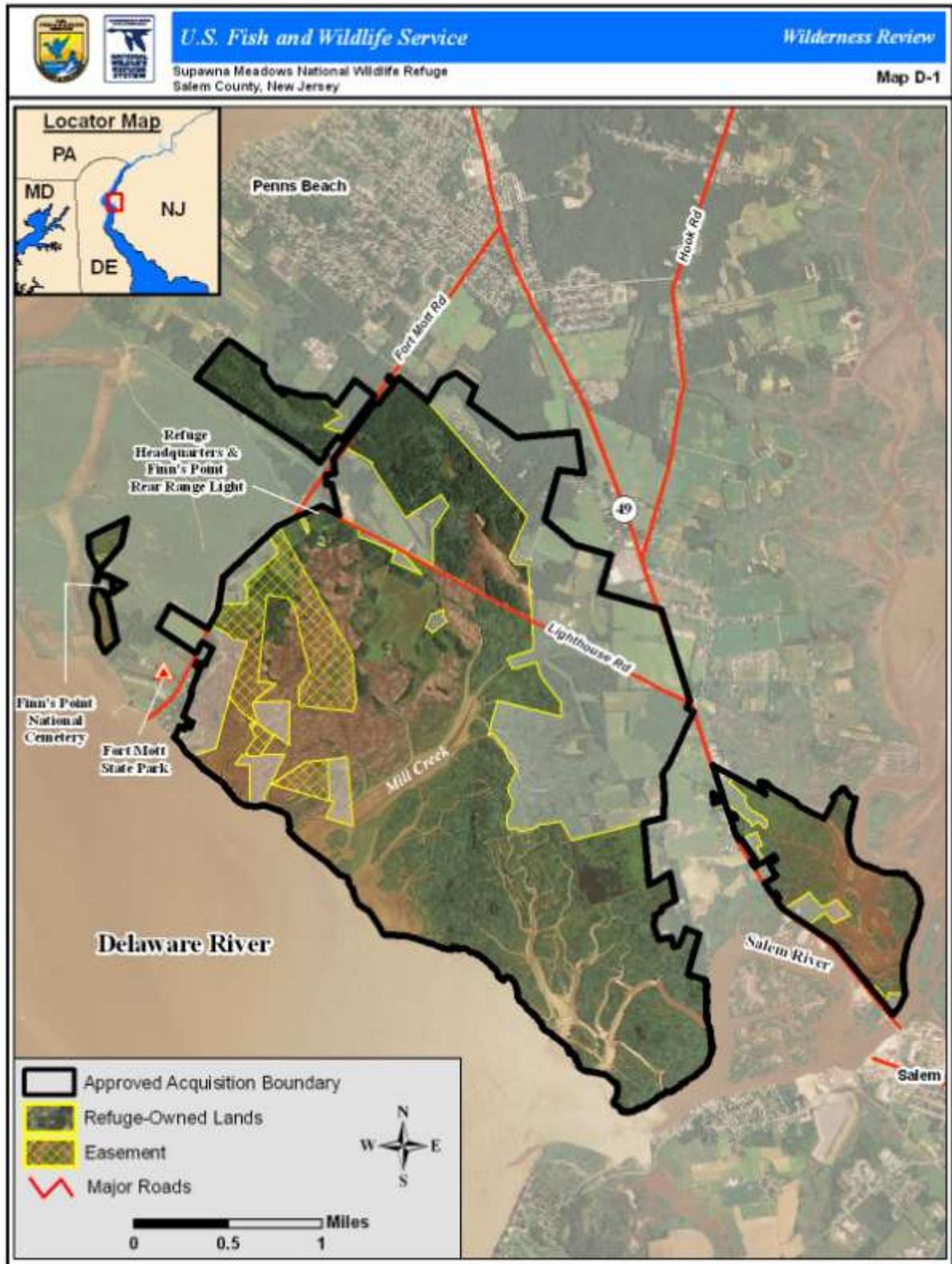
We initially assessed Supawna Meadows National Wildlife Refuge based on the size criteria. The size criterion is satisfied for areas under Service jurisdiction in the following situations:

- An area with over 5,000 contiguous acres (2,000 hectares). state and private land inholdings are not included in calculating acreage.
- A roadless island of any size. A roadless island is defined as a roadless area that is surrounded by permanent waters or that is markedly distinguished from surrounding lands by topographical or ecological features such as precipices, canyons, thickets, or swamps.
- An area of less than 5,000 contiguous acres that is of sufficient size as to make practicable its preservation and use in an unimpaired condition, and of a size suitable for wilderness management.
- An area of less than 5,000 contiguous acres that is contiguous with a designated wilderness, recommended wilderness, or area of other Federal lands under wilderness review by the United States Department of Agriculture Forest Service, Bureau of Land Management, or National Park Service.

INVENTORY CONCLUSIONS

The 3,016-acre Supawna Meadows National Wildlife Refuge does not meet the size criteria for a WSA. It is less than 5,000 acres and its size is not sufficient to preserve natural ecological processes. Map D-1 shows the current refuge-owned lands, easements and proposed acquisition boundaries. We will reevaluate this determination in 15 years with the revision of this CCP, or sooner if significant new information warrants a reevaluation. In summary, at this time additional study is not warranted.

Map D-1. Current refuge-owned lands, easements, and proposed acquisition boundaries.



Appendix E



Phil Szczerzenie/Mangi Environmental Group

Service Staff on the Refuge

Refuge Staffing Charts

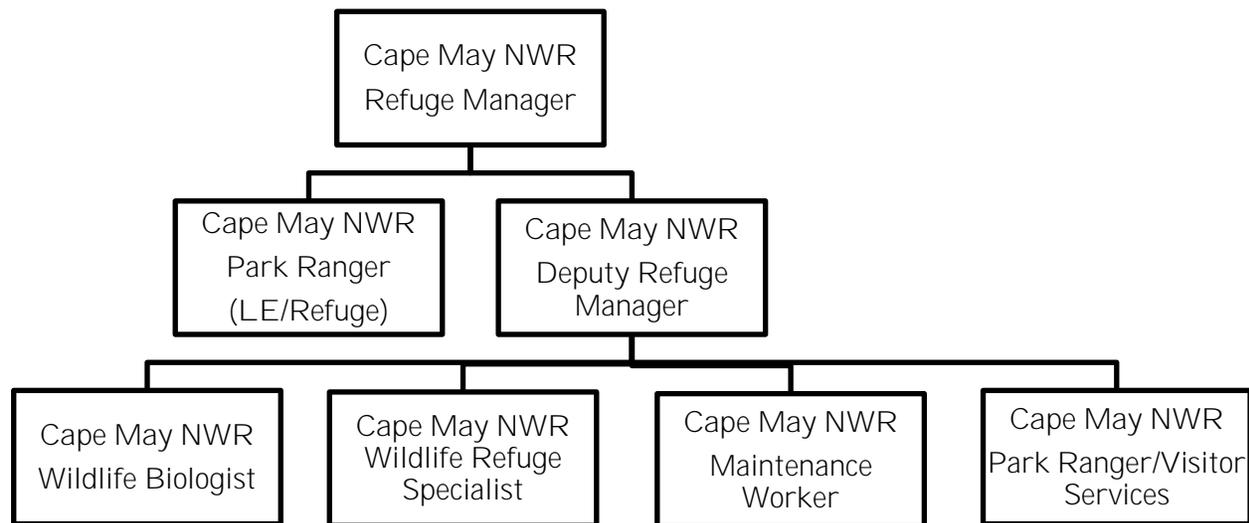


Figure E-1. Supawna Meadows National Wildlife Refuge current approved staff (all staff located at Cape May National Wildlife Refuge).

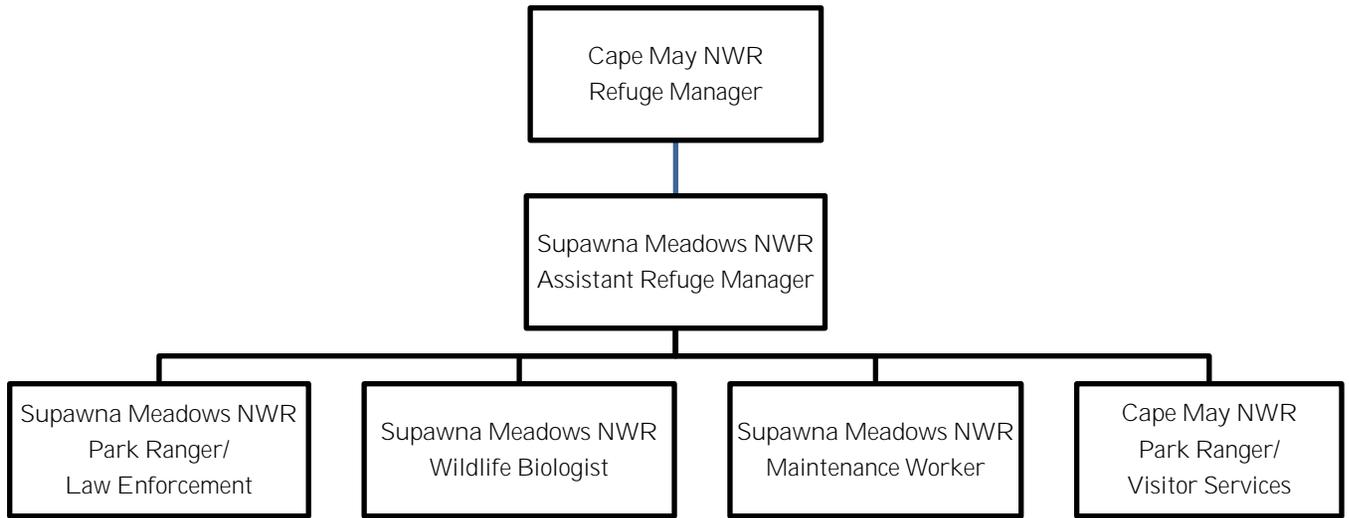


Figure E-2. Supawna Meadows National Wildlife Refuge New Staffing Chart.

Appendix F



USFWS

Prescribed Burn on Service Lands

Fire Management Program Guidance

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Introduction

The mission of the National Wildlife Refuge System is “to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans” as stated in the National Wildlife Refuge Improvement Act (October 9, 1997).

The Role of Fire

Historically, natural fire and ignitions by Native American people played an important disturbance role in many ecosystems by removing fuel accumulations, decreasing the impacts of insects and diseases, stimulating regeneration, cycling nutrients, and providing a diversity of habitats for plants and wildlife.

In the heavily manipulated areas of the northeast U.S., that role has been modified significantly. However, when fire is used properly it can:

- reduce hazardous fuels build-up in both wildland-urban interface (WUI) and in non-WUI areas;
- improve wildlife habitats by reducing the density of vegetation, and/or changing plant species composition;
- sustain and increase biodiversity;
- improve woodlands and shrublands by reducing plant density;
- reduce the susceptibility of plants to insect and disease outbreaks; and
- assist in the control of invasive and noxious species.

Wildland Fire Management Policy and Guidance

In 2001, the Secretaries of the Interior and Agriculture approved an update of the 1995 “Federal Fire Policy.” The 2001 “Federal Wildland Fire Management Policy” directs Federal agencies to achieve a balance between fire suppression to protect life, property, and resources, and fire use to regulate fuels and maintain healthy ecosystems. It also directs agencies to provide a management response to all wildfires, commensurate with values at risk, safety, and costs for suppression.

This policy provides nine guiding principles that are fundamental to the success of the fire management program. Firefighter and public safety is the first priority in every fire management activity. The role of wildland fires as an ecological process and natural change agent will be incorporated into the planning process.

Fire management plans (FMPs), programs, and activities support land and resource management plans and their implementation. Sound risk management is the foundation for all fire management activities. Fire management programs and activities are economically viable, on the basis of values to be protected, costs, and land and resource management objectives. FMPs and activities are based on the best available science. FMPs and activities incorporate public health and environmental quality considerations. Federal, State, Tribal, local, interagency, and international coordination and cooperation are essential. Standardization of policies and procedures among Federal agencies is an ongoing objective.

The fire management considerations, guidance, and direction should be addressed in the land use resource management plans (for example, the CCP). The FMP is a step-down plan derived from the land use plans and habitat plans, with more detail on fire suppression, prescribed fire, and fuels management activities.

Management Direction

Supawna Meadows National Wildlife Refuge would protect life, property, and other resources from wildland fire by suppressing all wildfires. Prescribed fire, in conjunction with chemical, manual, and mechanical fuel treatments, would be used in an ecosystem context to protect Federal and private property for habitat management purposes. Fuel reduction activities would be applied in collaboration with Federal, state and nongovernmental organizations partners.

Prescribed fire would be used as a management tool to promote and accomplish the goals set forward in the CCP:

- Protect and enhance Service Trust Resources and Species and Habitats of Special Concern.
- Maintain a healthy and diverse complex of natural community types comprised of native plants and animals to pass on to future generations of Americans.
- Conduct effective outreach activities to promote quality, wildlife dependent public use programs, with the emphasis on wildlife observation, and photography, to raise public awareness of the refuge and the Refuge System, and to promote enjoyment and stewardship of natural resources in the Delaware Bay region.

All aspects of the fire management program would be conducted in a manner consistent with applicable laws, policies, and regulations. Supawna Meadows NWR would maintain a FMP to accomplish the fire management goals described below in Fire Management Goals. Prescribed fire, chemical, manual, and mechanical fuel treatments would be applied in a scientific way, under selected weather and environmental conditions.

Fire Management Goals

The goals and strategies of the National Wildlife Refuge System Wildland Fire Management Program Strategic Plan are consistent with Department of Interior (DOI) and the United States Department of Agriculture Forest Service policies, National Fire Plan direction, the President's Healthy Forest Initiative, the 10-year Comprehensive Strategy and Implementation Plan, National Wildfire Coordinating Group (NWCG) Guidelines, initiatives of the Wildland Fire Leadership Council, and Interagency Standards for Fire and Fire Aviation Operations. The fire management goals for the refuge are to use prescribed fire, chemical, and manual, and mechanical treatments to:

1. reduce the threat to life and property through hazardous fuels reduction treatments and
2. meet the habitat goals and objectives identified in this CCP.

Fire Management Objective

The purpose of the fire management program is to:

- Ensure public and firefighter safety while protecting property and natural resource values from wildfire.
- Reduce the wildfire impacts to all resource management activities. Reduce the threats associated with accumulations of hazardous fuel loads in marsh and woodland habitats.
- Provide and enhance and protect habitats for State and federally endangered and threatened species and species of special concern.
- Provide, maintain, enhance, and protect feeding, resting, nesting, and brood habitat that meet the requirements of migratory waterfowl, other migratory birds, and resident wildlife.
- Maintain health and vigor of marsh vegetation.
- Facilitate the control of invasive and exotic species.
- Increase habitat diversity in refuge woodland habitats.
- Demonstrate and educate the public about the role and benefits of wildland fire protection and prescribed fire use in natural resource management.

- Maintain current ecosystem diversity within the landscape context, and contribute to the recovery and restoration of the Delaware Bay ecosystem.
- Comply with State Air Quality Implementation Plans to protect public health and the environment.

Strategies

The refuge would use strategies and tactics that consider public and firefighter safety as well as resource values at risk. Wildfire suppression, prescribed fire, chemical, manual and, mechanical treatment methods, along with timing and monitoring are described in more detail within the step-down FMP.

Prescribed fire burn plans would be developed for specific sites following the interagency Prescribed Fire Planning and Implementation Procedures Reference Guide (2008) template.

Prescribed fire temporarily reduces air quality by diminishing visibility and releasing components through combustion. The refuge would meet the Clean Air Act emission standards by adhering to the New Jersey Air Quality requirements during all prescribed fire activities.

Fire Management Organization, Contacts, and Cooperation

Fire management technical oversight for the refuge has been established in Region 5 of the Service, using the fire management zone approach. Under this approach, fire management staff has been determined by established modeling systems based on fire management workload of a group of refuges and possibly interagency partners. The fire management workload consists of historical wildfire suppression activities as well as past hazard fuels treatments. At this time, Supawna Meadows NWR is within a fire management zone, which includes all the national wildlife refuges in New York, Pennsylvania, and New Jersey. The primary fire management staffing and support equipment are located at Wallkill River National Wildlife Refuge. Depending upon budgets and the qualifications of personnel assigned to Supawna Meadows NWR, fire qualified individuals may be available at the refuge in the future. All fire management activities are conducted in a coordinated and collaborative manner with the refuge and other Federal and non-Federal partners. The fire management zone has also developed a close working relationship with the New Jersey Forest Fire Service and regularly works jointly on fire projects. Initial attack of any wildfire is carried out by the New Jersey Forest Service and Salem County Fire Companies under cooperative agreements in place among the agencies.

Appendix G



Beth Goldstein/USFWS

Marsh Habitat on Supawna Meadows NWR

Application of Sea Level Affecting Marshes Modes (SLAMM 5.1) to Supawna Meadows NWR

Application of the Sea Level Affecting Marshes Model (SLAMM 5.1) to Supawna Meadows NWR

Prepared For: Dr. Brian Czech, Conservation Biologist

U. S. Fish and Wildlife Service
National Wildlife Refuge System
Division of Natural Resources and Conservation Planning
Conservation Biology Program
4401 N. Fairfax Drive - MS 670
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December 18, 2009

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Application of the Sea Level Affecting Marshes Model (SLAMM 5.1) to Supawna Meadows NWR

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INTRODUCTION

Tidal marshes are among the most susceptible ecosystems to climate change, especially accelerated sea level rise (SLR). The International Panel on Climate Change (IPCC) Special Report on Emissions Scenarios (SRES) suggested that global sea level will increase by approximately 30 cm to 100 cm by 2100 (IPCC 2001). Rahmstorf (2007) suggests that this range may be too conservative and that the feasible range by 2100 could be 50 to 140 cm. Pfeffer et al. (2008) suggests that 200 cm by 2100 is at the upper end of plausible scenarios due to physical limitations on glaciological conditions. Rising sea level may result in tidal marsh submergence (Moorhead and Brinson 1995) and habitat migration as salt marshes transgress landward and replace tidal freshwater and Irregularly Flooded marsh (Park et al. 1991).

In an effort to address the potential effects of sea level rise on United States national wildlife refuges, the U. S. Fish and Wildlife Service contracted the application of the SLAMM model for most Region 5 refuges. This analysis is designed to assist in the production of CCPs for each refuge along with other long-term management plans.

MODEL SUMMARY

Changes in tidal marsh area and habitat type in response to sea level rise were modeled using the Sea Level Affecting Marshes Model (SLAMM 5.0) that accounts for the dominant processes involved in wetland conversion and shoreline modifications during long-term sea level rise (Park et al. 1989; www.warrenpinnacle.com/prof/SLAMM).

Successive versions of the model have been used to estimate the impacts of sea level rise on the coasts of the U.S. (Titus et al., 1991; Lee, J.K., R.A.Park, and P.W. Mausel. 1992; Park, R.A., J.K. Lee, and D. Canning 1993; Galbraith, H., R. Jones, R.A. Park, J.S. Clough, S. Herrod-Julius, B. Harrington, and G. Page. 2002; National Wildlife Federation et al., 2006; Glick, Clough, et al. 2007; Craft et al., 2009).

Within SLAMM, there are five primary processes that affect wetland fate under different scenarios of sea level rise:

- **Inundation:** The rise of water levels and the salt boundary are tracked by reducing elevations of each cell as sea levels rise, thus keeping mean tide level (MTL) constant at zero. The effects on each cell are calculated based on the minimum elevation and slope of that cell.
- **Erosion:** Erosion is triggered based on a threshold of maximum fetch and the proximity of the marsh to estuarine water or open ocean. When these conditions are met, horizontal erosion occurs at a rate based on site-specific data.
- **Overwash:** Barrier islands of under 500 meters width are assumed to undergo overwash during each 25-year time-step due to storms. Beach migration and transport of sediments are calculated.
- **Saturation:** Coastal swamps and fresh marshes can migrate onto adjacent uplands as a response of the fresh water table to rising sea level close to the coast.
- **Accretion:** Sea level rise is offset by sedimentation and vertical accretion using average or site-specific values for each wetland category. Accretion rates may be spatially variable within a given model domain.

SLAMM Version 5.0 was developed in 2006 and 2007 and based on SLAMM 4.0. SLAMM 5.0 provides the following refinements:

- The capability to simulate fixed levels of sea level rise by 2100 in case IPCC estimates of sea level rise prove to be too conservative.
- Additional model categories such as “Inland Shore,” “Irregularly Flooded (Irregularly Flooded) Marsh,” and “Tidal Swamp.”
- *Optional.* In a defined estuary, salt marsh, Irregularly Flooded marsh, and tidal fresh marsh can migrate based on changes in salinity, using a simple though geographically realistic salt wedge model. This optional model was not used in this model application.

Model results presented in this report were produced using SLAMM version 5.0.1, which was released in early 2008 based on only minor refinements to the original SLAMM 5.0 model. Specifically, the accretion rates for swamps were modified based on additional literature review. For a thorough accounting of SLAMM model processes and the underlying assumptions and equations, please see the SLAMM 5.0.1 technical documentation (Clough and Park, 2008). This document is available at <http://warrenpinnacle.com/prof/SLAMM>.

All model results are subject to uncertainty due to limitations in input data, incomplete knowledge about factors that control the behavior of the system being modeled, and simplifications of the system (CREM 2008).

SEA LEVEL RISE SCENARIOS

SLAMM 5 was run using scenario A1B from the SRES – mean and maximum estimates. The A1 scenario assumes that the future world includes very rapid economic growth, global population that peaks in mid-century and declines thereafter, and the rapid introduction of new and more efficient technologies. In particular, the A1B scenario assumes that energy sources will be balanced across all sources. Under the A1B scenario, the IPCC WGI Fourth Assessment Report (IPCC, 2007) suggests a likely range of 0.21 to 0.48 meters of sea level rise by 2090-2099 “excluding future rapid dynamical changes in ice flow.” The A1B-mean scenario that was run as a part of this project falls near the middle of this estimated range, predicting 0.40 meters of global sea level rise by 2100.

The latest literature (Chen et al., 2006; Monaghan et al., 2006) indicates that the eustatic rise in sea levels is progressing more rapidly than was previously assumed, perhaps due to the dynamic changes in ice flow omitted within the IPCC report’s calculations. A recent paper in the journal *Science* (Rahmstorf, 2007) suggests that, taking into account possible model error, a feasible range by 2100 might be 50 to 140 cm. This work was recently updated and the ranges were increased to 75 to 190 cm (Vermeer and Rahmstorf, 2009). Pfeffer et al. (2008) suggests that 2 meters by 2100 is at the upper end of plausible scenarios due to physical limitations on glaciological conditions. A recent US intergovernmental report states; “Although no ice-sheet model is currently capable of capturing the glacier speedups in Antarctica or Greenland that have been observed over the last decade, including these processes in models will very likely show that IPCC AR4 projected sea level rises for the end of the 21st century are too low.” (US Climate Change Science Program, 2008) A recent paper by Grinsted et. al (2009) states that “sea level 2090-2099 is projected to be 0.9 to 1.3 m for the A1B scenario, with low probability of the rise being within Intergovernmental Panel on Climate Change (IPCC) confidence limits.”

To allow for flexibility when interpreting the results, SLAMM was also run assuming 1 meter, 1½ meters, and 2 meters of eustatic sea level rise by the year 2100. The A1B- maximum scenario was scaled up to produce these bounding scenarios (figure G-1).

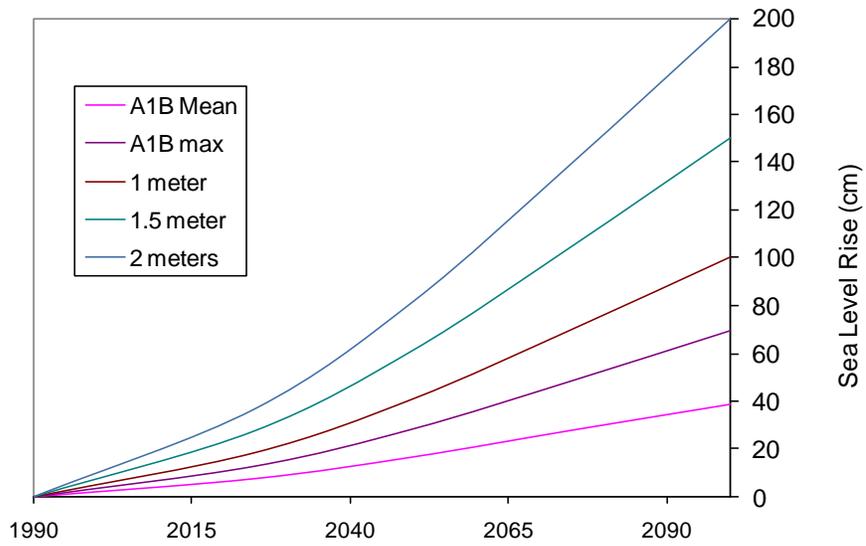


Figure G-1: Summary of Sea Level Rise Scenarios Utilized

Additional information on the development of the SLAMM model is available in the technical documentation, which may be downloaded from the SLAMM Web site (Clough and Park, 2008).

METHODS AND DATA SOURCES

The digital elevation map (DEM) used in this model simulation was derived from a 2007 LiDAR coverage produced by the USGS and New Jersey Department of Environmental Protection (Figure G-2). The LiDAR DEM was provided to us exclusively within the NWR boundaries, with contextual results based on 10 foot contour USGS topographical DEMs.

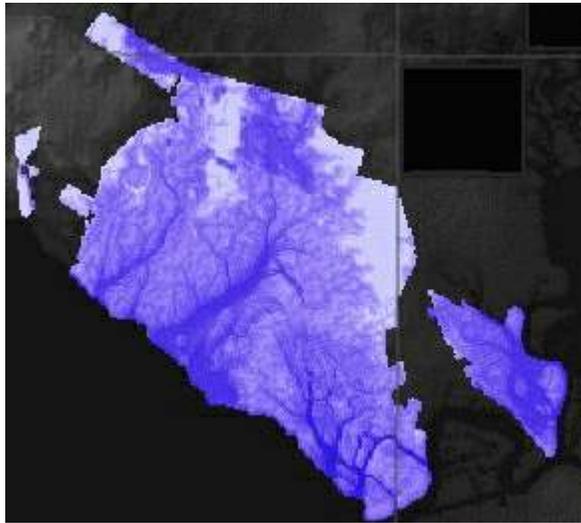


Figure G-2: LiDAR coverage map (blue) of Supawna Meadows NWR.

The diurnal range of tide (GT) for Supawna Meadows NWR was estimated at 1.78 m based on two NOAA gages (8551910, Reedy Point, DE; 8551762, Delaware City, DE). These gages were in close agreement measuring ranges of 1.779 meters and 1.786 meters.



Figure G-3: NOAA Gage Relevant to the Study Area.

The historic trend for sea level rise was estimated 3.46 mm/year using the nearest NOAA gage (Reedy Point, Delaware, 8551910). The estimated rate of sea level rise for this refuge is roughly 1.7 mm/year greater than the global average for the last 100 years (approximately 1.7 mm/year). This difference in relative sea level rise is maintained throughout all model projections.

The National Wetlands Inventory for Supawna Meadows is based on photo dates of 1999. Comparing this polygon coverage to current satellite photos, there appears to be a slight but pervasive shift throughout the NWI coverage of around 30 meters due to either horizontal uncertainty or shoreline change (figure G-4).



Figure G-4: National Wetlands Inventory layer over current satellite imagery.

Converting the NWI survey into 30-meter cells indicates that the approximately 4,500- acre refuge (approved acquisition boundary including water) is composed of the categories as shown below:

Irreg. Flooded Marsh	46.4%
Dry Land	22.2%
Estuarine Open Water	15.5%
Tidal Swamp	10.7%
Tidal Fresh Marsh	1.5%
Inland Open Water	1.2%

There are several diked or impounded wetlands in Supawna Meadows NWR according to the National Wetlands Inventory classifications.

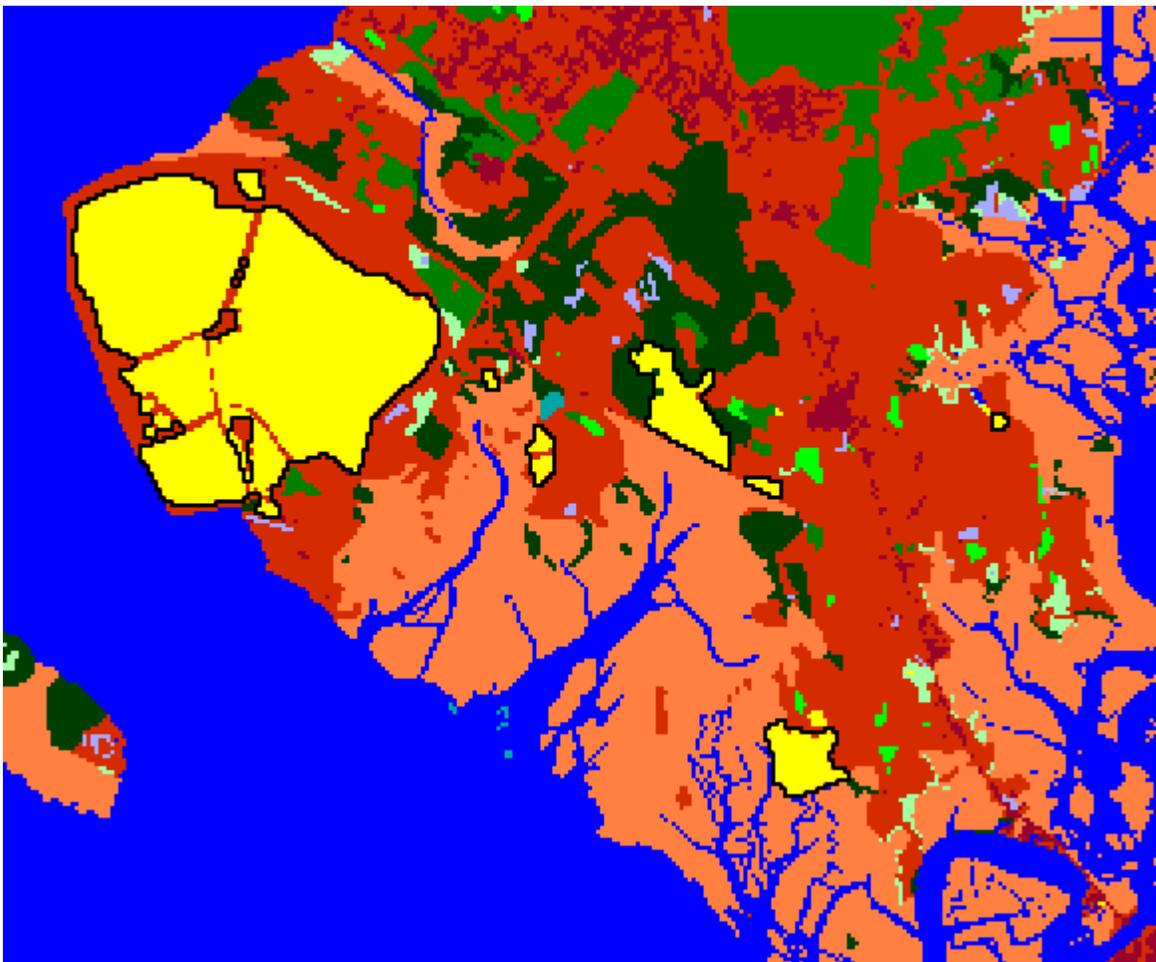


Figure G-5: Diked areas at Supawna Meadows NWR (yellow areas, bordered by black).

No site-specific marsh accretion data were located for this refuge. The marsh accretion values used were based on a rough average of three different calculations:

- The marsh accretion study located nearest to this study area (Port Mahon DE, Kraft, 1992) measured accretion rates as 4.05 mm/year.
- Based on a large analysis of accretion studies within the mid-Atlantic region (Reed 2008), the average Delaware salt marsh accretion value was calculated at 3.88 mm/yr (n=9).
- Based on data in this same paper (Reed 2008), the average Delaware *estuary* accretion value was calculated at 4.28 mm/yr (n=15).

As these three different estimates are quite similar, accretion rates in regularly flooded marshes were set to 4 mm/year, irregularly flooded marshes to 4 mm/year and tidal fresh were also set to 4 mm/year.

The MTL to NAVD88 correction was derived using the NOAA VDATUM modeling product. The correction was estimated at -0.036 meters which closely matches data available at a nearby NOAA gage (8551910, Reedy Point).

Modeled U.S. Fish and Wildlife Service refuge boundaries for New Jersey are based on Approved Acquisition Boundaries as published on the FWS National Wildlife Refuge Data and Metadata Web site. The cell-size used for this analysis was 30 meter by 30 meter cells. Additionally, the SLAMM model will track partial conversion of cells based on elevation and slope.

Heidi Hanlon of Supawna Meadows National Wildlife Refuge located the LiDAR DEM that was utilized in simulation modeling.

Marsh erosion rates for this refuge were set to two horizontal meters per year based on long-term measurements of coastal erosion rates in Delaware as presented in Kraft 1992.

Based on site-specific LiDAR elevation data (and also LiDAR elevation data from other sites) the allowed elevation ranges for tidal swamp and tidal fresh marsh were altered slightly. The SLAMM 5 conceptual model has traditionally assumed that these categories are all located above the salt boundary due to their “fresh” designation. Recent experience with the model in several sites with LiDAR data indicates that the presence of fresh water allows these categories to extend well below mean high higher water. Based on the LiDAR at this location, the minimum elevation for tidal swamp was set to 0.32 and the minimum elevation for tidal fresh marsh was set to 0.42 half-tide units. (One half-tide unit is half of the diurnal range of tide or 0.5 GT.)

SUMMARY OF SLAMM INPUT PARAMETERS FOR SUPAWNA NWR

Parameter Description	Global NJ	SubSite1: Supawna Meadows	SubSite2: Supawna North	SubSite3: Supawna West
NWI Photo Date (YYYY)	1995	1999	1999	1999
DEM Date (YYYY)	1989	2008	2008	2008
Direction Offshore [n,s,e,w]	East	South	North	West
Historic Trend (mm/yr)	3	3.46	3.46	3.46
MTL-NAVD88 (m)	0	-0.036	-0.036	-0.036
GT Great Diurnal Tide Range (m)	1.65	1.78	1.78	1.78
Salt Elev. (m above MTL)	1.45	1.84	1.84	1.84
Marsh Erosion (horz. M /yr)	2	2	2	2
Swamp Erosion (horz. M /yr)	2	2	2	2
T.Flat Erosion (horz. M /yr)	2	2	2	2
Reg. Flood Marsh Accr (mm/yr)	4	4	4	4
Irreg. Flood Marsh Accr (mm/yr)	4	4	4	4
Tidal Fresh Marsh Accr (mm/yr)	4	4	4	4
Beach Sed. Rate (mm/yr)	0.5	0.5	0.5	0.5
Freq. Overwash (years)	25	25	25	25
Use Elev Pre-processor [True,False]	TRUE	FALSE	FALSE	FALSE

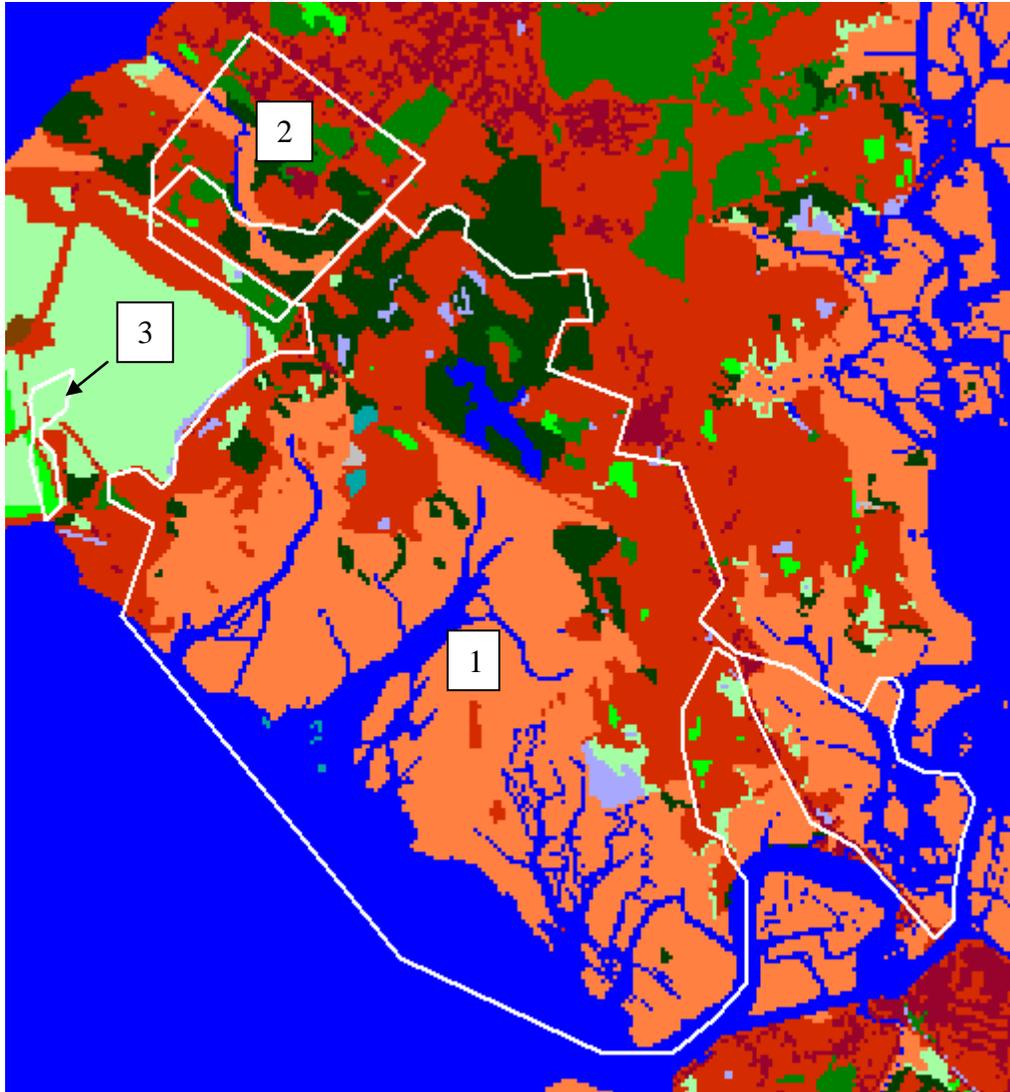


Figure G-6: Input sub-sites for SLAMM analysis of Supawna Meadows NWR.

RESULTS

The predicted effects of global sea level rise on Supawna Meadows NWR are fairly severe. For example, roughly half of the refuge’s dry land is predicted to be lost even in the lowest SLR scenario examined. The refuge is predicted to lose between 49 percent and 88 percent of its dry land across all scenarios.

The model results also show a predicted loss of between 18 percent and 93 percent of irregularly flooded marsh, which currently makes up roughly half of the refuge. Tidal swamps, about 10 percent of the refuge, are predicted to be lost at a rate of 19 percent to 82 percent across all SLR scenarios. Maps presented below illustrate the spatial extent of these predictions.

SLR by 2100 (m)	0.39	0.69	1	1.5	2
Irreg. Flooded Marsh	18%	28%	48%	89%	93%
Dry Land	49%	59%	69%	80%	88%
Tidal Swamp	19%	25%	38%	65%	82%

Predicted Loss Rates of Land Categories by 2100 Given Simulated Scenarios of Eustatic Sea Level Rise

Supawna Meadows NWR
 IPCC Scenario A1B-Mean, 0.39 M SLR Eustatic by 2100

Results in Acres

	Initial	2025	2050	2075	2100
Irreg. Flooded Marsh	2104.7	1805.6	1804.7	1764.4	1718.6
Dry Land	1004.3	665.6	614.1	563.7	517.1
Estuarine Open Water	704.1	858.1	895.5	926.1	951.0
Tidal Swamp	486.2	451.0	425.7	405.5	393.8
Tidal Fresh Marsh	68.7	80.4	81.3	81.9	82.2
Inland Open Water	56.0	36.3	36.0	35.4	35.4
Swamp	41.8	30.2	27.5	24.3	21.3
Inland Fresh Marsh	32.2	24.4	23.9	23.5	23.1
Saltmarsh	15.3	234.7	241.8	277.2	311.0
Dev. Dry Land	13.3	4.4	3.7	3.0	3.0
Tidal Flat	4.4	22.3	6.5	6.6	11.2
Trans. Salt Marsh	0.0	318.4	370.5	419.7	463.7
Total (incl. water)	4531.3	4531.3	4531.3	4531.3	4531.3

Supawna Meadows NWR
 IPCC Scenario A1B-Max, 0.69 M SLR Eustatic by 2100

Results in Acres

	Initial	2025	2050	2075	2100
Irreg. Flooded Marsh	2104.7	1796.6	1748.3	1634.3	1505.3
Dry Land	1004.3	652.3	579.8	503.7	406.8
Estuarine Open Water	704.1	869.7	940.7	1009.8	1102.4
Tidal Swamp	486.2	441.3	408.4	387.8	365.7
Tidal Fresh Marsh	68.7	79.1	80.4	80.8	81.0
Inland Open Water	56.0	36.0	35.4	35.4	33.1
Swamp	41.8	29.2	25.2	20.1	13.8
Inland Fresh Marsh	32.2	24.1	23.3	21.9	20.2
Saltmarsh	15.3	243.9	274.9	357.5	442.3
Dev. Dry Land	13.3	4.2	3.1	2.9	2.7
Tidal Flat	4.4	23.0	12.9	18.1	37.0
Trans. Salt Marsh	0.0	331.9	399.0	459.0	520.9
Total (incl. water)	4531.3	4531.3	4531.3	4531.3	4531.3

Supawna Meadows NWR
 1 Meter Eustatic SLR by 2100

Results in Acres

	Initial	2025	2050	2075	2100
Irreg. Flooded Marsh	2104.7	1781.3	1677.1	1466.1	1098.3
Dry Land	1004.3	635.8	546.1	428.8	313.8
Estuarine Open Water	704.1	884.0	984.8	1106.1	1289.2
Tidal Swamp	486.2	431.0	396.8	368.8	302.1
Tidal Fresh Marsh	68.7	78.7	80.1	80.2	79.0
Inland Open Water	56.0	36.0	35.4	33.6	30.7
Swamp	41.8	28.1	22.8	14.8	7.9
Inland Fresh Marsh	32.2	23.8	22.1	19.8	16.7
Saltmarsh	15.3	256.5	323.6	493.5	821.2
Dev. Dry Land	13.3	3.9	3.0	2.8	1.8
Tidal Flat	4.4	25.4	19.2	34.6	65.1
Trans. Salt Marsh	0.0	346.7	420.4	482.3	505.5
Total (incl. water)	4531.3	4531.3	4531.3	4531.3	4531.3

Supawna Meadows NWR
 1.5 Meters Eustatic SLR by 2100

Results in Acres

	Initial	2025	2050	2075	2100
Irreg. Flooded Marsh	2104.7	1750.8	1531.0	925.4	236.1
Dry Land	1004.3	612.4	487.5	319.5	198.4
Estuarine Open Water	704.1	904.3	1050.9	1296.2	1777.2
Tidal Swamp	486.2	418.5	381.2	300.4	169.9
Tidal Fresh Marsh	68.7	76.8	77.2	73.5	63.8
Inland Open Water	56.0	36.0	34.7	32.7	30.5
Swamp	41.8	26.6	18.5	8.1	3.8
Inland Fresh Marsh	32.2	23.3	20.4	15.6	10.5
Saltmarsh	15.3	283.1	457.5	989.0	1347.7
Dev. Dry Land	13.3	3.6	2.9	1.8	1.6
Tidal Flat	4.4	29.1	28.6	96.4	299.1
Trans. Salt Marsh	0.0	366.8	440.8	472.5	392.9
Total (incl. water)	4531.3	4531.3	4531.3	4531.3	4531.3

Supawna Meadows NWR
 2 Meters Eustatic SLR by 2100

Results in Acres

	Initial	2025	2050	2075	2100
Irreg. Flooded Marsh	2104.7	1717.0	1304.7	318.7	140.1
Dry Land	1004.3	588.6	417.0	236.2	117.1
Estuarine Open Water	704.1	924.1	1134.9	1544.3	2250.6
Tidal Swamp	486.2	407.6	361.9	209.1	86.3
Tidal Fresh Marsh	68.7	76.1	76.2	64.6	55.0
Inland Open Water	56.0	35.6	33.6	30.5	30.2
Swamp	41.8	25.2	14.0	4.6	1.2
Inland Fresh Marsh	32.2	22.5	18.1	10.9	9.6
Saltmarsh	15.3	315.1	665.2	1525.9	761.3
Dev. Dry Land	13.3	3.2	2.8	1.7	0.8
Tidal Flat	4.4	32.6	59.9	189.8	829.7
Trans. Salt Marsh	0.0	383.8	442.9	395.1	249.3
Total (incl. water)	4531.3	4531.3	4531.3	4531.3	4531.3

DISCUSSION

Supawna Meadows NWR is predicted to show effects of SLR under even the most conservative SLR scenarios utilized. However, as shown in the chart below, loss rates become increasingly severe as predicted SLR increases.

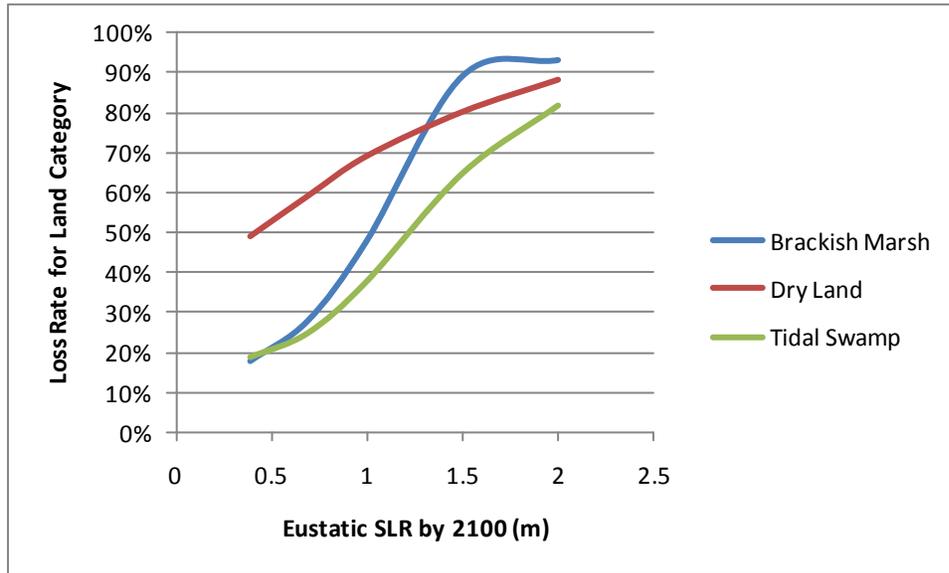


Figure G-7. Loss rates of primary NWR land-cover categories as a function of sea-level rise

When marsh accretion rates are unable to keep up with predicted local SLR, Irregularly Flooded marsh is predicted to first convert to regularly flooded marsh (saltmarsh). If this regularly flooded marsh falls to too low of an elevation to maintain itself, it is then predicted to convert to tidal flats and eventually to open water. Dry land, when it falls to an elevation range that suggests regular inundation, is predicted to convert to “transitional marsh.” Although significant irregularly flooded marsh conversion is predicted in eustatic scenarios of less than one meter, total refuge marsh acreage (including salt marsh, and transitional marsh) is predicted to increase due primarily to the conversion of dry lands. However, under the highest SLR scenario utilized, 50 percent of total marsh acreage is predicted to be lost.

As shown above, there are some shifts visible between the latest National Wetland Inventory data and current satellite photos. This likely means that some of the change predicted under lower scenarios is a result of change that has already occurred, or horizontal data uncertainty.

This site was entirely covered with high-vertical-resolution LiDAR data which reduces model uncertainty considerably. However, how refuge marshes will respond to SLR and their potential to vertically accrete at a higher rate is uncertain. These model results assume that historically measured accretion rates will continue for the next 100 years. Additionally, no site-specific accretion data were available, further exacerbating the uncertainty caused by the accretion assumptions within the model.

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Appendix H



Ryan Haggerty/USFWS

Northern Diamondback Terrapin

Summary of Public Comments and Service Responses on the Draft Comprehensive Conservation Plan and Environmental Assessment for Supawna Meadows NWR

Summary of Public Comments and Service Responses on the Draft Comprehensive Conservation Plan and the Environmental Assessment for Supawna Meadows National Wildlife Refuge

July 2011

Introduction

In September 2010, the U.S. Fish and Wildlife Service (Service, we, our) completed the Supawna Meadows National Wildlife Refuge (NWR) Draft Comprehensive Conservation Plan and Environmental Assessment (draft CCP/EA). That document outlines three alternatives for managing the refuge over the next 15 years and identifies alternative B as the “Service-preferred Alternative.” We released the draft CCP/EA for 30 days of public review and comment from September 27, 2010 to October 27, 2010.

We evaluated all the letters, electronic mail, and phone calls we received during that comment period, along with comments recorded in our two public meetings. This document summarizes the substantive comments we received and provides our responses to them. Based on our analysis in the draft CCP/EA and our evaluation of comments, we modified alternative B and recommended it to our Regional Director for implementation. It is that modified alternative B which is detailed in this final CCP. Our modifications include additions, corrections, or clarifications of our preferred management actions. We have also determined that none of those modifications warrants our publishing a revised or amended draft CCP/EA before publishing the CCP.

These are some important changes we made to the final CCP:

Under chapter 4

1. We inserted language discussing the potential for including a black bear hunt if New Jersey State regulations are changed to accommodate hunting this species at Supawna Meadows NWR (see General Refuge Management).
2. We inserted language clarifying changes to hunting safety zones and hunting closure signs (see goal 4, objective 4.1).
3. Goal 2, objective 2.3 was inadvertently excluded from the text in alternative B of the draft CCP/EA, but was included in table 3.5, Summary comparison of management actions by alternative. We did not receive any comments on this aspect of alternative B during the public comment period. We restored this objective in the final CCP.

Appendix A

1. We corrected and updated appendix A, Species of Conservation Concern on or near Supawna Meadows NWR.

Our Regional Director will either select alternative B for implementation, or one of the other two alternatives analyzed in the draft CCP/EA, or a combination of actions from among the three alternatives. He will also determine whether a Finding of No Significant Impact (FONSI) is justified prior to finalizing his decision. He will make his decision after:

- Reviewing all the comments received on the draft CCP/EA, and our response to those comments; and,

- Affirming that the CCP actions support the purpose and need for the CCP, the purposes for which the refuge was established, help fulfill the mission of the National Wildlife Refuge System (Refuge System), comply with all legal and policy mandates, and work best toward achieving the refuge's vision and goals.

Concurrent with release of the approved CCP, we will publish a notice of the availability in the *Federal Register*. That notice completes the planning phase of the CCP process, and we can begin its implementation phase.

Summary of Comments Received

During the comment period, we received 11 sets of responses, both written and oral. We gathered oral comments at the following 2 public meetings attended by about 20 people:

October 12, 2010, 2-4 pm and 6-8 pm at the Sgt. W.T. Whitaker V.F.W. Post 1952, 171 S. Broadway, Pennsville, New Jersey 08070.

We received written comments, including electronic mail and post, from six people. We received comments from one person via telephone. We received a letter from the New Jersey Division of Fish and Wildlife with comments included below. We received electronic mail from New Jersey Historic Preservation Office concurring with the draft CCP/EA, and we received comments from The Friends of Supawna Meadows.

In the discussions below, we address every substantive comment received during the comment period. Comments were organized by subject. Directly beneath each subject heading, you will see a list of unique letter ID numbers that correspond to the person, agency, public meeting, or organization that submitted the comment. In some cases, one person may have submitted a comment more than once (public meeting, email, written letter, or telephone). The cross-referenced list appears as attachment 1 to this appendix.

In our responses, we may refer the reader to other places in this document or the draft CCP/EA where we address the same comment. In some instances, we refer to specific text in the draft CCP/EA and indicate how the CCP was changed in response to comments. There are several options for obtaining the full versions of the draft CCP/EA or the final CCP. They are available online at: <http://www.fws.gov/northeast/planning/SupawnaMeadows/ccphome.html>.

For a CD-ROM or a print copy, contact the refuge headquarters:

Supawna Meadows National Wildlife Refuge
c/o Cape May National Wildlife Refuge
24 Kimbles Beach Road
Cape May Court House, NJ 08210
Phone: (609) 463-0994
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Service Responses to Comments by Subject

Resource Management

Habitat Management

(Letter ID#: 1, 2, 3, 4, 6)

Comment: A few commenters asked if we were planning any grassland and early successional habitat management to benefit species like bobolink. One commenter asked if we were planning to re-introduce any species that use this habitat like bobwhite and American woodcock.

Response: The refuge manages habitat to best meet the needs of wildlife species. Bobolink is identified as a species of concern for the refuge in appendix A of both the draft CCP/EA and the final CCP. As described in the final CCP, we will manage for grassland habitat as stated in goal 2, objective 2.1, which will provide habitat for bobolink. We will also manage for early successional scrub/shrub habitat as stated in goal 2, objective 2.2, providing habitat for American woodcock. Bobwhite quail were not identified as a species of conservation concern on the refuge, so this species is not specifically addressed in our habitat management. However, the management of grassland and early successional scrub/shrub habitats will also benefit quail. Regarding species introduction, the Service typically addresses species population management through habitat enhancement rather than stocking. Only in extreme situations, typically when species are endangered or at risk of extinction, do refuges actively stock wildlife on refuges.

Comment: One person commented that habitat management for black ducks and other species should be emphasized.

Response: We appreciate support for habitat management that benefits American black duck and other species that use the refuge. As described in chapter 1 of the draft CCP/EA and the final CCP, two of the refuge's establishing purposes identify migratory birds, including waterfowl, as a priority for this refuge. As stated in chapter 4 of the final CCP, we will emphasize protecting and restoring native tidal marsh to benefit colonial-breeding wading birds, marsh birds, migratory waterfowl (including black ducks), shorebirds, and other birds of conservation concern. We will manage for tidal marsh habitat as stated in goal 1, objective 1.1, providing habitat for migrating and wintering waterfowl; freshwater impoundments as stated in goal 3, objective 3.3, providing habitat for waterfowl; and forested wetlands as stated in goal 3, objective 3.4, providing habitat for wood ducks.

Comment: One comment does not support opening previously closed areas because of the need for "rest area" for waterfowl.

Response: As required under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee) as amended by the National Wildlife Refuge System Improvement Act (Public Law 105-57) (16 USC 668dd(d)(1)(A)), we will continue to provide an "inviolate sanctuary" on at least 60 percent of refuge lands. Under the final CCP, the waterfowl hunt area will be reconfigured to focus fishing and waterfowl hunting in the central portion of the refuge (see chapter 4, goal 4.1, and map 4.2 in the final CCP), leaving the majority of the refuge undisturbed by these uses. As discussed in the Compatibility Determination for White-tailed Deer Archery Hunt presented in appendix B, we expect minimal disturbance to wildlife associated with this activity since bow hunting is generally a solitary sport and hunters are distributed across the refuge. If we decide to open the refuge to a deer hunt with firearms, we will complete additional analyses to assess potential effects on waterfowl and other wildlife.

Comment: One commenter suggested that the refuge needs to re-evaluate the current methods of tidal marsh restoration, suggesting that restoration should incorporate active revegetation rather than relying on passive regeneration from the existing seed bank.

Response: Goal 1, objective 1.1 identifies the need to restore tidal marsh habitat. The CCP does not go into the specificity of restoration methods including regeneration. Specifics as to how we will pursue restoration of native tidal marsh will be addressed in the step-down Habitat Management Plan (HMP) that will be developed after the CCP is finalized. We will use an integrated approach to phragmites control and develop an Adaptive Management Framework, and will consider this comment as we develop the HMP.

Comment: One commenter expressed concern about the decline in deer numbers this year, asked when the last deer count was performed, and indicated his concern over epizootic hemorrhagic disease (EHD).

Response: Currently, the refuge does not conduct deer counts at Supawna Meadows NWR. The New Jersey Division of Fish and Wildlife does not conduct deer counts either, instead it collects data from a representative sample of deer harvested in the various hunting seasons each year. The data collected provide the necessary information to assess the health of the deer herd and the quality of the habitat throughout the state. These data also provide information to successfully manage New Jersey's thriving deer herd, keeping it in balance with the changing landscape of the state. At this time, there is no indication that the health of the state or regional deer population is at risk.

Comment: One commenter requested clarification on what the species of concern were for the refuge or in the area.

Response: The primary species that are the focus of conservation for the final CCP are Pea Patch Island colonial-breeding wading birds, secretive marsh birds, migratory waterfowl, shorebirds, and other birds of conservation concern. We have developed a more detailed list of species of concern for Supawna Meadows NWR, please refer to appendix A in the draft CCP/EA and final CCP.

Comment: One commenter was ethically opposed to control (e.g., trapping) of any bird or mammal on the refuge including feral cats, muskrat, mute swans, Canada geese, snow geese, and beaver.

Response: In chapter 3 of the draft CCP/EA, Actions Common to Alternatives A and B, we explain the importance of controlling animal pests as they cause habitat destruction and degradation, water quality degradation, erosion, disease, mortality to native wildlife, threaten public safety, and interfere with management objectives.

Comment: One commenter opposed the use of prescribed burns on the refuge because of the cost to taxpayers and the potential for fires getting out of control.

Response: Fuel reduction may be achieved by various methods, each requiring a cost to taxpayers. In addition to fuel reduction, prescribed burns benefit wildlife and their habitat in many ways. Fire releases nitrogen and other nutrients into the soil, which encourages growth of a variety of beneficial plants. It also creates habitat diversity for wildlife, enhances plant growth, and reduces fuel buildup (e.g., dead grasses, twigs, and wood that accumulate on the soil). Fire is also used to control undesirable plants and to maintain habitats, such as grasslands. Prescribed burns are regulated by strict guidelines. Prescribed Burn Plans are written, reviewed, and approved by trained wildland firefighters for each planned burn. The plans dictate the conditions that will permit burning activity and are designed to ensure safe burn operations. In the review, requirements for air temperature, wind speed, wind direction, and humidity, among others, are determined. Additionally, the number of firefighters and pieces of fire equipment needed to oversee the burn are stated. A prescribed burn only takes place if all conditions of the plans are

met. Safety of the firefighters and protection of any nearby property are the top priorities. Refer to appendix F, Fire Management Program Guidance for more detailed information.

Impoundment Management
(Letter ID#: 2, 3, 4)

Comment: One commenter requested information on the long range plans for the impoundments off Lighthouse Road.

Response: We will manage freshwater impoundments to provide habitat for as stated in chapter 4, goal 3, and objective 3.3 of the final CCP. As stated under this objective, we will evaluate each impoundment for the potential for restoring or reverting to natural hydrology and we will participate in a Structured Decision-Making Process to determine its conservation value.

Comment: Two commenters asked who determines the water level for impoundments and requested if the impoundment levels could be changed currently due to concern over flooding in neighborhood properties. There was also concern expressed that impoundments were causing increased spread of invasive species and not providing habitat for migratory waterfowl.

Response: Chapter 3, alternative A, goal 3, objective 3.3 in the draft CCP/EA describes the current management of the impoundments. Currently, refuge staff determines water levels for impoundments. Because staff are located so far from the refuge, we are not actively managing water levels. Until the public comment period for the draft CCP/EA, we were unaware of flooding to any neighbors or an increase of invasive species. Refuge staff has been controlling various invasive species every year, but cannot treat all areas. As stated in alternative B (chapter 3, goal 3, objective 3.3) of the draft CCP/EA and in chapter 4, goal 3, objective 3.3 of the final CCP, we intend to manage the impoundments to provide habitat for migratory waterfowl contingent on sufficient staff and funding. Over the course of the plan, we will work with hydrologists, other biologists, and technical experts and partners as needed to determine the best way to manage or remove each impoundment in light of climate change and other factors. We have already requested to have the regional hydrologist visit the refuge and evaluate the impoundments but have not scheduled a site visit yet.

Comment: One commenter opposed impoundment management because of its contradiction in issues of climate change and extreme weather events.

Response: As stated in chapter 4, goal 3, objective 3.3 of the final CCP, we agree that as sea level rises, management and maintenance of coastal wetland impoundments will become increasingly challenging and expensive. We will continue to study the feasibility of whether or not to continue individual impoundment management. Refer to chapter 3 of this document for additional information on climate change and effects of relative sea level rise and appendix G for the application of the Sea Level Affecting Marshes Model (SLAMM) analysis for the refuge.

Water Quality
(Letter ID#: 2, 6)

Comment: One commenter noted that the refuge should be managed for drinking water, not just tidal marsh habitat.

Response: As stated in chapter 4 of the draft CCP, Water Quality and Aquatic Species Impacts, we recognize that good water quality is essential to sustaining healthy ecosystems. As stated in this section, we believe that our management practices on the refuge and our projects partnering with local communities and conservation organizations continue to benefit water quality, including drinking water,

on the refuge, in area wells, and in the Delaware River Basin. Refuge habitats filter impurities in water and provide cleaner water and habitats. We will continue to comply with all applicable Federal, State, and local water quality requirements. Please see chapter 4 of the draft CCP/EA, Water Quality and Aquatic Species Impacts for a more detailed discussion of water quality effects associated with refuge activities.

Comment: A few commenters were concerned about the use of herbicides and pesticides on the refuge and possible infiltration into the drinking water of local wells. One commenter requested that the neighbors be notified before spraying any pesticide or herbicide so they could refrain from using well water for a few days.

Response: As stated above, we recognize that good water quality is essential to sustaining healthy ecosystems. As we discuss in chapter 4 of the final CCP, Managing Invasive Plants, integrated pest management procedures are used when determining the best method for controlling pests on the refuge. Where herbicides and pesticides are determined the best management procedure to be used, a Pesticide Use Proposal is written and reviewed to determine if the chemical is safe (for people, plants, and wildlife) to use at that location. Various parameters, including location and depth of wells and groundwater, soil condition, slope, etc., are used in determining the appropriateness of using a chemical at each location. If deemed safe and appropriate, we may apply herbicides using a variety of techniques including hand spraying, aerial spraying (via planes), and spraying from motorized vehicles. Neighbors are notified before aerial spraying occurs. Due to the makeup of the products currently used at the refuge, drinking water is not affected. The chemicals break down quickly and are filtered out of the water column or are bound to organic content in soils before getting to any wells. Please see chapter 4 of the draft CCP/EA, Water Quality and Aquatic Species Impacts for a more detailed discussion of water quality effects associated with refuge activities.

Invasive Species **(Letter ID#: 1, 3, 4, 9)**

Comment: One commenter was concerned about phragmites management and requested information about how many acres have been sprayed and if there is reoccurring growth.

Response: Recently, we have focused phragmites control efforts at the refuge on a 500-acre block of tidal marsh northwest of Mill Creek. On average, 100 acres are sprayed per year in this block. Growth of phragmites is reoccurring; however, native plants have also reestablished in this area as a result of the control efforts. We will develop an Adaptive Management Framework for monitoring and evaluating effectiveness of phragmites control and will use an integrated approach for control using tools as they are developed. Please refer to chapter 4, goal 1, objective 1.1 of the final CCP for more information on current strategies used in phragmites control.

Comment: One commenter suggested that the refuge use a “dike or sluice to flood the area around the observation deck for phragmites control” so that the observation area would provide better waterfowl habitat and viewing opportunities.

Response: Chapter 1 of the draft CCP/EA and the final CCP provides the mission of the Service and Refuge System, purposes of the refuge, appropriate refuge uses policy, compatibility policy, and various other policies that guide refuge decisions. As described in chapter 1, the Service has developed a policy on Maintaining Biological Integrity, Diversity, and Environmental Health (601 FW 3). This policy provides guidance on evaluating the best management direction to prevent the additional degradation of environmental conditions and to restore lost or severely degraded environmental components. To implement this policy, it directs us to eliminate artificial features, such as a dike or sluice, and processes where appropriate and feasible. Also, as mentioned in our response to a comment above on

impoundment management, management and maintenance of coastal wetland impoundments will become increasingly challenging and expensive with projected sea level rise. For these reasons, we are not planning to construct any additional impoundments, dikes, or water control structures. Phragmites is being controlled on portions of the marsh near the observation deck by hand and aerial spraying. Unfortunately, phragmites was not recently sprayed in front of the deck. Future control efforts may include phragmites control in front of the observation deck which would allow the regeneration of native plants in this area.

Comment: There was similar concern about mile-a-minute weed and that the weevil release appears minimally effective. One commenter suggested that the refuge should spray herbicide regularly to control or eradicate this species.

Response: Various methods are used to control invasive plants on the refuge. The current method used by the refuge to control mile-a-minute is the Asian weevils. The refuge will continue to work with the New Jersey Department of Agriculture as studies and results become available. The refuge may consider using herbicides in the future. Integrated pest management procedures are used when determining the best method for controlling pests on the refuge. For more information, refer to chapter 4, Managing Invasive Plants, and goal 2, objective 2.3, Upland Forest Habitat, in the final CCP.

Comment: One commenter was opposed to the use of pesticides and herbicides because of the concern for possible effects on birds.

Response: Herbicides used on the refuge are not known to affect birds. The Service strives to protect birds and provide quality habitat; therefore, we would not use a product that had a negative effect on birds. Please refer to our response to the first comment in the Water Quality section above, and chapter 4 in the draft CCP/EA for a more thorough discussion of effects of pesticide and herbicide use on the refuge.

Comment: The New Jersey Division of Fish and Wildlife strongly supports the restoration of native saltmarsh vegetation and the active control of the invasive plant, *Phragmites spp.*, as outlined in alternative B, chapter 3.

Response: Thank you, we appreciate your support in this effort.

Public Use and Access

Public Use (see also Hunting and Fishing) **(Letter ID#: 1, 2, 5, 9)**

Comment: One commenter asked if there was a way to record current visitation/public use on the refuge.

Response: There are several ways to try and measure visitation, for example installing vehicle counter at entrances, conducting periodic visual counts of visitors, and installing pedestrian counters at trail entrances. Without dedicated staff at the refuge, it is difficult for us to maintain counting equipment or conduct visual counts. Currently, we estimate refuge visitation at Supawna Meadows NWR using our best professional judgment. We have no plans to institute a more formal measurement of public use at this time.

Comment: One commenter asked the refuge to maintain, or to allow neighbors bordering the refuge to maintain, a cleared area on refuge lands bordering private property. The commenter stated that keeping this area mowed would improve visibility and minimize potential conflicts between wildlife (for example, coyotes) using the refuge and the neighboring properties.

Response: As established in the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd) as amended by the National Wildlife Refuge System Improvement Act (Public Law 105-57), “wildlife and wildlife conservation must come first” on Refuge System lands. Habitat loss and fragmentation are major causes of declines in wildlife populations in New Jersey, the region, and the nation. Maintaining a mowed or cleared buffer area would increase the disturbance to wildlife on the refuge and would decrease the available habitat for wildlife on the refuge. For these reasons, we do not plan to allow or maintain a mowed or cleared buffer area on refuge property.

Comment: One commenter requested that refuge staff post signs to warn visitors about the length and rough terrain at Xmas Tree Lane Trail.

Response: Refuge staff has not received any complaints or comments on this trail in the past. This trail is a wooded trail, typical of many in the area. Unfortunately, with limited resources and time, it is likely that the trail does become somewhat overgrown at times. We do have standard trail head signs, along with some signs indicating which activities are prohibited (i.e., no ATVs, etc.) posted at this location. Our intent has always been to properly maintain all our trails. If we notice, or are notified, that a trail is not safe, we make every effort to perform whatever maintenance or correction is required.

Comment: Two commenters wished to know more about the rules for dogs on the refuge and the restrictions for pets.

Response: The Refuge System Administration Act, as amended by the Refuge Improvement Act, identifies six priority public uses: hunting, fishing, wildlife observation and photography, and environmental education and interpretation. These uses are to receive enhanced consideration on refuges. Allowing access for dogs and other pets is not one of the priority public uses. As discussed in appendix B of the draft CCP/EA and final CCP, dog walking (on or off leash) has been found to be not appropriate at Supawna Meadows NWR. Dogs are therefore not allowed on refuge trails or in refuge facilities. Horseback riding has also been found to be not appropriate at Supawna Meadows NWR. Please see appendix B in this document or the draft CCP/EA for our justifications on why dog walking and horseback riding have been found not appropriate at the refuge. The Service has not received requests to allow other domesticated animals or pets on the refuge. Prior to authorizing access by these animals, Service policy (603 FW 1) requires us to complete a Finding of Appropriateness. If we find the use appropriate, the Refuge System Administration Act requires we complete a Compatibility Determination.

Comment: One commenter opposed the partnership with New Jersey Audubon and their ability to lead tours and charge money on land paid for by taxpayers (refuge land).

Response: The guided tours offered by New Jersey Audubon help facilitate wildlife observation, photography, and environmental interpretation, three of the Refuge System’s six priority public uses identified in the System Administration Act, as amended by the Refuge Improvement Act. Refuge admission remains free to all members of the public, the charge for New Jersey Audubon’s guided tours serve only to compensate this non-profit for its travel expenses, time, and expertise. We are in the process of completing the finding of appropriateness and compatibility determination for this activity and will make these available separately.

Comment: The New Jersey Division of Fish and Wildlife recommend that recreational furbearer trapping be instituted on Supawna Meadows NWR, as it is on other NWR’s in New Jersey. Recreational trapping is an effective, cost-efficient method for controlling furbearers (some of which are significant waterfowl nest predators) and is a centuries old tradition in this part of New Jersey. We also received one request to see the refuge open to coyote trapping.

Response: We agree that trapping can be an effective and cost-efficient method for controlling furbearers. We use this method at other refuges in the State and throughout the country to accomplish this management purpose; however, the U.S. Fish and Wildlife Service (Service) considers trapping to be an economic use because pelts are usually sold for profit by the trapper. According to 50 CFR 29.1, “We [the Service] may only authorize public or private economic use of the natural resources of any national wildlife refuge...where we determine the use contributes to the achievement of the national wildlife refuge purposes or the National Wildlife Refuge System mission.” As discussed in chapter 3 of the draft CCP/EA and in chapter 4 of the final CCP (under General Refuge Management, Controlling Animal Pests), we will consider opening the refuge to trapping if we determine it is needed to manage furbearers to achieve refuge purposes or the mission of the National Wildlife Refuge System. Prior to opening the refuge to trapping, we would need to determine if it is compatible and complete additional NEPA analysis, then include it as part of an approved Furbearer Management Plan.

Hunting and Fishing
(Letter ID#: 1, 2, 3, 4, 6, 9, 10)

Comment: We received several comments on the refuge’s deer hunting program. One commenter supported the archery-only deer hunt. Another commenter asked how we had staff to manage waterfowl hunting but not firearm deer hunting on the refuge.

Response: We appreciate the support of the refuge’s archery deer hunt. Prior to archery-only hunting on the refuge, we offered a firearm deer hunt program. Because of the potential for high demand, limited upland areas where hunters tend to concentrate, our policy to provide a quality hunt program, and to ensure the safety of neighbors, visitors, and hunters, we implemented permits, a lottery system, and refuge-specific orientation classes for the firearm deer hunt program. This intensive hunt program required much staff time to manage, so we were only able to open the refuge for a limited number of days. After the refuge was complexed with Cape May NWR, this intensively managed hunt was not feasible. Bow hunting was implemented as a safe means to allow a quality deer hunt and harvest a similar amount of deer without the added cost of implementation. In general, there is less demand for bow hunting and we have extended the refuge bow hunt to coincide with State regulations which decreases the daily concentration of hunters; therefore, it has not required the same level of management as the firearm deer hunt. Because waterfowl hunting occurs in the tidal creeks of the refuge, away from refuge neighbors and trails, there is less potential for conflicts with neighbors and other users. In addition, waterfowl hunters do not appear to concentrate in certain areas. For these reasons, we have not needed to intensively manage waterfowl hunting with permits, lotteries, and orientations, and refuge resources required to manage the waterfowl hunt are considerably less than those required to manage a deer firearm hunt.

Comment: The New Jersey Division of Fish and Wildlife has recommended in the past that Supawna Meadows NWR be opened to all the legal New Jersey deer seasons to better effect control of this species that can have detrimental impact on the ecosystem. This would also result in lessening agricultural damage, fewer deer/auto collisions, and increased wildlife-associated recreation. They still recommend that this be done, particularly as internal exceptions to the refuge are acquired over time.

Response: We agree that deer can cause serious degradation to wildlife habitat and agriculture through browsing, as well as present risks to human safety through deer and automobile collisions. Opening the refuge to a firearm season and opening more areas of the refuge to hunting were discussed during the planning process. Based on the discussions during planning, the planning team incorporated the following strategies under goal 4 in our preferred alternative (alternative B) of the draft CCP/EA: 1) We will rely on State hunting regulations to define hunting safety zones; 2) we are proposing to open additional areas of the refuge to deer hunting (see map 3.5 in the draft CCP/EA or map 4.2 in the final

CCP); and, 3) we will monitor the deer population and its effects on refuge habitats. If the herd needs to be further culled, we will work with the State to offer a doe-first season, a firearm season, or another method for taking more deer off the refuge. This preferred alternative, including these strategies, is expected to become our final CCP. As with opening the refuge to other types of hunting, we would need to conduct additional NEPA analysis before these new areas could be opened to deer hunting and before a firearm season could be re-established.

While we may open the refuge to a firearm season for deer sometime during the 15-year life-span of the CCP, we are not proposing to incorporate a firearm season at this time. Prior to archery-only hunting on the refuge, we offered a firearm deer hunt program. Several years ago, an incident occurred at Supawna Meadows NWR where a deer hunter shot and hit a neighboring residence. This precipitated a re-evaluation of the deer hunt program at this refuge. With limited upland areas where hunters tend to concentrate, our desire to provide a quality hunt program, and to ensure the safety of neighbors, hunters, and other visitors, we modified the firearm deer hunt by implementing refuge hunt permits, a lottery system, and refuge-specific orientation classes for the firearm deer hunt program. This intensive hunt program required much staff time to manage, therefore, we were only able to open the refuge for a limited number of days. After the de-staffing of the refuge, this intensively managed hunt was no longer feasible. In 2007, after coordinating with NJDFW, the archery-only hunt was implemented on the refuge as a safe means to allow a quality deer hunt and harvest a similar amount of deer without the added cost of implementation. The new program included lengthening the hunt season on the refuge to correspond with State regulations, yielding more hunting days. Since the archery-only hunt was initiated in 2007, refuge staff has received several positive comments supporting this hunt program.

If a decision is made to incorporate firearm deer hunting at Supawna Meadows NWR, we will work with the State to develop a system which will meet our shared objectives for safety, deer population control, and recreation.

Comment: The New Jersey Division of Fish and Wildlife has recommended in the past that hunting for upland game and wild turkey be permitted on Supawna Meadows NWR to increase the opportunity for wildlife-associated recreation and we continue to recommend that this be done. One commenter requested we open the refuge to coyote hunting.

Response: We appreciate the interest in expanding upland hunting opportunities, including coyote hunting, on the refuge. As we discussed in chapter 1 of the draft CCP/EA, under “Issues Outside the Scope of this CCP,” we did consider this recommendation. We eliminated this from detailed evaluation because of the small amount of upland area within the refuge and the potential conflicts with other priority public uses. However, we are willing to further discuss opening the refuge for the spring turkey season with assistance from the New Jersey Division of Fish and Wildlife. Many refuges are open to spring turkey hunting, and we agree that this action would provide an opportunity to facilitate this priority public use. To open the refuge to spring turkey hunting would require further detailed NEPA analysis and public involvement. With assistance from the New Jersey Division of Fish and Wildlife, we believe we could make progress on this matter this year.

Comment: One commenter requested the Service close the refuge to deer hunting this year and for the refuge to be open to deer hunting every third year due to what appears to be a decline in the deer population associated with epizootic hemorrhagic disease (EHD).

Response: According to National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd) and the Code of Federal Regulations (43 CFR 24.4(e)), Congress has required us to be consistent with State laws and regulations governing public use “to the maximum extent practicable.” At this time, there is no indication that the health of the State or regional deer population is at risk and the New Jersey

Division of Fish and Wildlife has chosen not to restrict hunting in Zone 63, the zone encompassing the refuge. We see no need to impose additional restrictions on deer hunting on the refuge at this time.

Comment: To avoid any potential future issues similar to those that have been of concern most recently at Wallkill NWR, the New Jersey Division of Fish and Wildlife would like bear hunting to be authorized under the CCP should it be necessary at some point in the future as New Jersey's bear population continues to grow.

Response: Currently, refuge staff is not aware of any black bears on or near the refuge. However, we are aware that New Jersey's black bear population is increasing, and it is possible that bears could appear on or near the refuge within the next 15 years. If the State changes hunting regulations to allow black bear hunting in bear hunt area 6, which includes the refuge, and there is interest, we will evaluate whether or not to authorize this activity on the refuge. Before opening the refuge to bear hunting, we would need to comply with NEPA, as amended. NEPA requires we thoroughly evaluate the effects of major Federal actions on natural resources and the socioeconomic environment. This process would include, among other things, completing additional analyses on the potential beneficial and negative effects of opening the refuge to bear hunting, providing opportunities for public review and comment, and making an announcement in the *Federal Register*. This level of analysis is not feasible at this time, since we cannot predict when or if black bear hunting will be proposed at Supawna Meadows NWR. We have included a statement discussing our willingness to evaluate opening the refuge to black bear hunting in the future, if warranted, in chapter 4 of the final CCP, under General Refuge Management, Priority Public Uses.

Comment: Currently, few snow geese use Supawna Meadows NWR although many of the nearby areas are heavily used (e.g., Mannington Meadow). The New Jersey Division of Fish and Wildlife appreciates that the Service acknowledges the population overabundance issue and that the refuge will continue to monitor the snow goose population on the refuge and open the refuge for snow goose hunting outside the "regular" waterfowl seasons if conditions warrant this action.

Response: Thank you, we appreciate your support in this effort.

Comment: One commenter would like to see the refuge closed to migratory waterfowl hunting. Another commenter was ethically opposed to any form of hunting on the refuge due to the conflict with other public uses and the lack of respect for animal rights. This same commenter was also opposed to deer hunting stating it negatively affects deer size and population health.

Response: Hunting is one of the six priority public uses to receive enhanced consideration on national wildlife refuges, according to the 1997 Refuge Improvement Act (Public Law 105-57; 111 Stat. 1253), which amended the National Wildlife Refuge Administration Act of 1966 (16 U.S.C. 668dd-668ee). We are therefore required by law to facilitate hunting on national wildlife refuges wherever hunting is compatible with refuge purposes and the mission of the National Wildlife Refuge System. We have found hunting both waterfowl and deer to be compatible at Supawna Meadows National Wildlife Refuge and therefore we will continue to allow it. For more information about appropriate and compatible uses, refer to appendix B of the final CCP.

Deer hunting is currently the most effective tool to manage the health of the deer population and sustain the integrity, diversity, and health of forest habitats on the refuge. If deer populations are allowed to progress unchecked by management, deer densities can become quite high. In addition to a general decrease in habitat quality, impacts of high deer densities include a decline in overall deer population health as evidenced by decreased body weights, increased occurrence of deformities, increased levels of internal and external parasitism, decreased body fat deposits, and increased disease transmission. For more details on deer density concerns, impacts to habitat quality, and deer population health, refer to the

benefits section of chapter 4, Public Use Management-Hunting, alternatives A and B of the draft CCP/EA.

Comment: Three commenters requested the existing buffer zone between the refuge and the five residential properties on Lighthouse Road remain closed to hunting to minimize potential trespassing by hunters and provide additional space to minimize other potential conflicts between hunters and refuge neighbors. Commenters also requested that the hunting closure signs remain and be maintained.

Response: According to National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd) and the Code of Federal Regulations (43 CFR 24.4(e)), Congress has required us to be consistent with state laws and regulations governing public use “to the maximum extent practicable.” Therefore, as stated in the draft CCP/EA and the final CCP, we intend to modify the previous “safety zones” to be consistent with New Jersey State regulations restricting hunting around occupied properties (see goal 4, objective 4.1). The original “safety zones” were established to ensure safety during the hunt season. However, we believe that State regulations are adequate for ensuring safety. New Jersey requires that all hunters, prior to obtaining their first license, complete a hunter education course, pass a written exam, and attend a field session. Hunting safety and regulations are a major component of this hunter education program.

We recognize that several refuge neighbors would like us to continue to post and maintain area closed signs to help ensure that hunters do not hunt within the restricted areas or on private property. As discussed above, all hunters are required by New Jersey State to complete a hunter education course, including passing a written exam, before obtaining their first license. Rules and regulations on hunter safety, including restrictions around occupied buildings and not trespassing on private property, are a major component of the hunter education courses. Therefore, every hunter has been notified that they have the responsibility to comply with State laws and regulations regarding restricted hunting around occupied buildings and not trespassing on private property. Because of this and to be consistent with management actions at Cape May NWR (which is in the same state and under the same refuge manager), we do not intend to post or maintain signs marking the restricted area. To address risks of hunters trespassing onto neighboring property, refuge staff will continue to post and maintain refuge boundary signs.

Comment: One commenter requested banning the use of lead shot and sinkers on the refuge because of potential health risks to wildlife (especially fish and birds) and people that consume harvested wildlife.

Response: As stated previously, whenever practicable we comply with State laws and regulations regarding public use, including hunting and fishing. Currently, New Jersey State waterfowl hunting regulations and Federal waterfowl hunting regulations (50 CFR 20.108) require the use of non-toxic shot and deer hunting is bow hunting only on the refuge. Therefore, lead shot is not permitted for deer or waterfowl hunting on Supawna Meadows NWR. New Jersey State has jurisdiction over open tidal waters in the State, where most fishing occurs. In refuge waters, we currently follow State regulations and lead sinkers are currently permitted for fishing. We have noted the comment and will reevaluate the use of lead sinkers in refuge waters when we revise our fishing plan.

Comment: One commenter requested that there be a policy or regulation for hunters to remove temporary stands for hunting each day because they are sometimes left up for the entire hunting season.

Response: We understand the interest in ensuring fair access to hunting areas on the refuge. It is not our intent for hunters to leave portable stands in place on the refuge throughout the hunting season. However, as stated previously, according to National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd) and the Code of Federal Regulations (43 CFR 24.4(e)), Congress has required us to be consistent with State laws and regulations governing public use “to the maximum extent

practicable.” Current State regulations do not require hunters to remove portable stands daily in Hunt Zone 63, and we believe it is practicable to comply with State regulations. In addition, it would require additional law enforcement for us to implement this type of regulation.

Comment: One commenter requested clarification on whether hunting would be allowed on any new properties under the chosen alternative.

Response: As described in the chapter 4, goal 4 (see also map 4.2, page 4-52), we intend to open the Tract 48 (AID) property and refuge lands in Mannington Meadows (east of Route 49) to hunting and fishing. We intend to open any additional lands acquired to deer hunting. Before we can open any new lands to hunting, we must complete additional analyses and provide opportunities for public review and comment to comply with NEPA.

Comment: One commenter suggested we are “focusing time” attracting hunters instead of focusing on attracting wildlife observation when wildlife observers outspend hunters significantly.

Response: The six priority public uses for the Refuge System include both consumptive (hunting and fishing) and non-consumptive (wildlife observation, photography, and environmental interpretation and education) activities. The Refuge System Improvement Act does not specify a priority order to the six priority uses. It is established in Service policy (603 FW 2) that the refuge manager must evaluate the compatibility of these priority activities in developing refuge programs. The process to make compatibility determinations is defined in this same policy. It considers the impacts of the activities on refuge resources and the impacts among and between other uses on the refuge. The consideration of how much a particular use contributes to the local economy is not part of the evaluation.

Land Acquisition (Letter ID#: 1, 2)

Comment: One commenter requested information about the status of the acquisition of the Sinnickson property including when the Sinnickson property was going to become part of the refuge and if the \$54,000/acre for 14,500 acres was worth the price.

Response: To date, the property generally referred to as the Sinnickson property has not been acquired by the Service. The property is currently in the ownership of The Conservation Fund, a non-profit organization devoted to the protection and conservation of valued wildlife habitat and open space. The Conservation Fund is in the planning process for restoring wetland and grassland habitat on this property with the intent that the property will be deeded over to the U.S. Fish and Wildlife Service as part of Supawna Meadows NWR upon completion of the restoration project. Acquisition of lands by the Service is based on appraised values established at the time of the land purchase agreement. We may acquire lands for less than the appraised market value if the owner is willing, but Federal law prevents us from acquiring lands or interests for more than their appraised market value.

Comment: One commenter asked how the Service intends to acquire property west of Highway 49 and asked if eminent domain would be used.

Response: As specified in chapter 3 of the draft CCP/EA and chapter 4 of the final CCP, the Service will continue to acquire property and interests in property only from willing sellers. This would apply to all lands within the approved acquisition boundary. We will not buy lands or easements if the owners are not interested in selling, and so do not use eminent domain except occasionally, when, with the agreement of the landowner, it may be used as a legal mechanism to clear up a defect in legal title and permit a sale from an otherwise willing seller.

Comment: One commenter wanted to know if there were any plans to expand the current acquisition boundary.

Response: At this time, we have no plans to expand the current acquisition boundary. As stated in alternative B of the draft CCP/EA and in the final CCP (goal 2, objective 2.1), we intend to re-evaluate the refuge's current acquisition boundary because much of what is currently within the refuge boundary will likely be under water in the next 50 to 100 years. Any proposed changes to the refuge's acquisition boundary resulting from this process would be subject to further analysis and review under NEPA.

Comment: One commenter opposed any additional land acquisition because of the refuge's current difficulty of managing the existing acreage.

Response: We respectfully disagree. Habitat loss continues to be one of the greatest risks to sensitive species. Once land is developed, it is difficult to reestablish it as valuable habitat for plants and animals. While many lands would benefit from additional habitat management, including refuge lands, we believe that conserving natural areas and ecosystem functions through land protection is beneficial to fish, wildlife, plants and people.

Comment: One commenter suggested that Supawna Meadows NWR be administratively complexed with John Heinz NWR at Tinicum, primarily because it is geographically closer to Supawna Meadows NWR.

Response: Comment noted. In the past, Supawna Meadows NWR was administratively complexed with John Heinz NWR. Decisions about which refuges will be complexed and how refuges will be complexed are based on a variety of factors including staffing, budget constraints, proximity to other refuges in the complex, State jurisdictions, and others.

Alternatives

Alternative B **(Letter ID#: 1, 8)**

Comment: One commenter would like to know what species in alternative B are the focuses of conservation.

Response: The priority focal species are based on the establishing purposes of the refuge as outlined in chapter 1 of both the draft CCP/EA and final CCP, which identifies the refuge as a use an inviolate sanctuary for migratory birds [Migratory Bird Conservation Act (16 U.S.C. 715 D)]. The primary species that are the focus of conservation under alternative B of the draft CCP/EA are Pea Patch Island colonial-breeding wading birds, secretive marsh birds, migratory waterfowl, shorebirds, and other birds of conservation concern. Examples of such birds include great blue heron, glossy ibis, great egret, and American black duck. For more detailed information of focal species by habitat, refer to the habitat management goals 1, 2, and 3 in the final CCP in Chapter 4, Management Direction and Implementation. Please refer to appendix A of the final CCP for a more complete list of species of concern for Supawna Meadows NWR.

Comment: Two commenters supported alternative B. One commenter would like to see alternative B with emphasis on environmental education.

Response: We appreciate the support for alternative B, our preferred alternative. We have noted the interest in emphasizing environmental education. In 2006, the Service completed a visitor services regional analysis to help refuges address providing opportunities for the six priority public uses identified in the Refuge Improvement Act. This analysis identified wildlife observation and photography

as the areas of emphasis for Supawna Meadows NWR. While these priority uses will continue to be emphasized, we agree that environmental education at the refuge is important. We outline how we plan to increase environmental education efforts under goal 4, objective 4.4 in the final CCP.

Alternative C
(Letter ID# : 2, 3, 4, 7, 8)

Comment: Several commenters opposed alternative C. Friends of Supawna Meadows NWR commented that “[alternative C] does not meet the mission of the refuge system and even though [the draft CCP/EA] states that it ‘partially’ meets the purpose for the agency, we feel that ‘partial’ is the same as failure.” Another commenter asked why we even included alternative C.

Response: We agree that alternative C does not best meet the mission of the Refuge System. It would at least partially meet the refuge’s purposes and vision, but would fail to meet a majority of the goals and does not best respond to issues raised during public scoping and comment periods. As discussed in chapter 3, alternative C of the draft CCP, we included this alternative because budget constraints could force its selection.

Comment: One commenter supported alternative C (closing the refuge) until more funding became available to manage it.

Response: As discussed in chapter 4 of the draft CCP/EA, closing the refuge and ceasing all management as proposed under alternative C would have substantial negative effects on refuge habitat and wildlife and would eliminate opportunities for wildlife-dependent recreation on the refuge. Invasive species would be allowed to spread unchecked, early-successional habitat would be lost through succession, and the refuge would be more vulnerable to trespassing, poaching, and vandalism. As stated above and in chapter 3 of the draft CCP/EA, we believe alternative C would fail to meet the majority of the goals identified in our purpose and need for agency action (that is, developing a CCP). Please see chapter 4 of the draft CCP/EA for a more thorough discussion of the effects associated with implementing alternative C.

Refuge Administration

Administrative
(Letter ID#: 2, 4)

Comment: Two commenters were concerned about funding and stated that additional funding would be needed if alternative B were to be implanted. One commenter asked where funding comes from.

Response: We agree that funding is critical to the successful implementation of alternative B. Funding is allocated to the Service, as well as other government agencies, by the U.S. Congress on an annual basis as part of the Federal Government’s appropriations process. These allocations are distributed to all the regions of the Service and further distributed by the Refuge System’s Regional Headquarters to individual refuges. Any additional funding would come from the annual allocations by Congress or redistribution of funds within the region from the Refuge System program.

Comment: One commenter requested clarification on whether the new maintenance worker was part of the proposed staffing, especially in regard to habitat management needs (e.g., grassland mowing).

Response: As specified in chapter 3 of the draft CCP/EA, alternative B, and in appendix C of the draft CCP/EA and the final CCP, a new maintenance worker is part of the proposed staffing for Supawna Meadows NWR. Filling this position is depended on funding.

Facilities

(Letter ID#: 2)

Comment: One commenter wished to know more about the plans for the house off Lighthouse Road and for the barn.

Response: As discussed in chapter 4 of the final CCP, we intend to demolish all buildings with the exception of the refuge office, associated garages, the (bat) barn, the intern house on Route 49, and Finns Point Rear Range Light. It is our understanding that the two buildings referred to by the commenter are what we call the Yerkes House and the (bat) barn. Because of its value as a roosting site for bats, we intend to maintain the bat barn. Because of its extreme state of disrepair and vulnerability to vandalism, we intend to demolish the Yerkes House. We will continue to work with the New Jersey Historic Preservation Office and the Service's regional archaeologists to ensure compliance with section 106 of the National Historic Preservation Act and all other applicable State and Federal laws and regulations.

Comment: One commenter suggested investigating whether chemical companies and the U.S. Army Corps of Engineers are polluting the refuge.

Response: We are unaware of any illegal activities by the U.S. Army Corps of Engineers or chemical companies that would affect refuge resources. We would need more specific information to pursue any kind of investigation.

Planning Process and Policy

CCP Process

(Letter ID#: 1, 2, 3, 8)

Comment: There were a few comments related to the CCP process requesting clarification on the next steps including the approval process.

Response: The planning team reviews and responds to all of the substantive comments submitted on the draft CCP/EA. The planning team then decides on any changes that need to be made to the document. We submit the document with our recommendation on the preferred alternative to the U.S. Fish and Wildlife Service's Regional Director. In this case, the preferred alternative is alternative B. The Regional Director then reviews the document, the public comments, and the planning team recommendation. After reviewing this information, the Regional Director decides which alternative, or parts of the alternatives, to select as the final CCP. Based on the Regional Director's decision, the planning team prepares the final CCP, and a NEPA decision document, a Finding of No Significant Impact. A Notice of Availability is published in the *Federal Register* when the NEPA decision document has been signed and the final CCP is ready for distribution. We notify stakeholders when the final CCP is available through the *Federal Register* notice, a newsletter, and through the Supawna Meadows NWR planning Web site. The final CCP will be ready to implement 30 days after the Notice of Availability is published in the *Federal Register*.

Comment: The same commenter asked, once an alternative is selected, can the Service later switch to another alternative and what would be the process for that?

Response: The Service can decide to re-evaluate the CCP at any time provided changes are advisable, but CCPs need to be re-evaluated at least every 15 years. Minor revisions likely would not require additional public notification. If major changes are proposed, a separate EA or Environmental Impact Statement (EIS) on the specific changes, or a complete revision of the CCP would need to be conducted.

Complete revisions of the CCP would go through the same process of scoping, issues identification, developing alternatives, etc.

Comment: One commenter expressed that public comments are not taken into consideration for the final draft of NEPA documents and in Service policies.

Response: The Service is committed to involving the public, state agencies, our partners, other Federal agencies, Tribal governments, and other organizations in developing CCPs for national wildlife refuges. We make every effort to identify issues during our scoping process so they can be addressed in the CCP. We considered and respond herein to every substantive comment we received during the comment period. After considering comments, we have made changes to the final CCP where deemed appropriate. A summary of the substantive changes we have made to the document is presented at the beginning of this appendix. Where we have not implemented recommendations we have explained the reasons, whether rooted in law, regulation, policy, or other management consideration, for not doing so.

Comment: There were two comments regarding the public meeting. One commenter wanted to know if we were legally required to hold one or more public meetings. One commenter opposed the location, viewing it as biased towards a particular interest group.

Response: Public participation is crucial to the planning process and legally required under the Refuge System Improvement Act and NEPA. Public participation can take many forms. We are not legally required to hold public meetings, we believe holding one or more meetings facilitates public involvement with the CCP process, including comments on the draft CCP/EA. Public meetings assist the planning team in identifying any additional concerns of the public with the management of the refuge and allows for modifications in the plan as warranted. Please refer to chapter 2 of the final CCP for more details regarding our planning process. We respectfully disagree that our choice for the public meetings was biased towards any interest group. The locations chosen for public meetings are based on proximity to the community near the refuge, site availability, handicap accessibility, and facility accommodations. This venue fulfilled all of these requirements.

Comment: One commenter expressed concern over the use of outdated material for research in documenting our rationale for our hunt program.

Response: The Service is directed by the Department of Interior Information Quality Guidelines as published in the *Federal Register* (67 FR 8452) to use the best available science and supporting studies conducted in accordance with sound and objective scientific practices, including peer-reviewed studies where available. We believe that we have used the best available science and our best professional judgment to develop and manage our hunt program to protect wildlife and habitat first and to provide a quality hunt experience second. For specific information on our hunt program and effects, please refer to chapter 4, goal 4.1 in the final CCP, Chapter 4, Environmental Consequences in the draft CCP/EA, and the compatibility determinations in appendix B in the final CCP.

Attachment 1-Letter ID Numbers and Respondents

Letter ID Number	Name or Public Meeting Date and Time
1	October 12, 2010 2-4 p.m. meeting
2	October 12, 2010 6-8 p.m. meeting
3	Ms. Barbara Sachau
4	Mr. Nicholas C. Mesogianes
5	Mr. Stan Kite
6	Mr. John Jaeger
7	Ms. Judy Orshipp
8	Mr. John Wilmot-The Friends of Supawna Meadows NWR, Inc.-President
9	Director David Chanda, New Jersey Department of Environmental Protection (DEP), Division of Fish and Wildlife
10	Ms. Deidre Meehan
11	Ms. Meghan Mac Williams Barrata, New Jersey DEP Historic Preservation Office

Appendix I



Steve Hillebrand/USFWS

Great Blue Heron

Finding of No Significant Impact

Finding of No Significant Impact

Supawna Meadows National Wildlife Refuge Comprehensive Conservation Plan

In September 2010, the U.S. Fish and Wildlife Service (Service) published the Supawna Meadows National Wildlife Refuge (NWR) draft comprehensive conservation plan and environmental assessment (draft CCP/EA). Supawna Meadows NWR is located along the shoreline of the Delaware River, where it widens to become the Delaware Bay estuary in Salem County, New Jersey. The refuge currently includes 3,016 acres of tidal waters and marsh, grassland, shrubland, and forest habitats. The approved refuge acquisition boundary encompasses approximately 4,527 acres along the Upper Delaware Bay and Salem River in Pennsville Township, New Jersey. The refuge boundaries are roughly defined by the Delaware Bay, Salem River, and Fort Mott Road. The Supawna Meadows NWR draft CCP/EA outlines three alternatives for managing the refuge over the next 15 years. It carefully considers their direct, indirect, and cumulative impacts on the environment and their potential contribution to the mission of the National Wildlife Refuge System (Refuge System). The draft CCP/EA restates the refuge's purposes, creates a vision for the next 15 years, and proposes six goals to be achieved through plan implementation. Alternative B is identified as the Service-preferred alternative. Chapter 3 in the draft plan details the respective goals, objectives, and strategies for each of the three alternatives. Chapter 4 describes the consequences of implementing those actions under each alternative. The draft plan's appendixes provide additional information supporting the assessment and specific proposals in alternative B. A brief overview of each alternative follows:

Alternative A (Current Management): The Council on Environmental Quality regulations on implementing the National Environmental Policy Act (NEPA) require this "No Action" alternative, which we define as "continuing current management." It describes our existing management priorities and activities, and serves as a baseline for comparing and contrasting alternatives B and C. It would maintain our present levels of approved refuge staffing and the biological and visitor programs now in place. We would continue to focus efforts on providing native tidal marsh habitat for Federal trust resources, in particular, for migrating and nesting wading birds, wintering habitats for marshbirds, waterfowl, shorebirds, and other wildlife. We would continue to improve native tidal marsh, primarily through invasive species control. We would also continue to maintain grassland habitats, as well as dikes and water levels on impoundments that have water control structures.

Alternative B (the Service-preferred Alternative): This alternative combines the actions we believe would most effectively achieve refuge purposes, vision, and goals, and respond to public issues. In particular, the priority would be to protect and restore the refuge's native tidal marsh habitat to benefit Pea Patch Island colonial-breeding wading birds, as well as secretive marshbirds, migratory waterfowl, shorebirds, and other birds of conservation concern. A secondary consideration would be to manage a diversity of other refuge wetland and upland habitats to benefit breeding and migrating songbirds, waterfowl, and raptors, as well as amphibians, reptiles, and mammals of conservation

concern. We would accomplish this by increasing efforts to control invasive species and implementing a variety of monitoring elements to assist us in adaptively managing the refuge by determining the status of species on the refuge and evaluating management efforts. We would actively maintain high value early/successional habitats. We would evaluate removing or breaching existing dikes to restore tidal flow and reestablish natural marsh functions.

Our visitor services program would be enhanced to provide more opportunities for hunting, fishing, wildlife observation, photography, environmental education, and interpretation. We would open new areas to deer hunting and would reconfigure waterfowl hunting and fishing areas to occur in the same areas of the refuge. We would construct at least one additional trail and would consider extending the current trail system onto newly acquired lands. We would add additional facilities and improve existing structures to facilitate wildlife observation, photography, environmental education, and interpretation. We would work with existing and new partners to accomplish these tasks.

Alternative C (Cease Management and Close Refuge to Public Uses): Under this alternative, we would close Supawna Meadows NWR to all public uses and cease all habitat management activities. There would be no funding allocated for any projects at the refuge. This alternative would only partially achieve the refuge purposes, vision, and goals, and respond to public issues; however, budgetary constraints make it a reasonable alternative to consider. Under this alternative, the public would be notified of the closure and appropriate signage would be placed on all buildings and along the refuge boundary. Cape May NWR staff would conduct semiannual site inspections requiring about 40 staff hours per year. We would continue to meet our trust obligations under the Endangered Species Act (ESA), which requires us to take measures to benefit the recovery of any federally listed species that might be found on the refuge in the future. We would also continue to comply with the National Historic Preservation Act by maintaining Finns Point Rear Range Light.

We distributed the draft CCP/EA for a 30-day period of public review and comment from September 27 to October 27, 2010. We received nine letters or emails representing individuals, organizations, and State agencies and had approximately 20 people attend two public meetings. Appendix H in the final CCP includes a summary of those comments and our responses to them.

After reviewing the proposed management actions, and considering all public comments and our responses to them, we have determined that the analysis in the EA is sufficient to support our findings. We are selecting alternative B, as presented in the draft CCP/EA with the following changes recommended by the planning team, to implement as the final CCP. Changes we made in the final CCP are:

- We inserted language discussing the potential for including a black bear hunt if State regulations are changed to accommodate hunting this species at Supawna Meadows NWR and if there is interest (see chapter 4, general refuge management). This would require further detailed NEPA analysis and public involvement.

- We inserted a paragraph stating that although we are not proposing to open the refuge to turkey hunting at this time, we are willing to further discuss opening the refuge to the State's spring turkey season with assistance from the State. This would also require further detailed NEPA analysis and public involvement (see chapter 4, general refuge management).
- We inserted language clarifying our changes to hunting safety zones and removal of hunting closure signs (see chapter 4, goal 4).
- We added a Finding of Appropriateness to appendix B for the release of *Rhynoncomimus latipes* weevil for the biological control of mile-a-minute weed (*Polygonum perfoliatum*).
- We updated the White-tailed Deer Hunt Compatibility Determination in appendix B to include the State's deer hunt safety zones.
- We corrected all format and typographical errors that were brought to our attention.

We concur that alternative B, with the above changes, in comparison to the other two alternatives will: (1) best fulfill the mission of the Refuge System; (2) best achieve the refuge's purpose, vision, and goals; (3) best maintain and, where appropriate, restore the refuge's ecological integrity; (4) best address the major issues identified during the planning process; and, (5) be most consistent with the principles of sound fish and wildlife management. Specifically, in comparison to the other two alternatives, alternative B provides the biggest increase in the diversity, integrity, and health of high quality habitats through enhanced tidally influenced, upland, and non-tidal wetland habitat management. It also provides the most reasonable and effective improvements to existing public use programs that are in demand, with minimal impacts to wildlife and habitats. The plans to increase staffing and repair existing infrastructure are reasonable, feasible, and will result in the most efficient management of the refuge and best serve the American public. This Finding of No Significant Impact (FONSI) includes the EA by reference.

We have reviewed the predicted beneficial and adverse impacts with alternative B that are presented in chapter 4 of the draft CCP/EA and compared them to the other alternatives. We specifically reviewed the context and intensity of those predicted impacts over the short- and long-term, and considered the cumulative effects. The review of each of the NEPA factors to assess whether there will be significant environmental effects is summarized here (40 C.F.R. 1508.27).

(1) Beneficial and adverse effects – we expect the final CCP (alternative B) management actions to benefit both the wildlife and habitats at Supawna Meadows NWR. Important examples include the measures to reduce deer browse damage to trees and shrubs, control non-native invasive species, maintain important native tidal marsh to provide foraging habitat for colonial-breeding wading birds at Pea Patch Island, and manage a variety of other habitats on the refuge to benefit breeding and migrating songbirds, waterfowl, and raptors, as well as amphibians, reptiles, and mammals of conservation concern. These benefits will not result from any major change in management strategy; rather, they will be incremental to the effects of the current

management. Therefore, we do not anticipate any significant beneficial or adverse effect on the human environment.

(2) Public health and safety – we expect the good safety record of the refuge to continue based on the protective actions provided in the stipulations of the compatibility determination for each of the authorized public uses on the refuge. There should be no significant impact on public health and safety from the implementation of the CCP.

(3) Unique characteristics of the area – the primary, unique characteristic of Supawna Meadows NWR is its extensive tidal marsh. We expect the preservation and restoration measures in the CCP, such as increased control of non-native phragmites, to benefit these wetlands for which the refuge was created, and to benefit the surrounding habitats. As in (1), the benefits will be incremental to the effects of the ongoing management measures originally instituted to protect these resources. Thus, we do not expect these incremental benefits to result in a significant impact on the human environment.

(4) Highly controversial effects – the management actions in the final CCP such as invasive species control, early successional habitat restoration, deer hunting, and other wildlife-dependent recreational uses are time-tested measures. Their effects on the refuge are well-studied and widely known from past management and monitoring. There is no scientific controversy over what these effects will be. Thus, there is little risk of any unexpectedly significant effects on the environment.

(5) Highly uncertain effects or unknown risks – the management actions in the final CCP are evolutionary. They are mostly refinements of the existing management measures that we have used since it was administratively complexed with Cape May NWR in 2004. We will implement a comprehensive monitoring program to reassess the effectiveness of each planned improvement. With the data available on the current management results and the system in place to adjust for any unplanned effect, we do not find a high degree of uncertainty or unknown risk that the CCP will cause any significant impact on the environment.

(6) Precedent for future actions with significant effects – the purpose of the CCP is to establish the precedent for managing the refuge for up to 15 years. The effects of that management are designed as gradual improvements over the existing conditions, not global changes. For example, strategies such as restoring native tidal marsh will be completed over several years. Therefore, we do not expect this precedent to cause any significant impact on the environment.

(7) Cumulatively significant impacts – the CCP provides the programmatic, long-term management plan for the refuge. We plan to coordinate with surrounding land managers to promote common goals such as reducing browse damage from deer and expanding opportunities for deer hunting. Our management jurisdiction is limited, however, to the refuge lands, and we do not foresee any of the coordinated activities rising to the level of a significant effect on the environment. Within the term of the CCP, we intend to pursue additional projects such as constructing an additional trail and installing additional observation areas. We will examine the cumulative effects of all projects under the CCP before they are approved, and we will conduct whatever level of additional NEPA review is warranted.

(8) Effects on scientific, cultural, or historical resources – the archaeological and cultural studies summarized in the CCP showed no significant impacts on these resources from the planned management activities. Service cultural resource managers in the Regional Office keep an inventory of known sites and structures, and ensure that we consider them in planning new ground-disturbing or structure-altering changes to the refuge. Throughout the implementation of the CCP, we will continue to consult with the New Jersey Historic Preservation Office concerning removal of structures on the refuge (e.g., Yerkes House) and other projects that might affect sites and structures, and we will continue to conduct or contract archaeological or architectural surveys when needed.

(9) Effects on ESA-listed species and habitats – as detailed in the CCP, we have completed a consultation with the Service’s Ecological Services Field Office under Section 7 of the ESA. Their endangered species specialists have concurred with our biological assessment that the planned actions are not likely to adversely affect any of the ESA-listed species that may be present on the refuge, particularly the sensitive joint-vetch. The CCP also protects the delisted bald eagle. Our management actions are designed to preserve and improve the existing habitat for these species and there is no ESA-designated, critical habitat on the refuge. Therefore, we do not anticipate any significant effects on these ESA resources.

(10) Threat of violating any environmental law – our habitat management actions are designed to benefit the environment. They will comply with all applicable protections such as the Clean Water Act and the Clean Air Act. Pursuant to the National Wildlife Refuge System Administration Act (16 U.S.C. 668dd(e)(3), 668dd(m)). Our public hunting and fishing programs under the CCP require all participants to comply with State regulations. We do not anticipate a threat that the CCP will violate any environmental law or cause any significant impact on the environment.

Based on this review, we find that implementing alternative B will not have a significant impact on the quality of the human environment, in accordance with Section 102(2)(c) of NEPA. Therefore, we have concluded that an Environmental Impact Statement is not required, and this FONSI is appropriate and warranted.



Wendi Weber
Acting Regional Director
U.S. Fish and Wildlife Service
Hadley, Massachusetts

JUL 27 2011

Date

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July 2011

