

Chapter 3



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Picking the best path along the river presents many alternatives.

Alternatives Considered, Including the Service Preferred Alternative

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Introduction

This chapter describes the process for formulating our alternatives, the actions they share in common, and the three alternatives we analyzed and developed in detail.

At the end of this chapter, you will find a tabular matrix, table 3.3, which compares the specific management actions and strategies by alternative and issue. We organized that table to show how the actions and strategies in this chapter address the significant issues in chapter 1.

Formulating Alternatives

Goals and objectives define each alternative. Our goals are intentionally broad, descriptive statements of the desired future condition of refuge land. By design, they are more prescriptive than quantitative in defining the targets of our management. They also articulate the principal elements of refuge purposes, our vision statement, and the foundation for developing specific management objectives. The same goals appear in each alternative, but how we accomplish them varies.

Next, we considered a range of possible management objectives that would help us meet our goals. Essentially, objectives are incremental steps we take to achieve a goal; they further define the management targets in measurable terms. They often vary among the alternatives. Objectives provide the basis for determining strategies that are more detailed, monitoring refuge accomplishments, and evaluating our successes. Service guidance in “Writing Refuge Management Goals and Objectives: A Handbook” (USFWS 2004a), recommends that “SMART” objectives possess five properties: They must be (1) Specific, (2) Measurable, (3) Achievable, (4) Results-oriented and (5) Time-fixed.

Please notice that the objectives in alternative A do not adhere strictly to the SMART format, because they describe management activities established on the refuge before the Service published its 2004 handbook.

The objectives we considered range from those that require only minimum levels of funding and staffing to those that require considerable increases in funding, staffing, and developing infrastructure and partnerships. Some of them relate directly to managing habitat, while others relate to meeting population targets tied to species recovery or other regional plans.

Every objective includes a rationale to explain its context and importance. We will use the objectives our Regional Director selects for the final CCP in writing the refuge step-down plans, including a Habitat Management Plan (HMP). Our successes will reflect how well we achieve them.

Finally, we developed strategies for each objective. Strategies are specific actions, tools, techniques, considerations, or a combination of those we may use in achieving the objectives. Most likely, we will carry strategies directly over into subsequent step-down plans; we may revise some strategies in the process of developing those plans.

Alternatives, Including the No Action Alternative

After identifying a range of possible management objectives and strategies, we began the process of creating alternatives. Simply put, alternatives package complementary management objectives for achieving the missions of the Service and Refuge System, the purposes for which the refuge was established and its vision and goals, while responding to issues and opportunities identified during the planning process. To that end, we grouped various objectives that fit together

in what we loosely call themes. We believe our three alternatives and their respective objectives represent a reasonable range of proposals for achieving the purposes, vision, and goals of the refuge and addressing the significant issues in chapter 1.

NEPA requires our analysis of a “No Action” alternative, which continues our current management of the refuge. In this draft CCP/EA, alternative A fulfills that requirement. We refer to alternative A throughout this plan as the “Current Management” alternative. It provides the baseline for comparing or contrasting the other two action alternatives. In fact, we suggest first reading chapter 2, “Description of the Affected Environment,” for detailed descriptions of refuge resources.

Actions Common to All Alternatives

We will implement some actions regardless of the alternative selected. Those

- may be required by law or policy;
- represent NEPA decisions that have recently gone through a public agency review;
- compose administrative actions that do not necessarily require public review, but that we wanted to highlight in this document;
- are considered so fundamentally important in achieving refuge purposes and goals, we determined they should occur regardless of the alternative; or,
- fill approved, essential staffing positions, and provide essential maintenance, visitor, and administrative space required to fulfill refuge obligations.

Active Management of Bog Turtle Sites on the Wallkill River Refuge

All alternatives must comply with the Endangered Species Act. The northern population of the bog turtle was federal-listed as a threatened species in 1997. Therefore, all alternatives will share in common protecting and managing land to support our 2001 Bog Turtle Recovery Plan. Compliance will also include endangered species consultation on this draft CCP/EA.

One of the greatest threats to bog turtles is the loss of long-lived adults in the wild to a lucrative, illegal wildlife trade (USFWS 2001). Another serious threat is the continued loss, alteration and fragmentation of the species’ highly specialized wetland habitat (USFWS 2001). Strategies in this CCP follow the recommendations in the recovery plan for tasks that eventually will lead to the delisting of this species. Those include the following strategies to help achieve the objective for bog turtle management under goal 1 in all the alternatives.

- Monitor known bog turtle sites continually to prevent the illegal collection of individual animals.
- Monitor the status of and threats to known sites.
- Survey known, historical, and potential bog turtle habitat.
- Control invasive plants and set back succession by using biological control agents, girdling red maple stems, grazing goats or other livestock, and mowing or mulching.
- Allow beaver ponds to progress through natural stages of succession to provide potential bog turtle habitat, where beaver populations do not conflict with private landowners or public roads.

Habitat Management Tools

All the alternatives propose that we use several management tools on varying scales to help maintain, enhance or create wildlife habitat. Those management tools include the following.

- Use prescribed burns to enhance habitat for upland migratory birds, waterfowl, and Federal threatened species. Periodic burning of these areas reduces encroaching vegetation.
- Hire cooperative farmers to hay, mow or graze approximately 500 acres of cool season grassland in order to maintain grassland conditions to support nesting for grassland-dependent birds.
- Remove larger trees and shrubs, making way for contiguous, larger grassland parcels.
- Graze livestock on the bog turtle site on the refuge to control invasive plant species and arrest succession while maintaining the fluid mud substrate preferred by bog turtles.

Those and other habitat management tools specified in the CCP will help achieve goal 1 by restoring and enhancing habitats for federal trust species and other species of special management concern.

Non-Indigenous Invasive Plant Species

The Service adopted policy that defines biological integrity, diversity, and environmental health and provides refuge managers with guidance for ensuring that those are maintained and, where appropriate, restored on refuge land to the extent compatible with refuge purposes (601 FW 3). It states, “The highest measure of biological integrity, diversity and environmental health, is viewed as those intact and self-sustaining habitat and wildlife populations that existed during historic conditions.”

The presence and continued expansion of non-indigenous invasive plant species significantly compromises the biological integrity of all habitats. Biological diversity decreases because invasive species out-compete and replace native species. That process yields degraded wildlife habitat and ecosystem function. No actions are now being implemented to control overabundant animal populations.

Our objective for non-indigenous invasive plants on the refuge is to treat 700 acres of invasive plant species over a period of 10 years, so that those 700 acres will no longer be dominated (<50 percent cover) by invasive species such as purple loosestrife, multiflora rose and Japanese stiltgrass. The strategies we will use to accomplish this objective include the following.

0–5 years after CCP approval:

- Control invasive plants such as purple loosestrife and Phragmites by mowing, using biological control, and applying herbicides.
- Continue the annual monitoring of *Galerucella sp.* beetles and *Hylobius sp.* weevils as a biological control agent for controlling purple loosestrife.
- Continue the cooperative study with Cornell on monitoring the effects of rhizidra larvae as a biological agent for controlling Phragmites.
- Continue the Region 5 Invasive Plant Species Inventory and Mapping Initiative.

- Mechanically and chemically, control *Ailanthus* (Tree-of-heaven) on the refuge.
- Conduct research on biological control agents for use on woolly adelgid invasions on eastern hemlocks and for Phragmites.
- Work with utility and pipeline companies to use wildlife-friendly land management techniques such as enhancing habitats for migratory birds and controlling invasive plant species.

5–10 years after CCP approval:

- Develop an Invasive Plant Management Plan to improve the native biological diversity on Service-owned land within the current and expanded refuge boundaries. Include the following components in the Invasive Plant Management Plan.
 - Control invasive plants on habitats containing threatened and endangered species.
 - Emphasize biological control agents whenever feasible.
 - Evaluate control methods (biological, mechanical, prescribed fire, and chemical) before significant new investments occur.
 - Incorporate experimental designs into the plan to test different combinations of treatment types (i.e., spraying and burning plots of Phragmites).
- Release biological control agents in eastern hemlocks to control woolly adelgid.
- Focus on mapping and eradicating invasive plant species in Atlantic white cedar swamps due to that habitat's regional significance.
- Evaluate future habitat management projects (e.g., a water drawdown project on bare or open soil) for their potential to facilitate the spread of invasive plants.
- Develop an HMP and an Inventory and Monitoring Plan with specific strategies for controlling invasive plant species.

Controlling invasive species will help achieve goal 1 by restoring and enhancing habitats for federal trust species and other species of special management concern.

Overabundant Wildlife

Service policy is to control wildlife and plants in the Refuge System to assure balanced wildlife and fish populations consistent with the optimum management of refuge habitat (7 RM 14.1). Control measures are necessary when native or nonnative wildlife populations interfere with our ability to attain refuge objectives or pose a threat to human health.

Canada geese and mute swans can cause severe damage to refuge land by feeding on seedlings, roots and large amounts of vegetation. High numbers of resident Canada geese browsing on moist soil units during the growing season also have the ability to degrade habitat quality for subsequent migrant waterfowl use through selective browsing on preferred vegetation. Droppings from Canada geese can threaten animal and environmental health by contaminating water.

Resident Canada geese and mute swans consume valuable plants and reduce the quality and quantity of habitat for other bird species.

White-tailed deer often overpopulate due to the abundance of agricultural food sources and the absence of natural predators. Large populations of deer can cause severe damage to refuge trees and shrubs by heavy browsing. Deer also cause damage to crops by feeding on winter and summer plantings.

Beaver have caused flooding on neighboring properties, and muskrats have burrowed into the dikes at Liberty Marsh, threatening to compromise the water control system there. Fox and coyote prey upon birds, reptiles and their eggs, potentially reducing their numbers on the refuge.

Control programs are designed to maintain environmental quality and conserve and protect wildlife resources. The techniques are based on a broad, systematic approach using all the information available on the ecology of the pest animal or plant. Population reduction methods are chosen based on effectiveness, cost and minimal ecological disruption.

Our objective for controlling nuisance wildlife is, within 3 years of CCP approval, develop an integrated Animal Population Management Plan for Service-owned land within the current and expanded refuge boundaries to ensure nuisance wildlife populations are maintained at levels that do not threaten the viability of federal trust species or other species of special management concern. We will use the following strategies to accomplish that objective.

0–5 years after CCP approval:

- Manage resident Canada goose and white-tailed deer populations through hunting.
- Addle mute swan eggs on the refuge so there is no population increase (if needed, obtain the appropriate permits).
- Manage beaver and muskrat populations, as needed, at the Liberty Marsh property through trapping.
- Provide information to private landowners on techniques to control flooding caused by beavers.
- Use non-lethal means of addressing beaver impacts, to the extent practicable, in areas where they are flooding adjacent landowners or affecting sensitive refuge habitats. Remove problem animals through lethal means when necessary. Trapping would occur only to accomplish specific management objectives.
- Provide technical information annually to adjacent private landowners on methods to discourage resident Canada geese.
- Expand furbearer management program on refuge land, as needed, where sensitive refuge habitats, such as impoundment structures, are impacted.
- If the refuge staff observes signs of predation by fox, coyote or other predators on bird or reptile nests, we will consult scientific literature and subject experts to determine an acceptable level of predation. If predation on those nests rises above identified threshold levels, then the refuge will manage predator populations using legal methods that have proven effective. Those may include trapping and shooting.

Within 5–10 years of CCP approval:

- If the Canada goose population on the refuge exceeds a threshold density to the point where geese are causing damage to private landowners or refuge habitats, we will obtain the appropriate permits, if required, to reduce the Canada goose population on the refuge by means other than traditional hunting.
- Obtain the appropriate permits, if necessary, to eradicate mute swans on the refuge.
- Develop an integrated Animal Population Management Plan.

Managing nuisance wildlife will help achieve goal 1 by restoring and enhancing habitats for federal trust species and other species of special management concern. It will also help achieve goal 3 by providing wildlife-dependent recreation opportunities for hunting and trapping.

Dog Walking

All alternatives continue to allow dog walking on the portion of the Liberty Loop Trail that coincides with the Appalachian Trail (AT). The AT enters the refuge at the Liberty Loop Trail and follows it for about 1.5 miles. The AT then continues along Oil City Road to where it crosses the Wallkill River, continues on State Line Road and then onto Carnegie Street and reenters the forest. Because the AT permits dog walking along most of its 2,100-mile route, through-hikers are permitted to walk their dogs on the part of the Liberty Loop Trail that coincides with the AT.

Compatibility Determinations

Federal law and 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 National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997 (Refuge Improvement Act), is the key legislation on managing public uses and compatibility.

Before we can allow any activity or use on a national wildlife refuge, we must determine first that it is an appropriate use. The determination of an appropriate use precedes the analysis of its compatibility. A compatible use is one “that will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuge.” “Wildlife-dependent recreational uses may be authorized on a refuge when they are compatible and not inconsistent with public safety. Except for consideration of consistency with state laws and regulations as provided for in section (m), no other determinations or findings are required to be made by the refuge official under this Act or the Refuge Recreation Act for wildlife-dependent recreation to occur” (Refuge Improvement Act). We may revisit compatibility determinations sooner than their mandatory review date if new information reveals unacceptable impacts or incompatibility with refuge purposes.

We are revising, and will recertify, the following compatibility determinations as part of this CCP process.

- Public Fishing
- Haying
- Grazing

- Hunting (deer, turkey, migratory birds)
- Research
- Furbearer Management
- Mosquito Control
- Motorized and non-motorized boating
- Wildlife Observation and Photography
- Environmental Education
- Environmental Interpretation

The following compatibility determinations are new; we will write them as part of this CCP process.

- Bear Hunting (separate from Hunting CD because of the addition of a new big game species)
- Dog Walking (relates to the management of the Liberty Loop Trail where it coincides with the Appalachian Trail)

The complete compatibility determinations can be found in appendix B. Compatibility determinations help to achieve all goals because they ensure that any use of the refuge does not conflict with its legislated purpose.

Refuge Hours of Operation

To ensure visitor safety and protect refuge resources, the refuge is open one hour before official sunrise to one hour after official sunset. At the refuge manager's discretion, organized night activities could be allowed under a special use permit, if determined to be compatible.

Night hunting would not be allowed at the refuge. Opening the refuge to night hunting would create the potential for unsafe encounters between hunters, increase the disturbance of adjacent landowners, and increase the likelihood of poaching and other illegal activities. Those adverse conditions would not contribute to a "quality hunt program" as defined by Service policy.

Permitted hunters can access the refuge two hours before sunrise to two hours after sunset.

No Pursuit Hounds, No Game Stocking

Pursuit hounds in support of hunting will not be allowed on the refuge. Hunting areas are small enough that pursuit hounds, and the game they are chasing, could easily venture off the refuge and onto private land. That is especially likely, given the current number of privately owned inholdings within the approved refuge acquisition boundary. In addition, within such small areas, pursuit hounds are likely to detract from the quality of other visitors' wildlife-dependent recreational opportunities, especially those of other hunters.

We would not stock non-native fish or wildlife in any alternative. Generally, refuge management strives to promote intact, self-sustaining habitats and species populations that existed during historic conditions. We define a "native" species as one that historically occurred within the ecosystem.

However, in the past, the refuge has stocked ponds with native fish for National Fishing Day, and we would continue to do so in the future. We recognize the need to protect the current, native genetic strains of fish. We will not allow the stocking of genetically modified strains. The refuge will work with hatcheries to ensure that the stocked native fish have not been genetically manipulated.

Refuge Law Enforcement

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 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.



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Law Enforcement officers provide protection for refuge wildlife and people visiting the refuge.

Among other things, the deployment model recommended a law enforcement staff of four full-time officers for the Great Swamp National Wildlife Refuge, which includes the Wallkill River refuge. That is based on an analysis of 25 separate factors detailed in appendix B of the deployment model. No matter which alternative our regional director chooses, we will follow the recommendation for law enforcement staffing in the deployment model.

Refuge Revenue Sharing Payments

As described in chapter 2, we pay one Orange County township and several Sussex County townships a refuge revenue sharing payment based on the acreage and value of refuge land in each jurisdiction. The payments, which are calculated by formula, come primarily from revenues collected by the Refuge System for timber sales and oil and gas leases, etc. Congress may appropriate additional funds. All of the alternatives will continue those payments in accordance with the law, commensurate with changes in the appraised market values of refuge land or new appropriations by Congress. The total of those funds is about \$80,000 per year.

Maintenance of Existing Facilities

Periodic maintenance and renovation of existing facilities is necessary to ensure safety and accessibility for refuge staff and visitors. Existing facilities include the Wallkill River refuge headquarters, the large building at Owens Station, and numerous parking areas, observation platforms, kiosks and trails. We will continue to minimally maintain the building at Owens Station for environmental education until we make a final determination about that facility. Appendix E displays the fiscal year (FY) 2007 SAMMS (Service Asset Maintenance Management System) database list of backlogged maintenance entries for the refuge.

Future maintenance needs will vary among the alternatives, because their construction of new facilities differs. Appendix E also identifies new construction in the project listing for each alternative.

Refuge Special Use Permits

Under all alternatives, we will evaluate separately all requests for special use permits for their appropriateness and compatibility. Generally, we would approve those requests with the potential to provide a benefit to the refuge, once we have determined that they are appropriate and compatible. To maintain the natural landscapes of the refuge, we would not allow any proposals for permanent or semi-permanent structures, except under extenuating circumstances unforeseen at this time. Existing approved special use permits will continue in all alternatives.

Wilderness Review

As we described in chapter 1, our wilderness 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 do not need to analyze further the refuge's suitability for wilderness designation (see appendix C). The refuge will undergo another wilderness review in 15 years as part of the next planning process. We will evaluate all newly acquired refuge land that meets Service criteria for their wilderness potential within 2 years of acquiring them.

Mosquito Management

With the spread of West Nile virus and other mosquito-borne diseases across the country, national wildlife refuges may come under increasing pressure to work with other local and state agencies to manage mosquito populations. In addition to the West Nile virus, other human or wildlife health concerns may arise from those mosquito populations.

On October 15, 2007, the Service published in the Federal Register its "Draft Mosquito and Mosquito-Borne Disease Management Policy Pursuant to the National Wildlife Refuge System Improvement Act of 1997." That draft policy describes the process to determine whether and how to manage mosquito populations on lands in the Refuge System. Although we recognize that mosquitoes are a natural component of most wetland ecosystems, we also recognize that they may represent a threat to human or wildlife health. Therefore, the draft policy states "we will allow populations of native mosquito species to function unimpeded unless they cause a human and/or wildlife health threat." When necessary, we would manage mosquito populations using effective means that pose the lowest risk to wildlife and habitats. The draft policy also states that refuges with current mosquito control or mosquito monitoring programs must prepare a mosquito management plan.

Until we finalize the draft policy, we will follow the "Interim Guidance for Mosquito Management on National Wildlife Refuges," prepared in spring 2005. It provides refuges with interim guidance on addressing mosquito-associated health threats in a consistent manner. Like the draft policy, the guidance states that refuges will not conduct mosquito monitoring or control unless it is necessary and compatible with protecting the health of a population of humans, wildlife, or domestic animals. If a health emergency is declared, the Service will work with local and state mosquito managers to minimize any risks to human health.

Local mosquito control districts in the State of New Jersey want to implement full mosquito control measures, including the use of pesticides on refuge land. The Service has been concerned with the direct and indirect impacts on other invertebrates, which serve as a vital food source for birds, amphibians and reptiles. However, to cooperate with local officials and address their concerns, the refuge has issued a special use permit annually to the Sussex County Office of Mosquito Control to access the refuge to monitor larval and adult mosquitoes. The permit requires, within the confines of policy and regulations, that any mosquito control have a basis in sound scientific methods. Dip counts and monitoring of populations are essential parts of any mosquito control program involving refuge land. The refuge permits larvicides but not adulticides.

The long-term solution to suppress mosquito populations at the refuge is to restore wetland hydrology in the habitats that produce the greatest abundance of mosquitoes. Fish play a major role in controlling mosquito populations, and the Service often restores wetlands in a way that allows fish to feed on mosquito larvae, which then reduces mosquito populations.

Research

The Service will encourage and support research and management studies on refuge land that will improve scientific knowledge and contribute to natural resource management decision-making. 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 enhance management of the Nation's biological resources and is important to agencies of the Department of the Interior, the U.S. Fish and Wildlife Service, the Refuge System, and state fish and game agencies, and that addresses important management issues or demonstrates techniques for the management of species or habitats.

The refuge will also consider research for other purposes, which may not relate directly to specific refuge objectives, but contributes to the broader enhancement, protection, use, preservation or management of native populations of fish, wildlife, plants, and their natural diversity in the region or flyway. Those proposals must comply with the Service compatibility policy.

Each refuge will maintain a list of research needs that it will provide to prospective researchers or organizations upon request. Refuge support of research directly related to refuge objectives may take the form of funding, in-kind services such as housing or the use of other facilities, direct staff assistance with the project in collecting data, providing historical records, conducting management treatments, or providing other appropriate assistance.

All researchers on national wildlife refuges, present and future, will be required to submit a detailed research proposal following Service policy in Refuge Manual chapter 4, section 6. The proposals will be prioritized based on need, benefit, compatibility, and funding required. Special use permits must also identify a schedule for annual progress reports, on which we will base our decisions for continued research activities. We will ask our regional refuge biologists, other Service divisions, and state agencies to review and comment on proposals.

Monitoring and Adaptive Management

Common to all alternatives is a strategy of adaptive management to keep the management of the refuge relevant and current through scientific research and management. We acknowledge that our information on species and ecosystems is incomplete, provisional, and subject to change as our knowledge base improves.

Objectives and strategies must be adaptable in responding to new information and spatial and temporal changes. We will continually evaluate management actions, both formally and informally, through monitoring or research to reconsider whether their original assumptions and predictions are still valid. In that way, management becomes an active process of learning what works best. It is important that the public understand and appreciate the adaptive nature of natural resource management.

The Refuge Manager is responsible for changing management actions or objectives if they do not produce the desired conditions. Significant changes may warrant additional NEPA analysis; minor changes will not, but we will document them in our annual monitoring, project evaluation reports, or annual refuge reports.

Monitoring and research in support of adaptive management generally can be increased without additional NEPA analysis. Although we have attempted to

identify monitoring elements for each objective of this plan, we cannot always predict the subject, scope, and duration of future monitoring.

Managing State-owned Land

Through a series of agreements signed in 2007, the Service has management authority over about 150 acres of state-owned land within the current refuge acquisition boundary and about 70 acres outside the current refuge acquisition boundary. In all the alternatives, we will manage that state-owned land in compliance with the policies of the Service and the Refuge System, and according to whichever alternative our Regional Director chooses for the final CCP for the refuge.

Land Protection and Refuge Expansion

All alternatives will continue Service acquisition of land from willing sellers within the existing approved refuge boundary to ensure long-term protection of refuge resources and to maximize the effectiveness and efficiency of refuge administration. As of 2006, we own 5,106 acres within the approved refuge boundary.

In all alternatives, we will also continue to work with conservation partners to identify important habitats in need of protection and management, and will support our partners' land protection and acquisition.

Description of Alternatives Fully Developed

We developed in detail the three alternatives below. After a narrative description of each alternative, we list the management objectives, actions and strategies designed to address the goals identified in chapter 1. Maps depicting habitat management and public use actions follow each alternative discussion. The actions in alternative A, "Current Management" are presented in their entirety; the actions in the other alternatives are presented according to their relative differences from those in alternative A.

Following those descriptions, table 3.3 provides a side-by-side comparison of how the alternatives support the goals and address the key issues. That table highlights the principal Federal actions and strategies for each alternative. We designed it to give the reader a quick overview of the actions that distinguish the alternatives and their relationship to the goals and key issues. Chapter 4 describes in detail the environmental consequences of implementing all the proposed actions.

Alternative A. Current Management

Introduction

This alternative portrays current, planned, or approved management activities, and is the baseline for comparing the other two alternatives. It identifies specific projects already planned, funded, or underway.

Species priorities would include managing for the one federal-listed species known to be present on the refuge, the bog turtle. There is one confirmed bog turtle site on the refuge. Other priorities for the refuge's biological program include migrating waterfowl and grassland birds. Habitat management priorities would focus on wetland restoration and maintaining grassland. We would continue to manage early successional fields and grassland for grassland-dependent birds. The refuge would continue to manage the 335-acre Liberty Marsh as seven individual moist soil management units to provide habitat for migratory waterfowl, shorebirds and wintering raptors. The refuge would continue controlling invasive plant species on refuge land with mechanical, chemical and biological control methods. The refuge would also continue to seek acquisition from willing sellers of the 2,021 acres that remain within our currently approved acquisition boundary. It is important to note that of the

93 ownerships that we have not acquired, New Jersey Green Acres, the County Farmland Protection Program or the local municipality, permanently protect 17. That leaves only 76 ownerships, or approximately 1,200 acres that we do not permanently protect within the current refuge boundary. (An ownership is one or more parcels of land owned by a legal entity.)

Public use on the Wallkill River refuge would remain virtually unchanged. We would continue to provide opportunities for the public to hunt deer, turkey, and migratory birds. We would also continue to provide an American with Disabilities Act (ADA)-compliant hunt. We would maintain fishing access to the Wallkill River at four locations. We would continue to offer wildlife observation and photography on the three refuge trails. The public would benefit from the refuge's interpretive materials and programs. School and scout programs would continue by request only. The refuge will pursue partnerships to provide additional environmental education programs using partner resources. Due to this alternative's limited staffing and funding, the refuge has not launched a curriculum-based environmental education program, and would not develop one. The Owens Station site would continue its limited use in supporting environmental education programming.

Due to the current fiscal climate, the Wallkill River refuge was complexed with the Great Swamp refuge to save money by sharing resources. Subsequently, we eliminated every position except the biologist position from the refuge staffing chart.

We developed the following objectives for the Wallkill River refuge under alternative A based on the premise that the refuge has acquired all the land within its approved acquisition boundary. We wrote them before the Service issued its guidance in "Writing Refuge Management Goals and Objectives: A Handbook." Although we did not modify the objectives in alternative A to comply with that handbook, we did so in alternatives B and C.

Map 3-1 illustrates the proposed habitat management strategies for alternative A, map 3-2 illustrates the proposed public use strategies and map 3-3 illustrates the proposal for hunting on the refuge. Those maps appear after the presentation and detailed discussion of all the goals and objectives for alternative A.

Goal 1. Protect and enhance habitats for federal trust species and other species of special management concern, with particular emphasis on migratory birds and bog turtles.

Objective 1.1 (Scrub-shrub Habitat)

Manage 999 acres of scrub-shrub habitat in patches of two acres or larger within the existing, approved refuge boundary to provide nesting habitat for shrubland-dependent birds such as the golden-winged warbler, field sparrow, eastern towhee, and woodcock (Dettmers, 2000).

Rationale

For a variety of reasons including development and increased forestation, shrub-scrub nesting birds have suffered the steepest declines in population over the past 30 years of any bird assemblage in the Northeast (Askins 2000). Long-term trends for American woodcock, for example, show a decline of 1.3 percent per year from 1993–2003 and 2.3 percent per year from 1968–2003 in the eastern United States. The Service developed the American Woodcock Management Plan in 1990 (USFWS 1990a) to help stem the decline in this species. The Wallkill River refuge has worked specifically with the Ruffed Grouse Society to manage woodcock habitat. Even so, the decline of all scrub-shrub-dependent birds has



Scrub-shrub habitat often grows in former grasslands.

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received relatively little attention. The loss of this habitat type to reforestation is often seen as a return to more natural conditions. Similar to grassland birds in the Northeast, shrubland birds are often seen as birds that only colonized the region in response to human activity, and that must necessarily return to the lower population levels they previously experienced (Askins 2000). Historically, many of these species colonized forest gaps created by disturbances such as fires and storms and openings by Native Americans, but many depended on larger openings. Fire control and intensive trapping of beavers in the remaining large patches of forest have been contributing factors to the decreasing amount of suitable habitat for shrubland birds (Askins 2000).

Historic human activities, such as agriculture, in northwestern New Jersey have created ideal habitat for shrubland-dependent birds on the refuge, including American woodcock. Functional foraging habitat for woodcock occurs on moist, rich soil dominated by dense shrub cover (75 to 90 percent); alder is ideal, although young aspen and birch are also suitable as feeding areas and daytime cover. Woodcock also require several different habitat conditions that must be close to each other. Those include clearings for courtship (singing grounds), large openings for night roosting, young second growth hardwoods (15-30 years) for nesting and brood-rearing and functional foraging areas (Sepik et al. 1981; Keppie and Whiting 1994). The old fields, thick forest edges and hedgerows that dot the landscape around the refuge provide nesting and migrating stopover habitat for woodcock and several other declining shrub land species.

Strategies

- Continue to acquire from willing sellers the 100 acres of scrub-shrub habitat still in private ownership within the existing, approved refuge boundary and manage similarly to land under objective 1.1 (above).
- Allow natural succession to occur on existing grasslands less than 40 acres in size.
- Conduct annual woodcock surveys refugewide.
- Continue partnership with the Ruffed Grouse Society to maintain scrub-shrub habitat.

- When habitat measurements indicate succession has caused a degradation of quality scrub-shrub habitat, the refuge staff will use prescribed fire, mowing or other appropriate action to maintain habitat quality.

Objective 1.2 (Non-forested Wetlands)

Manage 1,216 acres of emergent wetlands, including 335 acres of moist soil units at Liberty Marsh, within the existing, approved refuge boundary to provide spring and fall migratory waterfowl habitat for species such as black duck, wood duck, mallard and green-winged teal; to provide shorebird habitat for species such as greater and lesser yellowlegs and spotted sandpiper; and to provide wintering raptor foraging habitat for species such as short-eared owls, northern harriers and rough-legged hawks.

Rationale

National wildlife refuges expend considerable effort manipulating water levels in impounded wetlands to benefit a variety of wildlife species, including migratory shorebirds (Lyons, et. al., 2005). Managed wetlands often have the capability to provide appropriate habitat for either northward or southward migrating shorebirds, with few wetlands having the management capability to meet shorebird needs during both migrations. Whether management actions are designed to benefit spring or summer/fall migrant shorebirds, hydrologic regimes will affect other waterbirds as well, primarily through changes in invertebrate and plant communities. Thus, there is a need to understand the differential impacts of spring vs. summer/fall drawdown on the vegetation structure, invertebrate communities, and use of impoundments by shorebirds and other waterbirds.

The 335 acres of moist soil management units at Liberty Marsh are part of a multi-Regional impoundment study in which Wallkill River refuge and 22 other refuges in USFWS Regions 3 and 5 are participating. The study is a 3-year management experiment that will compare the impacts of early vs. late season management actions on several biological resources. This study will evaluate the potential for refuges in Region 3 and 5 to provide habitat for shorebirds during their northward and southward migrations, both as a function of location and management actions. The results will identify those geographic portions of each region that can make a significant contribution to management of selected species of shorebirds in spring or fall, and determine the impact of this management on other waterbirds, invertebrates and vegetative communities. A particular focus of the study is to understand the trade-offs in providing habitat to different water bird guilds through the two drawdown cycles. Finally, this study will provide the tools and analyses needed to facilitate adaptive management of impoundments on a station-by-station level as well as on a regional level. This information will aid the refuge in managing its moist soil units to provide the highest quality stopover habitat for spring and fall waterfowl and shorebirds.

Strategies

- Continue to acquire from willing sellers 523 acres of non-forested wetland habitat still in private ownership within the existing, approved refuge boundary and manage similar to land under objective 1.2.
- Continue to manage water levels in seven impoundments at Liberty Marsh and record weekly gauge readings. Use drawdown, flooding, soil manipulation and other techniques to provide quality habitats at appropriate times to meet the migration chronology of the wildlife in the objective. We will manage the habitats as a combination of 18- to 36-inch shallow water habitat (about 75 acres) for waterfowl such as common mergansers, 3- to 18-inch shallow water habitat (about 125 acres) for species such as black duck, and mudflat habitat (about 130 acres) for shorebirds such as sandpipers.

- Continue to participate in the Regional Impoundment study from 2005-2008. Based on the results of this study, we would implement adaptive management strategies in the refuge impoundment system. Participate in future wetland management studies in order to continue refinement of refuge management practices. Physical and structural limitations of the impoundments will play a role in how the refuge will manage them.
- Continue to conduct waterfowl and shorebird surveys to evaluate response to management.

Objective 1.3 (Grassland Habitat)

Refuge staff will manage 632 acres of grasslands in habitat patches of 50 acres or larger within the existing, approved refuge boundary to maintain habitat diversity and to provide nesting habitat for grassland-dependent migratory birds such as savannah sparrow, grasshopper sparrow, bobolink and eastern meadowlark.

Rationale

Grassland-dependent migratory birds and the habitat that supports them are rapidly declining throughout the Northeast. Estimates derived from our North American Breeding Bird Survey indicate that grassland birds have declined more consistently over a wider geographic area than any other group of North American birds (Robbins et al. 1986, Askins 1993, Knopf 1995, Askins 1997, Sauer et al. 1997). Species with especially dramatic declines ($P \leq 0.01$) include grasshopper sparrow (69 percent), eastern meadowlark (43 percent) and bobolink (38 percent) (Peterjohn et al. 1995). These grassland birds are listed as either special concern, threatened or endangered in New Jersey or New York, and they are a special management concern at the refuge.

Strategies

- Continue to acquire from willing sellers 23 acres of this cover type still in private ownership within the existing, approved refuge boundary and manage according to the above objective.
- Continue mowing, cooperative haying, prescribed burns, herbicides, and livestock grazing as grassland maintenance tools.
- When agricultural fields >50 acres in size are acquired within the acquisition boundary, maintain by mowing and haying or restore to warm season native grasslands.
- Each year, maintain the 50-acre, early-successional cool season grassland on Tract 43 to provide nesting habitat for bobolinks.
- Exchange information with local farmers on Best Management Practices for land within the acquisition boundary, such as grazing fields on a rotational basis, herbicide application and prescribed fire.
- Continue annual breeding grassland bird surveys following Regional protocol to help assess larger-scale population and other trends.
- Continue annual mid-winter raptor surveys.

Objective 1.4 (Forested Communities)

Maintain at least 3,658 acres of forested land within the existing, approved refuge boundary, including 2,098 acres of palustrine, mature (>80 years) deciduous floodplain forest in large patches (>100 acres), and 1,560 acres of mixed upland forest, to sustain habitat for forest-dependent neotropical migrants such as cerulean warbler and Louisiana water thrush.

Rationale

The floodplain forests surrounding the Wallkill River are part of the river’s normal cycle and an extension of its drainage system. Those forests serve as a natural control in the retention of soil and floodwaters. Maintaining an interconnected system of floodplain forest helps prevent erosion and allows the river’s natural hydrologic cycles to play out over adjacent land.

Upland forested communities also provide a filter for water flowing into the wetlands and, subsequently, the river and its tributaries. Those forests provide habitat for Neotropical migratory birds, large mammals and others species that are interconnected with the wetland communities on lower-lying lands.

Strategies

- Continue to acquire from willing sellers 356 acres of forested wetland habitat and 439 acres of upland forested habitat still in private ownership within the existing, approved refuge boundary and manage according to the strategies below.
- Allow natural succession to occur in existing forested communities.
- Continue annual land bird surveys following Regional protocol in the forested habitats of the refuge.
- Continue long-term monitoring of the refuge’s 26 or more vernal pools and their associated amphibian populations. This monitoring effort is part of the USGS “Amphibian Research and Monitoring Initiative.” That regionwide study aims at determining the regional distribution of vernal pools in parks and refuges in the northeast.

Objective 1.5 (Bog Turtle Management)

Protect and maintain the northern population of bog turtles and their associated habitats, contributing to the efforts that will result in the eventual delisting of the species.

Rationale

The actions and strategies below come almost directly from the Service’s 2001 Bog Turtle Recovery Plan. They focus on mapping current and potential bog turtle sites on a small scale (i.e., wetland habitats) and on a larger scale (i.e., entire wetland systems and watersheds). Once identified, these sites are eligible for protection under applicable laws and regulations. Identifying current and potential sites will help improve the effectiveness of the project/permit screening process and reduce the potential for delays by creating species occurrence zones in the Natural Heritage databases.

Strategies

- Work with the New Jersey and New York Service Field Offices and the states of New Jersey and New York to screen adequately the projects or permits that may affect bog turtles and their habitats on and near the refuge.
- Work with the New Jersey and New York Service Field Offices and the states of New Jersey and New York to improve the effectiveness of regulatory reviews in protecting bog turtles and their habitats, specifically to address agencies working at cross-purposes when permitting activities in wetlands.
- Conduct surveys of known, historical and potential bog turtle habitat.



USFWS

Using transmitters, Service personnel track bog turtles to learn about their home ranges.

- Monitor the status of and threats to populations and habitat, including changes in hydrology, encroachment of development, successional changes, and the introduction and spread of invasive native and exotic plants. Monitor population trends, signs of recruitment and reproduction, seasonal movements, and home range using methods such as radio telemetry, trapping and foot searches.
- Each year, refuge staff will coordinate with the Bog Turtle Recovery Team, states (NYSDEC and NJDEP), and conservation partners to insure the best available science is employed for management decisions.
- Continue efforts to acquire the one known bog turtle site on private land within the current refuge boundary.
- Deter poaching of bog turtles by conducting routine and random site visits.
- Evaluate report on freshwater turtle management, written by Dr. Kurt Buhlmann in 2005, to assess new bog turtle habitat management techniques.

Objective 1.6 (Other Threatened and Endangered Species)

Identify the presence of, and habitat potential for, threatened and endangered species within the existing, approved refuge boundary.

Rationale

Surveys of the Wallkill River in August 2000 found no dwarf wedge mussels, but documented other freshwater mussels such as eastern elliptio, eastern floater, creeper and eastern lamp mussel. Surveys also found a host fish of the dwarf wedge mussel, the tessellated darter (*Etheostoma olmstedi*). Two recovery objectives for the mussel are to down-list its status to threatened, and to delist it.

Strategies

- Continue land acquisition within current refuge boundary to maintain undeveloped river shoreline and reduce continued degradation of water quality.
- Continue to work with state biologists and with the Service’s New Jersey Field Office to conduct surveys of the Wallkill River and its tributaries for dwarf wedge mussel. State biologists have suggested using aquascopes during underwater searches, searching a 300-meter segment of the river bottom at a time, conducting shoreline inspections for shells and relics, and recording bivalve species, habitat information, current speed and depth of water at each location.
- If we found a population of dwarf wedge mussels on the refuge, we would establish and implement a monitoring and management plan for this listed species.

Goal 2. Promote actions that contribute to a healthier Wallkill River.

Objective 2.1 (Wetland Restoration)

Maintain or restore the historic floodplain of the Wallkill River wherever possible.

Rationale

Over the last century, many of the wetlands surrounding the Wallkill River have been drained, ditched, impounded and converted to agricultural fields. This has reduced waterfowl stopover habitat for species such as American black duck. The first step towards restoring those lands to their natural, historic floodplain conditions is to identify and map the impediments.

Strategies

- Identify and map in GIS impediments to historic hydrologic flow, including flooding regimes, on all Service-owned land. Include all drainage ditches, impoundments, farmed lands, dikes, excavations, tertiary roads, and berms affecting flow.
- Restore 25 acres of adjacent wet meadow habitat at Bassett's Bridge and allow natural hydrology to maintain the site.

Objective 2.2 (Improve Water Quality through Partnerships)

Each year, work in partnership with local communities to improve the biological integrity and environmental health of the Wallkill River and its tributaries through restoration projects and activities that promote river stewardship and protection.

Rationale

Service policy requires refuge managers to maintain and restore the biological integrity, diversity and environmental health of refuge land to the extent consistent with the purposes of the refuge. The Wallkill River, which runs nine miles through the middle of the refuge, is the heart of this river valley and serves as a focal point for humans and wildlife alike. Maintaining the biological integrity and environmental health of the Wallkill River is a concern to us because of the impacts to refuge resources. Agricultural practices and residential, commercial and industrial land use along the river have altered the natural function of the river floodplain, eroded stream banks, and degraded water quality. As such, the biological integrity and environmental health of this river system are in jeopardy.

One measure of biological integrity is the variation in the timing and frequency of flooding. Other measures of environmental health include water quality and contaminants, soil conditions, and the presence and productivity of aquatic life.

The refuge has worked with the Wallkill River Task Force to identify biological issues and concerns. The Task Force operates in both New York and New Jersey with a mission to protect and enhance the Wallkill River and its watershed by protecting land, improving water quality, stabilizing soils and hydrologic cycles, and educating recreational users and the public.

Strategies

- Continue to work with Wallkill Watershed Coordinator to measure water quality through various studies and tests.
- Continue to work with the State of New Jersey and New York State to promote healthy water quality.
- Continue to work with local governments and agencies to reduce non-point source pollution and sedimentation.
- Maintain Ducks Unlimited partnership and continue to restore and enhance wetlands.
- Integrate a water quality message in public use programs

Goal 3. Increase or improve opportunities for hunting, fishing, environmental education, interpretation, wildlife observation and wildlife photography.

Objective 3.1 (Hunting)

Maintain the hunting opportunities currently available by permit under refuge regulations on Service-owned land in New Jersey.

Rationale

The Refuge Improvement Act identifies hunting as a priority public use. Priority public uses are to receive enhanced consideration when developing goals and objectives for refuges if they are determined to be compatible. Providing opportunities for the public to engage in these activities on the refuge promotes visitor appreciation and support for refuge programs and helps raise public awareness for the need to protect wildlife habitat. We consider hunting at Wallkill “an area of emphasis.”

Opportunities for hunting continue to decrease as land throughout northern New Jersey is subdivided and developed. Consequently, the demand for hunting on public land has increased. Refuge hunt programs should promote positive hunting values and hunter ethics such as fair chase and sportsmanship. In general, hunting on refuges should be superior to that available on other public or private land and should provide participants with reasonable harvest opportunities, uncrowded conditions, fewer conflicts between hunters, relatively undisturbed wildlife and limited interference from or dependence on mechanized aspects of the sport. The refuge may issue hunt permits and create hunt zones to accomplish some of these objectives.

Strategies

- Pursuant to refuge regulations, continue hunt program for deer during New Jersey state seasons.
- Pursuant to refuge regulations, continue hunt program for spring and fall turkey, migratory bird, woodcock, and resident geese during New Jersey state seasons.
- Continue youth hunting programs.
- Continue to provide barrier-free hunting opportunities to disabled hunters upon request, pursuant to refuge and state regulations. A special hunt would include use of special parking areas.
- Continue to collect a refuge permit fee from all refuge hunters except youth, Golden Age and Golden Access hunters.
- Continue to prohibit night hunting and stocking of game species.

Objective 3.2 (Fishing)

Maintain the current level of sport fishing opportunities and access to the Wallkill River through the refuge by providing shoreline fishing access and boat launch sites.

Rationale

The Refuge Improvement Act identifies fishing as a priority public use. As explained in the rationale for objective 3.1, priority public uses are to receive enhanced consideration when developing goals and objectives for refuges if they are determined to be compatible. The Service permits sport fishing on refuges where it contributes to or is compatible with refuge purposes. Sport fishing is an acceptable, traditional form of wildlife-oriented recreation. Where practical, fishing should be permitted according to state regulations and seasons. Fishing and watercraft launch sites are located on the refuge at Oil City Road, Bassett’s Bridge and County Route 565. A pond adjacent to the refuge headquarters is open for public fishing.

Strategies

- Maintain fishing and/or canoe access at Oil City Road, Bassett’s Bridge, and County Route 565, on the pond adjacent to refuge headquarters and on the Dagmar Dale Nature Trail.

- Complete the development of a parking area at Wallkill River on Route 565.
- Continue to allow anglers to fish anywhere from the river shoreline, which can be accessed from boats on the river or from designated footpaths.
- Continue to stock the pond near refuge quarters no. 5 (285 Lake Wallkill Road) with native fish only for National Fishing Day Sponsor or other youth/family events.

Objective 3.3 (Wildlife Observation and Photography)

On the refuge, maintain the current wildlife observation and photography opportunities provided by the existing three-trail network.

Rationale

In addition to hunting and fishing, the Refuge Improvement Act also identifies wildlife observation and photography as priority public uses. Providing opportunities for the public to engage in these activities on the refuge promotes visitor appreciation and support for refuge programs and helps raise public awareness of the need for protecting migratory bird habitat.

Wildlife observation on the refuge is available on the Wood Duck Nature Trail, the Liberty Loop Nature Trail and Dagmar Dale Nature Trail, and by motorized boat, canoe, kayak, or rowboat along the Wallkill River.

Strategies

- Continue to provide opportunities for wildlife observation and photography by allowing foot access to the refuge through the Wood Duck Nature Trail (1.5 miles), Dagmar Dale Nature Trail (loops of 1.2 and 1.7 miles) and Liberty Loop Trail (2.5 miles). Snowshoeing and cross-country skiing are permitted in order to facilitate wildlife observation and photography in the winter, when access on foot is difficult.
- Continue to provide access to the Wallkill River at Oil City Road, Bassett's Bridge, and Route 565. Canoes, kayaks, and other small boats are allowed on the river.
- Maintain photography blind on Wood Duck Nature Trail.
- Maintain observation platform at Liberty Loop Trail.
- Complete plans for parking area for canoe access on Route 565 and Bassett's Bridge. On the refuge, maintain the current wildlife observation and photography opportunities provided by the existing three-trail network.
- Each year, maintain Tract 43 as a 50-acre, early-successional cool season grassland to promote an exceptional wildlife viewing opportunity.



Birdwatching at Liberty Marsh is a favorite refuge pastime.

Objective 3.4 (Interpretation)

Work with partners to provide wildlife interpretation opportunities on- and off-refuge, offering at least two programs annually.

Rationale

Along with hunting, fishing, wildlife observation and photography, environmental education and interpretation are priority public uses. Our policy is to advance public awareness, understanding, and appreciation of the functions of ecosystems and the benefits of their management for fish, wildlife and people. One way refuges pursue that objective is by offering wildlife interpretation opportunities on and off refuges. Such opportunities promote awareness and understanding of

resource issues, particularly issues relating to fish and wildlife resources and their management. We recognize interpretation at Wallkill as “an area of emphasis.”

Interpretation is an educational activity aimed at revealing relationships, examining systems, and exploring how the natural world and human activities intertwine. One of its goals is to stimulate additional interest and positive action. Interpretation is both educational and recreational in nature. That is, participants voluntarily become involved in interpretive activities because they enjoy them, and in the process, they learn about the complex issues confronting fish and wildlife resource managers. Although audiovisual media, exhibits, demonstrations, and presentations are often advantageous and necessary components of interpretation, the program emphasizes first-hand experience with the environment.

Strategies

- Continue to provide training opportunities for college students through a refuge internship program.
- Continue to conduct public events such as National Fishing Day.
- Continue to maintain five kiosks with up-do-date information about the refuge and refuge system.
- Continue to provide and update a Wood Duck Nature Trail brochure, general refuge brochure, bird checklist and other Service brochures.

**Objective 3.5
(Environmental Education)**

Work with partners to provide environmental education and wildlife interpretation opportunities on- and off-refuge, offering at least two programs annually.

Rationale

Environmental education in the Refuge System incorporates on-site, off-site, and distance-learning materials, activities, programs, and products that address the audience’s course of study, the mission of the Refuge System and the management purposes of the refuge. The goal of environmental education is to promote an awareness of the basic ecological foundations for the interrelationships between human activities and natural systems. Through curriculum-based environmental education, both on- and off-refuge, refuge staff and partners hope to motivate students and other persons interested in learning the role of management in the maintenance of healthy ecosystems and conserving our fish and wildlife resources.

Strategies

- Staff and volunteers will continue to conduct occasional on- and off-site presentations.
- Facilitate partners to develop a more comprehensive environmental education program.

Objective 3.6 (Cultural Resource Management)

Protect, maintain, and plan for the use of Service-managed cultural resources for the benefit of present and future generations.

Rationale

It is the policy of the Service to identify, protect and manage cultural resources located on Service land and affected by Service undertakings, in a spirit of stewardship, for future generations (USFWS 1992). Specifically, the Service

will manage those resources in a manner that sufficiently protects sites, structures, and objects of importance for present or future scientific study, public appreciation and socio-cultural use.

Strategies

- Continue to comply with section 106 of the National Historic Preservation Act of 1966, as amended.
- Continue to promote and encourage academic research on, or relating to, refuge land.
- Add Archaeological Resource Protection Act (ARPA) language to appropriate public use materials to warn visitors about disturbing/looting historic and archeological resources.
- Encourage law enforcement personnel to train in ARPA enforcement.

Goal 4. Cultivate an informed and conservation-educated public that works to support the goals of the refuge and the mission of the National Wildlife Refuge System.

Objective 4.1 (Outreach)

Continue to participate in local events and remain active with conservation commissions and state and local conservation partnerships with a message advocating resource conservation and stewardship and promoting the mission of the National Wildlife Refuge System.

Rationale

Public outreach would improve recognition of the refuge, the Refuge System and the Service among neighbors, local leaders, conservation organizations and elected officials, thus generating support for conservation in the region.

Strategies

- Implement public use program in accordance with draft Visitor Services Plan prepared in 1997.
- Increase public awareness and attract visitors through use of media and local businesses, including local television, Internet, and local chambers of commerce.
- Participate in annual special events such as Vernon Earthfest, Orange County Conservation Field Days, Earth days and special events sponsored by local organizations.
- Continue to collaborate with Bergen County Audubon Society through the “Audubon Refuge Keeper” program.
- When invited, participate in local and regional committees, such as the Wallkill River Watershed Management Plan Public Advisory Committee and the Vernon Chamber of Commerce Eco-tourism Committee.
- Maintain open communication with local and county officials and organizations.

**Objective 4.2
(Communication)**

Increase public awareness and attract visitors through use of media and local businesses, including local television, the Internet, and local chambers of commerce.

Rationale

It is Service policy that refuge personnel will actively involve themselves in effective communication between the Service and the public. Good public relations depend on many factors. Important among these is open and continuing communication between the refuge and the public. Various means are available to refuge managers by which to communicate information effectively, such as contact with the public through refuge programs, news media interviews, news releases, and participating in community events.

Strategies

- Continue to maintain the refuge website.
- Continue to distribute media releases, media alerts and television advertisements.
- Continue to hold media events at the refuge.
- Continue to offer and provide tours to members of the local media.
- Continue to participate in local chamber of commerce events.

Objective 4.3 (Support Programs)

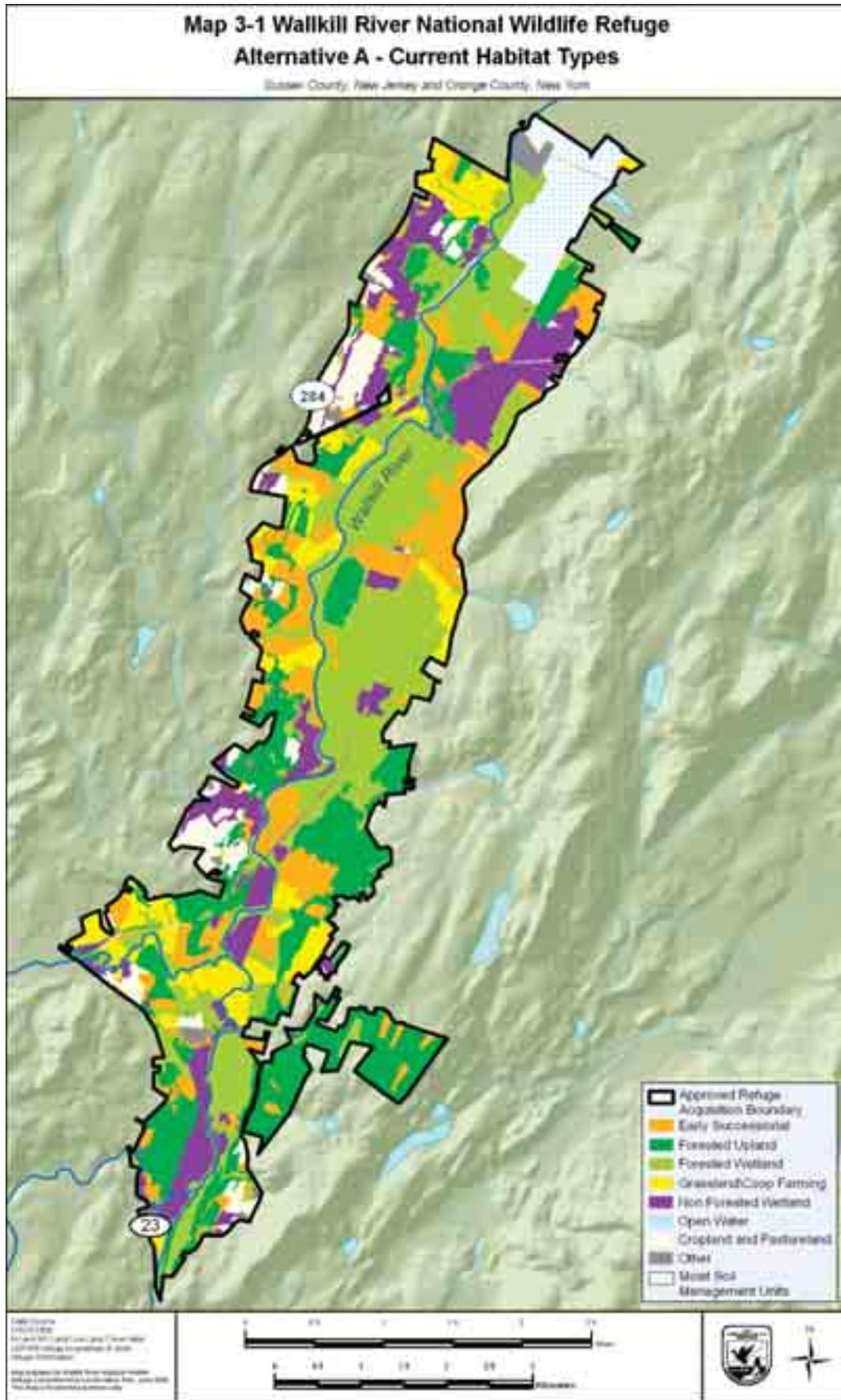
Maintain programs for volunteers, interns, youths and community service participants to help support all aspects of refuge management including maintenance, biological surveys and public use.

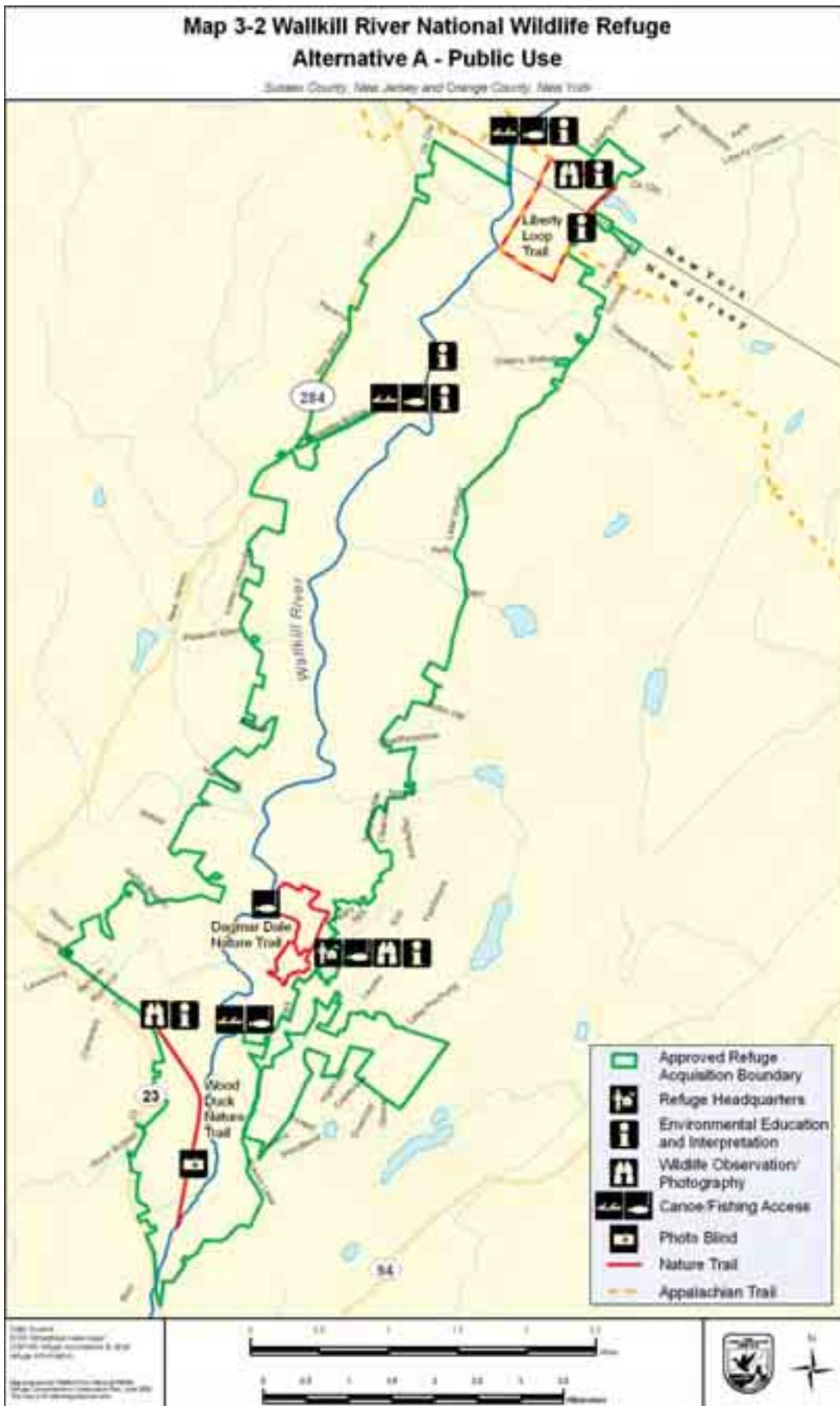
Rationale

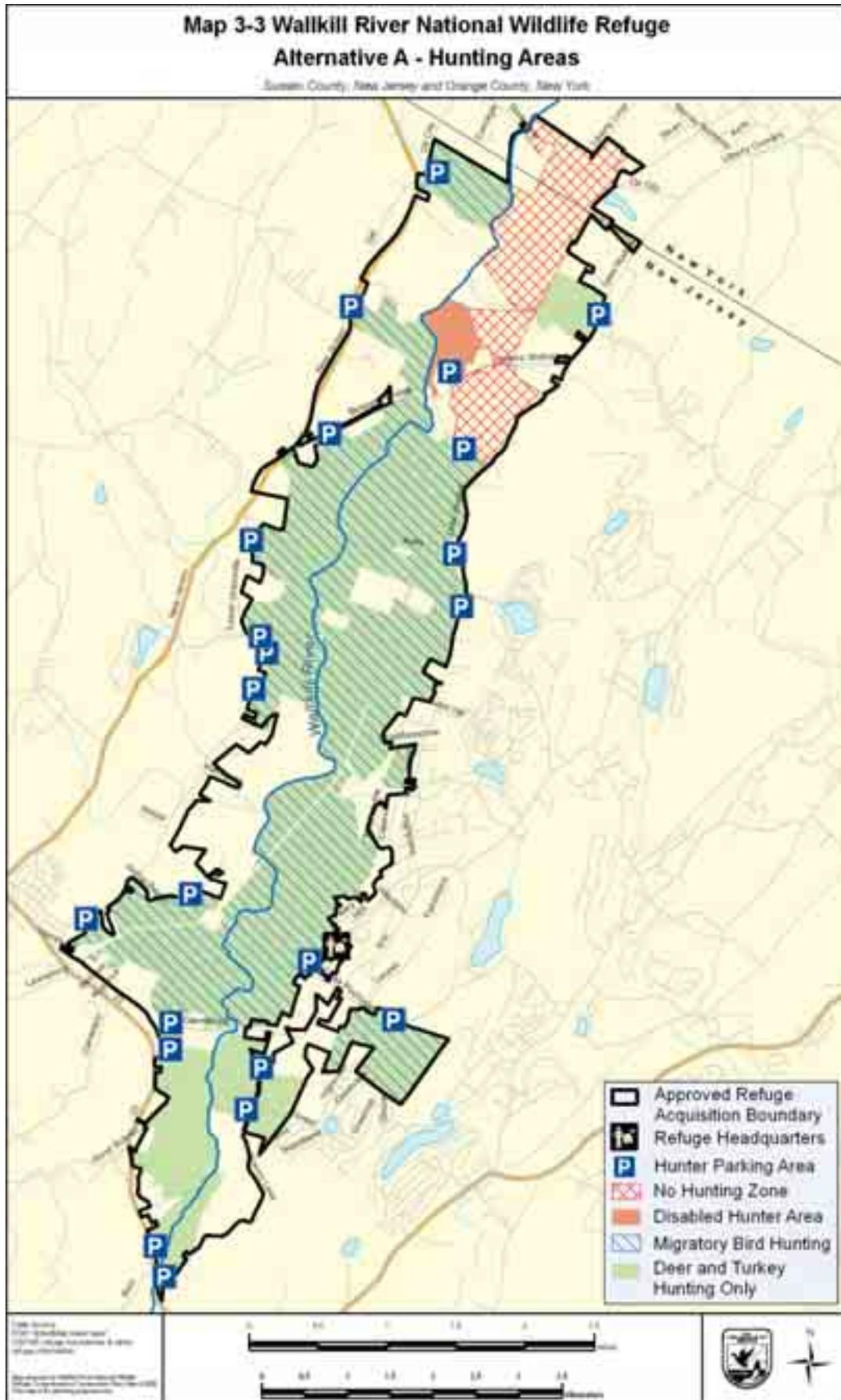
Volunteers, interns and other youth and community service participants contribute significantly to the refuge's biological, public use, and maintenance programs. Their work includes wildlife surveys, invasive species identification, bluebird box monitoring and maintenance, trail maintenance, carpentry, computer support, visitor services support, and cleanup or grounds maintenance. In fiscal year 2006, 35 refuge volunteers contributed more than 2,000 hours.

Strategies

- Continue to work with independent, local volunteers as opportunities arise. Make an effort to recruit volunteers who have a specific set of skills and knowledge of the refuge so they can work with minimal supervision.
- Continue to foster the new refuge Friends Group (founded in 2006).
- Continue scouting programs.
- Continue to provide training opportunities for college students through refuge (and partner) internship program.
- Work with Sussex County Probation Office's community service program to maintain trails, grounds, and structures.







Alternative B. The Service-Preferred Alternative

Introduction

Alternative B is the alternative our planning team recommends to our Regional Director for implementation. It includes an array of management actions that, in our professional judgment, work best towards achieving the refuge's purposes, the vision and goals, and would make a significant contribution to conserving natural resources in the Kittatinny Valley, where the refuge lays. This alternative would address most effectively the significant issues identified in chapter 1. We believe it is reasonable, feasible, and practicable, within its 15-year timeframe, but would require appropriate funding to obtain its goals.

Alternative B proposes to add a total of 9,550 acres that composes four focus areas to the existing, approved refuge boundary. Of that total, we recommend acquiring 4,763 acres in fee title and 4,585 acres in conservation easements. (Note: Those numbers may not add up to the total acres proposed for acquisition because we based them on a different set of GIS calculations.) The rest of the land we propose to acquire in either fee or easement. As always, the ability of the Service to acquire land depends on the availability of funds; and the method of acquisition depends on the needs and desires of each willing seller.

The proposed expansion lays in the Wallkill River Valley, part of the Kittatinny Valley. The Kittatinny Valley lays in Sussex and Warren counties, between the Kittatinny Ridge and the northern extent of the Hudson Highlands. The Wildlife Action Plan of the State of New Jersey recognizes the Kittatinny Valley as important for dozens of species in a variety of habitats. Among the species most relevant to the Service are the bald eagle, peregrine falcon, various hawks, bog turtle, wood turtle, dwarf wedge mussel, wood duck, vesper sparrow, arogos skipper, bobolink, grasshopper sparrow, and savannah sparrow. The 9,550 acres would be divided among four focus areas: Papakating Creek (7,079 acres), Beaver Run (849 acres), Wallkill Adjoining West (1,092 acres) and Wallkill Adjoining North (530 acres).

*More than
30,000 people
per year
currently
visit Wallkill
River NWR*



USFWS

The Papakating Creek Focus Area, the largest of the areas, encompasses a major tributary to the Wallkill River, and includes significant wetlands associated with bog turtle habitat. Other important habitats in the proposed expansion area include forested and emergent wetlands, large grassland complexes, upland forests, floodplain forests, and farmlands that are regionally important for migratory waterbirds, waterfowl, raptors, grassland birds, and rare reptiles. Rare calcareous wetlands are also present in some of the areas proposed for inclusion in the current boundary. Appendix G, "Land Protection Plan," explains in more detail the contributions of each focus area in protecting wildlife habitat and enhancing the biological integrity of the refuge.

Protecting habitat for trust resources, including by preserving land in northwest New Jersey and southeast New York is critical and challenging. With real estate values increasing due to migrations of people from the New York metropolitan area, there is an acute need to act quickly to preserve key remaining habitat parcels in Sussex and Orange counties. For that reason, the Service recognizes the need to collaborate with other conservation organizations in the region.

In July 2005, the Service met with representatives from the State of New Jersey, The Nature Conservancy, Trust for Public Land, New Jersey Audubon Society, New Jersey Conservation Foundation, Morris Land Conservancy, as well as municipal, county and state officials to discuss and define the role each agency could play in protecting wildlife habitat in the Kittatinny Valley. Each partner uses its agency's individual mission statement to focus protection efforts. Taken together, those mission statements cover the protection of farmland, threatened and endangered species, scenic areas, grassland habitats, and open space that has been identified as significant to the local community.

After each agency outlined areas of protection interest on a map, we had identified 61,743 acres worthy of protection in the Kittatinny Valley. As mentioned above, the Service proposes to focus our limited resources on 9,550 acres of the Wallkill River Valley, adjacent to the current acquisition boundary. Our partners would lead in protecting an additional 52,193 acres in the larger Kittatinny Valley. Only with partners working to preserve the uplands and tributary valleys along the expansion area will the refuge be able to maximize the valley's potential to function as a viable ecosystem.

By adding the four proposed focus areas to its current acquisition boundary, the refuge could become a catalyst for land conservation in the Kittatinny Valley. It is appropriate for the Service to lead this land conservation because the proposed acquisition area will further the refuge's purposes, by preserving and enhancing lands and waters that will conserve the natural diversity of fish, wildlife, plants, and their habitats for present and future generations. The wetlands along Beaver Run and Papakating Creek will allow the refuge to conserve and enhance fish and wildlife populations, including populations of black ducks and other waterfowl, raptors, passerines, and marsh and water birds. By re-establishing healthy forests and reducing erosion, sedimentation and non-point source pollution, the Service will be able to maintain and enhance habitats for migratory birds, fish, and state and federal-listed species. In addition, the opportunities for wildlife-dependent recreation would increase, through additional trails, wildlife observation areas, fishing and hunting access points and lands, and interpretation and education. Without that protection, those lands no doubt will no longer support fish and wildlife populations and, by default, will no longer support opportunities for wildlife-dependent recreation.

Expanding the refuge boundary would spur land protection adjacent to the proposed boundary as well as inside it. Some of our partners focus expressly on

helping the Service acquire land within our approved acquisition boundaries. Those partners have a great interest in the proposed expansion area, particularly because the Service has acquired almost all the land in the current acquisition boundary: 5,106 acres of the GIS-calculated 7,100-acre current acquisition boundary. The county farmland protection program owns and protects an additional 590 acres of land within the current acquisition boundary. New Jersey's Green Acres owns and protects 175 acres. That leaves only 1,245 acres unprotected.

Much of the land in the proposed acquisition boundary is used for private agriculture or woodlots, or functions as early successional habitat associated with previous agriculture and silviculture. Although we will assess each opportunity on its merits at the time, many parties show significant interest in purchasing land within the proposed acquisition boundary through easement or in fee. In almost all cases, the land within the Service's proposed expansion area would be turned over to the Service in full or via management rights. In this way, there will be significant cost savings to the Service and distribution among many organizations in the conservation field.

Most significant among the acquisition areas is the Papakating Creek Focus Area. Heading generally westward from the current refuge, this major tributary winds through farmland, forest and a few small developments before dispersing along the Kittatinny Ridge and its state-protected land. Primary among the benefits to wildlife, wildlife habitats and the region from this proposed expansion would be the establishment of a preserved corridor running from the Kittatinny Ridge to the Hudson Highlands. The current refuge borders the Hudson Highlands' western edge. Such an uninterrupted band of land exists nowhere else in New Jersey; it presents the last opportunity to create this kind of preserved set of wildlife corridors. With a band of natural habitats spanning the Kittatinny Valley, species will be able to better migrate from the large population production areas of the Allegheny Plateau, which extends across Pennsylvania and New York, to the more developed and isolated natural lands of the Hudson Highlands and the igneous (largely undeveloped) ridges of northern New Jersey. With the growing understanding of the importance of corridors for the flow of individual animals as well as entire animal populations, this expansion area represents a prime opportunity to strengthen wildlife populations at the edge of the New York metropolitan area. Through the establishment, management and maintenance of this corridor, the Service would help support populations of forest and wetland migratory birds, larger mammals, and reptiles and amphibians. Many of the species identified in the New Jersey WAP, such as northern harriers, wood turtles and bobcats, will benefit from this proposed expansion. It is as important to note that the maintenance of these species and habitats will help offset some of the less desirable impacts from species that may overpopulate, such as coyotes and deer, despite the region's fragmented, low-quality wildlife habitats. The Papakating Creek also supports a warm-water fishery and the upper tributaries could support native brook trout populations.

Most of the land in the focus areas contains the same habitat types as those found in the existing, approved refuge boundary. Our management objectives for these habitat types, namely, forested and non-forested wetlands, upland forest, grassland habitat and scrub-shrub habitat, will be similar to our management objectives in alternative A. One of the refuge's highest priority habitat projects would be to restore forested and non-forested wetlands. Many of the wetlands surrounding the Wallkill River have been deforested, drained, ditched and converted to agricultural fields. One major proposal in the CCP related to wetland restoration would pursue emergent wetland restoration projects that can be easily accomplished and maintained simply by plugging ditches. That would be a low-cost, low-maintenance project.

The refuge would also give priority to managing for early successional and grassland habitat conservation. We would focus limited resources on providing high quality, sustainable, and reasonably manageable grassland habitat on three priority, large (>150-acre) grassland complexes. Smaller grassland fields that formerly were managed across the refuge would not be maintained, unless needed to support an administrative or priority public use. Those fields would likely revert to shrub habitat over the next 15 years.

Under this alternative, the refuge would identify, map and field survey all suitable bog turtle sites. The refuge would develop a site management and monitoring plan for potential sites and start experimenting with different habitat management techniques on current sites. The refuge would also begin surveying for other listed species that may occupy certain habitat types.

We predict visitation to the refuge would increase by 15 percent under this alternative as public use opportunities would increase. However, the emphasis on this alternative is to improve the quality of existing programs. We would expand the hunting opportunities to include bear hunting. The quality of interpretive materials would improve at existing trails. The Wood Duck Nature Trail would be expanded, providing additional wildlife observation, photography, and interpretation opportunities.

For alternative B, we propose a staff of five: a Refuge Manager, Private Lands Biologist, Visitor Services Specialist, maintenance worker and biologist. Since the only currently approved staffing position is the biologist position, this would be an increase of four staff from alternative A.

Since the habitat types in the current acquisition boundary and the proposed acquisition area are similar, we calculated and mapped projected habitat types for the current acquisition boundary and used those same calculations for habitat type projections in the expansion boundary. For example, we project that both the current acquisition boundary and the proposed expansion boundary would have 33.13 percent of their total acres in forested wetland habitat under alternative B. The map for the current acquisition boundary, however, shows these projected habitat types (map 3-4), while the map for the proposed expansion area shows actual habitat types using National Land Use/Land Cover Data (map 3-5). We simply did not have the resources to map projected habitat types for the entire 9,550-acre expansion area.

Map 3-6 illustrates the proposed public use strategies. Those maps appear at the end of the alternative B write-up.

We developed the following objectives for the Wallkill River refuge in alternative B.

Goal 1. Protect and enhance habitats for federal trust species and other species of special management concern, with particular emphasis on migratory birds and bog turtles.

Objective 1.1 (Scrub-shrub Habitat)

Within 10-15 years of CCP approval, actively maintain a rotational mosaic of 1,708 acres in scrub-shrub habitat within the current and expanded refuge boundaries to provide habitat for shrub nesting land birds of concern, such as the golden winged warbler, prairie warbler, field sparrow, eastern towhee, gray catbird (Dettmers 2000) and woodcock. Depending on the spatial characteristics of the land, some scrub-shrub parcels will total less than 10 acres in size.

Rationale

The Wallkill River refuge is located in one of the more nonforested landscapes within the Northern Ridge and Valley physiographic area, made up of the Kittatinny Ridge to the west, the Hudson Highlands to the east and the Kittatinny valley in the middle. Much of the land that is already managed or protected in this physiographic area is forestland. Therefore, the refuge holds a unique position of being a large tract of public land with nonforested habitats that we could manage for grassland or shrub land birds, and lays within a landscape that has a significant proportion of open land where it makes ecological sense to manage for those types of species (Dettmers 2000). There has been a shift in focus from grassland management to scrub-shrub habitat in refuges in the east. This is due in part to a report on grassland bird breeding use of managed grasslands on National Wildlife Refuges within Region 5 (Runge et. al., 2004), which did not list Mid-Atlantic Coastal Plan refuges as the ideal place for grassland birds. Grassland species were a focus at one time in the east because of the amount of abandoned agricultural land that has the potential to be managed for grassland birds. Recently however, due to southern New Jersey's questionable matrix of habitats for grassland birds, the Grassland Study Preliminary Report recognizes scrub-shrub habitat as increasingly more important. Factors such as topography, habitat, soils, and surrounding upland forest make conditions at Wallkill better suited for scrub-shrub and forest interior-dependent species.

The refuge also lays within BCA Area 17, as defined by the PIF Bird Conservation Plan (Rosenberg 2003). This plan also identifies shrub-scrub habitat as high priority because of its importance to breeding populations of golden-winged warblers, but also because many other shrub land species have undergone significant population declines in this physiographic area (Dettmers 2000). The Area 17 targets for shrub land acres and bird populations are considerably higher than are those for the grassland suite, so it will be more difficult for the refuge to make as large a contribution to the PIF goals. The PIF plan calls for 71,000 ha (175,500 ac) of shrub land habitat to support the entire suite of birds using this habitat. However, although the refuge may not be able to make a large contribution to the overall PIF goal for this habitat-suite, some management for shrub land birds could fit rather easily into the overall plans and spatial configuration of habitats on Service-owned land, within the current and expanded refuge boundaries.

Within the refuge boundary, we will allow grassland and scrub-shrub habitats along the 100-meter riparian corridor to succeed to forest. We will maintain as scrub-shrub habitat the areas outside that corridor with substantial populations of scrub-shrub-dependent birds. Most birds that depend on shrub land do not require as large and as contiguous patches of appropriate habitat as many of the high-priority grassland- and woodland-dependent birds. Most of the shrubland species readily use small (2- to 5-acre) patches of scrub-shrub forest habitat. If we allow the small fields that would not be very beneficial for grassland birds on the refuge to continue their succession, they could make good habitat for shrub land birds. We could manage a complex of those small fields on a longer rotational basis to provide a variety of scrub-shrub habitats. The refuge should also make a greater effort to establish scrub-shrub habitat if golden-winged warblers are breeding on or near its land. This species is one of the highest-priority species, and if it is breeding in the area, the refuge could potentially provide good habitat for it. The PIF plan considers managing for this species as high priority wherever it is feasible. Golden-winged warbler territories have been described as having thick, brushy habitat interspersed with patches of relatively open, herbaceous vegetation (grasses or sedges), often with a forested edge or perimeter. Nests are often located along field-forest edges where brushy and herbaceous patches meet. Some of this type of habitat already exists on currently owned refuge

land. By allowing some small fields to succeed, we could provide more of that type of habitat on currently owned land and on land proposed for inclusion in the expansion boundary.

The New Jersey WAP also identifies golden-winged warbler and woodcock as important species to manage for in this area of the state. The state hopes to increase and stabilize population numbers for both these species of scrub-shrub-dependent birds.

Strategies

In addition to alternative A and within 5 years of CCP approval:

- Manage a total of 730 acres of land within the current acquisition boundary as scrub-shrub habitat.
- Inventory and map all existing scrub-shrub habitats >2 acres.
- Conduct bird surveys of scrub-shrub habitats to determine which species are using these habitats. Determine whether golden-winged warblers, a high-priority species within the PIF plan and the New Jersey WAP, are breeding on or near refuge land. If found, we would likely tailor scrub-shrub management strategies towards the golden winged warbler in some areas of the refuge
- Convene a group of specialists to evaluate each shrub-scrub habitat field and determine which fields could be effectively managed over the long-term to benefit focus species, such as those mentioned in the objective above.

Within 5–15 years of CCP approval:

- Determine which of the existing shrub-scrub fields (less than 25 acres) we will allow to grow into mature forest, and which we will manage on a 10- to 15-year rotation (or, once the height of the prevalent vegetation reaches 10 feet). In general, we will allow small fields within the 100-meter floodplain to succeed to forested habitat in order to establish the floodplain forest. For the fields that will remain as shrub-scrub, we will use accepted management practices such as mechanical control, management ignited prescribed fire, livestock grazing, and herbicides to maintain fields in desired vegetated stages.
- Incorporate plans for shrubland habitat management into a larger Habitat Management Plan (HMP). Establish shrubland management areas in the HMP.
- Acquire from willing sellers 978 acres within the proposed expansion area and manage fee land as scrub-shrub habitat according to the objective above (objective 1.1).

Objective 1.2 (Non-Forested Wetlands)

Manage 1,216 acres of emergent wetland within the existing, approved refuge boundary, including 335 acres of moist soil units at Liberty Marsh, to provide spring and fall migratory waterfowl habitat for species such as black duck, wood duck, mallard and green-winged teal; to provide shorebird habitat for species such as greater and lesser yellowlegs and spotted sandpiper; and, to provide wintering raptor foraging habitat for species such as short-eared owls, northern harrier and rough-legged hawk.

Rationale

The refuge falls within the Atlantic Coast Joint Venture (ACJV) Northern New Jersey Limestone Focus Area. That area is centered on valuable inland freshwater wetlands of Northwestern New Jersey stretching southeast of the Kittatinny Mountains into Warren and Sussex counties. These wetlands in the



Kevin Holcomb

Non-forested wetlands on the refuge provide stopover habitat for many migratory birds.

northeastern section of the focus area drain into the Hudson River Drainage Basin via the Wallkill River. According to the New Jersey Governor's Skyland Greenway Task Force, the Upper Wallkill River Valley is considered crucial land, and the New Jersey State Natural Heritage Program has identified several areas (most of which are wetlands) within the focus area as a Priority Site for Biodiversity. Waterfowl such as the Atlantic population Canada goose, American black duck, mallard, wood duck, hooded merganser, and the common merganser use the focus area in breeding, migrating and wintering. Additional migratory birds of significance are the common snipe (whose limited breeding sites include the Wallkill River), more than 170 species of passerines, and several nests of bald eagle pairs

(ACJV–Focus Area Report Draft quoting Walsh et al. 1999). In addition, the New Jersey WAP identifies non-forested wetland habitat in this area as important for increasing and stabilizing the populations of four state-listed endangered species and three state-listed threatened species. The endangered species include the American bittern, Northern harrier, pied-billed grebe and sedge wren. The threatened species include the black-crowned night heron, osprey, and long-tailed salamander.

We would continue to manage 335 acres of freshwater impoundments at Liberty Marsh. Depending on the results of the impoundment study mentioned in alternative A, the refuge may convert additional non-forested wetlands within the current and expanded refuge boundaries to moist soil management units. The acreage and location of habitats may vary somewhat each year, depending on wetland dynamics, vegetation management, and successional changes in each wetland. The primary effort within impoundments will be to provide productive annual vegetation communities to meet the feeding requirements for a variety of shorebirds and waterfowl that depend on this habitat. At Liberty Marsh, that means that for 3 to 4 weeks during the peak migration times in the spring and fall, the refuge staff will flood those impoundments, after which drawdowns will allow vegetative reproduction in the summer. However, recent management actions have revealed that the soils in Liberty Marsh may be unable to retain water for extended periods. For that reason, holding water in these impoundments for extended periods makes them ineffective. Therefore, the refuge is reconsidering the value of impoundments in its management goals.

We will base the decision to convert wetlands to moist soil management units on a set of criteria laid out in the strategies below. We will try to avoid duplicating habitat composition that occurs in natural wetlands outside the impoundment system. Moist soil management units are highly managed systems, and require significant amounts of staff time and maintenance to oversee water level manipulation and vegetation control.

We would consider restoring other wetlands to a more natural drainage regime. Many areas along the Wallkill River and its tributaries were used extensively for agriculture. As the Service acquires those lands, we can increase their benefit to migratory birds and fish if we remove the dikes and plug the drainage ditches. The return of more natural water flows can reduce the prevalence of invasive species. Often, those areas require no active management.

Strategies

In addition to alternative A and within 15 years of CCP approval:

- Manage a total of 1,420 acres within the current acquisition boundary as non-forested wetland habitat.
- Acquire from willing sellers 1,904 acres within the proposed expansion area, and manage fee land as non-forested wetland habitat according to the objective above (objective 1.2).
- Use the following criteria to determine whether non-forested wetlands within the current or expanded refuge boundary would qualify for conversion into moist soil management units and, therefore, would be managed similarly to Liberty Marsh, as stated in the rationale above. We expect that new impoundments would be managed in a similar proportion and in a similar way to our current impoundments, which are discussed in alternative A.
 - The area must be located near a direct water source (creek, river, runoff or some other water source)
 - The area must be located in a low area in relation to the water source so gravity can work with the water control structure to adjust water levels for the spring and fall bird migrations.
 - The area ideally would be deforested when the Service acquires it.
 - The site must contain soils suitable for holding water for moderate to extended periods.
 - Berms, dikes or other impediments to water flow should be preexisting.
- Evaluate waterways within the refuge to determine whether excessive erosion is occurring. Develop restoration plans if the erosion falls outside the range of natural variability.
- Evaluate the previously drained, ditched, and diked areas along the Wallkill River and its tributaries for restoration to more natural drainage patterns.

Objective 1.3 (Grassland Habitat)

Within 10 to 15 years of CCP approval, refuge staff will manage a mosaic of 1,382 acres of grassland habitat within the current and expanded refuge boundaries for bobolink, grasshopper sparrow and savannah sparrow, including three grassland focus areas of at least 100 acres each within the current boundary, and additional parcels >100 acres likely to be identified and managed within the expansion area. Half the total acreage would be managed as short, sparse grassland (<50 cm tall; <75 percent vegetative cover) to provide habitat for grasshopper sparrows and the other half would be managed as medium height, dense grassland (50–100 cm tall; 75–95 percent vegetative cover) to provide habitat for bobolink. Both types of grassland would also support savannah sparrows.

Rationale

As stated above in objective 1.1, the refuge holds a unique position of being a large tract of public land with nonforested habitats that we could manage for grassland or shrub land birds. Although scrub-shrub-dependent birds are a higher priority than are grassland birds in many of the regional bird conservation plans, and although the refuge cannot provide the quantity and quality of grassland habitat that refuges to the north and south are able to, the

Wallkill River refuge can still play a role in providing habitat for grassland-dependent birds.

For the grassland habitat suite, the PIF Bird Conservation Plan for Area 17 focuses on setting objectives for bobolinks, grasshopper sparrows, and upland sandpipers. The New Jersey WAP also identifies those three bird species as state-listed (threatened). We use bobolinks as a grassland generalist, and assume that, if sufficient habitat is provided for this species, then many of the other species in this habitat suite also will be provided for. Grasshopper sparrows and upland sandpipers are two more specialists, so we set specific objectives for them. Grasshopper sparrows require larger patches of grassland with fairly short and sparse vegetation. Upland sandpipers have the largest area requirements of all the grassland birds, and need a mixture of both tall and short grasses. Therefore, managing for upland sandpipers is not a realistic goal at the refuge. Instead, the refuge was encouraged to focus its grassland management goals on bobolinks, grasshopper sparrows, and savannah sparrows. A 3-year study of grassland birds at the Wallkill River refuge also recommended managing for those three bird species (Gore 1998).

In his report on how the Wallkill River refuge can best contribute to PIF objectives, Randy Dettmers (2000) suggested as a reasonable short-term goal (5–8 years) that the refuge support 1 percent of the target population/acres for the three grassland birds mentioned above within the current acquisition boundary. For bobolinks, the PIF Area 17 goals are 13,000 ha of grassland to support 12,000 pairs. One percent of 12,000 pairs is 120 pairs; 1 percent of 13,000 ha is 130 ha (320 acres). Dettmers suggested a long-term goal (10–15 years) for the refuge would be to double these numbers and support ~250 pairs of bobolinks with 650 acres devoted to management for grassland birds within the current acquisition boundary. The assumption being that within those 650 acres, the population objectives for bobolinks, grasshopper sparrows, and savannah sparrow could also be met. About half of those acres should be managed specifically to support 1 percent of the Area 17 grasshopper sparrow objectives, or 45 pairs of grasshopper sparrows, and 160 acres managed for the short-term goal, and 90 pairs and 300 to 350 acres managed for the long-term goal. Savannah sparrows are sufficiently general in their habitat needs that the acres managed for grasshopper sparrows and bobolinks should be sufficient to achieve the target numbers. See table 3.2 below for a summary of recommendations for grassland management on the refuge. Management for all of these species should focus in fields that are at least 50 acres in size, with larger being better. As mentioned in the grassland objective, the refuge will manage three grassland focus areas of 100 acres or more, while allowing grassland fields smaller than 100 acres to succeed to shrub-scrub habitat, as mentioned in objective 1.1.

We used the recommendations above as a guideline for setting the objectives for grassland habitat management in the current acquisition boundary. We would use the same guidelines as the Service acquires land in the proposed expansion boundary.

Table 3.1. Summary of recommendations for Wallkill River refuge grassland management.

Species	Short-term Goals (5–8 years)		Long-term Goals (10–15 years)	
	Population goal	Acreage goal	Population goal	Acreage goal
Bobolink	120 pairs	320 ac	250 pairs	650 ac
Savannah Sparrow	87 pairs		150 pairs	
Grasshopper Sparrow	45 pairs	160 ac (of 320)	90 pairs	300-350 ac (of 650)

Strategies

In addition to alternative A and within 5 years of CCP approval:

- Within the current acquisition boundary, manage a total of 590 acres of grassland habitat divided into three grassland focus areas. Apply a rotational treatment schedule every 1 to 5 years, depending on site characteristics, which will create a variety of successional stages and vegetation diversity. Treatments would include mowing, cooperative farming (haying), igniting management-prescribed fire, applying herbicides, and grazing livestock. Large fields (≥ 100 acres) could be divided in half or thirds, with each section managed on a rotational basis. Smaller fields (50–100 acres) could be managed as a complex, especially if they are close to each other. Use Mitchell's Grasslands Report for overall strategy as to grass species/structure/etc. (Mitchell 2000).
- Establish criteria and monitor effectiveness of cooperative haying and grazing to insure these operations benefit nesting or wintering grassland-dependent bird habitat as defined by Mitchell (USFWS 2000).
- Consult with NRCS when planting native grasses to ensure the selected species will grow well under the soil type and moisture conditions of a given field. Contact grassland bird experts about the value of grass species to wildlife.
- Annually conduct breeding and wintering grassland-dependent bird surveys, documenting the use of different successional stages by nesting and wintering grassland birds. Identify vegetation parameters that will be monitored along with bird response. Use this information to adjust habitat management techniques on grassland.
- Incorporate plans for grassland management into the larger Habitat Management Plan (HMP).

Within 10–15 years of CCP approval:

- Acquire from willing sellers 791 acres within the proposed expansion area and manage land acquired in fee as grassland habitat according to the objective above (objective 1.3).
- Create grassland focus areas in the expansion area where appropriate conditions exist. Some of the criteria we will use for deciding whether future land would be appropriate for inclusion in grassland focus areas include the following.
 - Several old fields that are adjacent or close to each other, and total at least 50 acres
 - Fields that contain soils that are conducive to growing grassland plant species for the target bird species mentioned above
 - Fields that refuge staff can access easily for management purposes
 - Fields that have a site history conducive to grassland plant species

Two areas within the Papakating Creek Focus Area could fit the above criteria are at the intersections of Plains Road, Meyer Road and Davis Road, continuing in each direction along Plains Road, and at Klimans Road and Route 519.

- Work with neighboring landowners to promote privately owned grassland that will benefit grassland species of conservation concern.
- Initiate a study on tracts 15b and 79a (26 acres) to assess the effectiveness of livestock grazing to maintain nesting grassland bird habitat and reduce the percent cover of invasive plant species such as purple loosestrife and multi-flora rose.
- Develop a Habitat Management Plan (HMP) and a Monitoring and Inventory Plan, emphasizing grassland to maintain the existing diversity of nesting and wintering grassland birds.

Objective 1.4 (Forested Communities)

Sustain 9,761 acres of forested wetlands and uplands within the current and expanded refuge boundaries to maintain overall habitat diversity in Sussex County. Approximately 5,474 acres would be maintained as palustrine, mature (80+ years) deciduous floodplain forest and 4,286 acres in mixed upland forest, both in habitat patches over 100 acres, to support a suite of nesting interior forested land birds of concern, such as cerulean warbler, worm eating warbler, wood thrush, eastern wood peewee, Baltimore oriole, Louisiana water thrush, Kentucky warbler, and scarlet tanager.

Rationale

The PIF Bird Conservation Plan for Area 17 calls for almost 2.5 million acres of mature hardwood forest to support mature forest habitat-species suite in Area 17 (Rosenberg 2003); however, because mature hardwood forest is the top conservation priority in Area 17, any contributions to the overall conservation goals for this habitat are significant. Many of the refuge's forested uplands connect to the larger blocks of forest covering the surrounding uplands. Within these upland forests, with their more fertile soils and gentler slopes, mature trees often will have greater height, health and biomass. Many migratory bird species such as red-eyed vireo and rufous-sided towhee will use those habitats. Vernal pools are an important component of those areas, and the refuge has more than 25 of those sites. Salamanders, frogs and toads all use them.

With much of the forestland in this physiographic area occurring on ridges, bottomland forests are a rare commodity (Dettmers 2000). Managing for forested bottomland corridors along the Wallkill River and its tributaries would constitute a significant contribution to the overall goals for Area 17, especially with a focus on cerulean warblers and Louisiana water thrushes. Cerulean warblers will occupy late succession bottomland forests, especially those with sycamore as a prominent component. Water thrushes require late successional hardwood forests along rocky, flowing streams. Both species are more common in larger patches of forest. Forest bottomlands and riparian corridors also would benefit most of the other high-priority species in this suite. Wood thrushes and Baltimore orioles, in particular, will readily occupy those habitats. Pewees and scarlet tanagers will also use them.

Connecting and consolidating existing large blocks of mature forest wherever possible will also benefit the suite of bird species mentioned above. Whether more active management of existing forestland would be needed depends on its condition. Many of the priority mature forest species prefer late successional woodlands with small gaps scattered throughout. The gaps create structural vegetation diversity that these birds require or at least prefer. Even-aged forests that are densely stocked and have little horizontal diversity in their vegetation layers will not support as many species or individuals as a forest with well-developed layers of understory, mid-story, and canopy. Selective cutting could be used to create small gaps if the existing woods lack sufficient structural diversity.

Large blocks of forested habitat would also benefit the state-listed threatened and endangered species identified in the New Jersey WAP. The state-listed endangered species include the Allegheny woodrat, bobcat, northern goshawk, red-shouldered hawk, and timber rattlesnake. The state-listed threatened species in this area include the barred owl, Cooper's hawk, long-eared owl, red-headed woodpecker, and wood turtle. New York's Comprehensive Wildlife Conservation Strategy (CWCS) identified the Shawangunk mountain range, located northwest of the refuge, as containing forested habitats that are important migratory corridors for raptors and other migratory birds. Those habitats contain a forest matrix of chestnut-oak forest (chestnut oak, red oak), hemlock, northern hardwood forest, and pitch pine-oak heath rocky summit interspersed with vernal pool and wetland habitat.

Strategies

In addition to alternative A and within 5 years of CCP approval:

- Within the current acquisition boundary, manage a total of 2,339 acres of forested wetland habitat and 1,831 acres of forested upland habitat.
- Map and inventory stand conditions in all mature deciduous forested stands greater than 10 acres. Identify core patches (>100 acres) of forest and options to increase the size of these core patches by allowing small fields to revert to forest.
- Where appropriate, increase the connectivity of core forest patches by creating forested travel corridors between them.
- Begin to establish and manage a minimum 100-meter mature forested riparian corridor on both sides of the Wallkill River. That corridor will comprise silver maple, eastern cottonwood, ash, black willow, sycamore, pin oak, river birch, and elm. Land may be exempt that makes up parts of the three grassland focus areas, the moist soil management units (see objectives above) or threatened and endangered species habitat.
- Monitor woolly adelgid outbreaks on the refuge and implement control methods when impacts are outside the range of natural variability. Monitor the occurrence of objective land bird species (Louisiana water thrush and cerulean warbler), and relate species occurrence to habitat conditions. Use that information to guide future decisions about forest management to improve forest contributions to these species.

Within 5–15 years of CCP approval:

- Develop an HMP and Monitoring and Inventory Plan for refuge land to maximize forest health and support mature (>80-year-old) forest-dependent species on the existing refuge forest. Use the PIF plan (Area 17) mature forested bird priorities and recommended management techniques. Also, look for upland species identified in the New Jersey WAP that would benefit from joint management on that land. A few areas in the Papakating Creek expansion area are good candidates for that, including the area around Roy Road, and numerous corridors around Armstrong Bog and along Gunn Road.
- Incorporate the Atlantic white cedar swamp into the HMP.
- Acquire from willing sellers 5,590 acres within the proposed expansion area. Manage 3,135 acres of fee land as forested wetland and 2,455 acres as forested upland. Identify upland forest tracts with significant ecological connections

with other preserved tracts around the refuge. Also, identify core patches (>100 acres) of forest and options to increase their size by allowing small fields to revert to forest. A few areas in the Papakating Creek Focus Area fit those criteria: the Armstrong Bog; the area between Roy Road, Lewisburg Road and Route 565; Gunn Road near and north of its intersection with South Dory Road; and the hemlock forest along George Hill Road between the Pines and Plains roads.

- Use the results of the “Amphibian Research and Monitoring Initiative” (mentioned in alternative A) to assess threats to the refuge’s vernal pools and their associated amphibian populations. By estimating the trends, extinction and turnover rates of populations in vernal pools, the refuge will have baseline monitoring information. If amphibian populations drop significantly, the refuge will take steps to identify factors related to that drop in population, and will manage for eliminating those factors when possible. Work with the USGS to establish adaptive management techniques and develop long-term management plans with suitable goals and objectives for managing vernal pools.
- Use accepted forestry practices to maximize horizontal diversity within these large forested blocks. That would reduce even-aged stands and produce a wider variety of habitats through better-developed layers of understory, mid-story and canopy.

Objective 1.5 (Bog Turtle Management)

In support of recovery efforts, pursue long-term monitoring and maintenance of bog turtle sites on Service-owned land within the current and expanded refuge boundaries by developing site management and monitoring plans for occupied, historical, or potential sites. Recovery tasks 3.1, 3.5, and 6.1 through 6.4 should be incorporated into each site plan as appropriate.

Rationale

One bog turtle site is known on refuge-owned land, and another within the current refuge acquisition boundary. Federal-listed threatened bog turtles also inhabit the Papakating Creek Focus Area in sedge fens. Those fens are often small (<5 acres) habitat patches that generally occur as part of larger calcareous wetland complexes, including shrub and forested swamp, dwarf shrub bogs, marsh, and beaver ponds. Up to five Bog Turtle Population Analysis Sites (PAS) among the Focus Areas must be protected to meet the recovery objectives for the bog turtle (USFWS 2001). The New Jersey WAP and the New York CWCS identify the bog turtle as a “species of greatest conservation need.” The New York strategy identifies the lower Hudson River Valley, wherein the northern portion of the current and expanded refuge boundaries lay, as a hot spot for amphibian and reptile biodiversity in New York State. That area contains high quality habitat for wetland-dependent species, and some of the best bog turtle habitat in the Hudson River Valley. Important habitats include red maple-hardwood swamp, floodplain forest, fens, and shallow emergent marsh.

Surveys are needed to monitor effectively the status of bog turtles at known sites, re-evaluate the presence of turtles at historical locations, and locate additional sites for conservation and recovery. Working with the Wallkill Watershed Management Group, and using maps available from federal and state sources, including the New Jersey WAP, we looked at areas within the proposed expansion area for their long-term value as bog turtle habitat. We also used maps developed by the Service and the state’s endangered non-game species program to locate potential and actual bog turtle sites.

Strategies

In addition to alternative A and within 5 years of CCP approval:

- Develop a site management and monitoring plan for occupied sites on Service-owned land. The plan will stipulate actions needed to sustain and/or improve habitat for bog turtles such as annually collecting information on population characteristics and movement patterns.
- Complete a field survey, using Service protocol, of all suitable refuge habitat sites for the presence of bog turtles.
- Work with the Service New Jersey Field Office to conduct an intra-Service section 7 consultation on all actions related to bog turtles in this draft CCP/EA and in future management plans.

Within 5–15 years of CCP approval:

- Based on surveys, develop site management and monitoring plans for potential refuge sites that could support the reintroduction of bog turtles with active management (e.g., manipulating trees or simulating beaver ponds flooding regime sequence). Selectively cut or girdle red maple trees to maintain a 70 percent open canopy.
- Evaluate pond by refuge headquarters to determine if natural hydrology can be restored to benefit bog turtles; implement if feasible.
- Work with partners to implement a tagging program for local bog turtles that would help identify them if they are illegally captured. Encourage the use of PIT tags so that illegal collectors will not know the turtle has been tagged, but law enforcement officials will be able to read the tag and determine where the turtle was collected.

Objective 1.6 (Other Threatened and Endangered Species)

In cooperation with the Service New Jersey Field Office, establish survey and monitoring protocol for dwarf wedge mussels, Indiana bats and Mitchell's satyr butterfly on Service-owned land within the current and expanded refuge boundaries.

Rationale

The dwarf wedge mussel, Indiana bat and Mitchell's satyr butterfly are three of the five species the New Jersey WAP identifies as "wildlife of greatest conservation need" within the Skylands Landscape, where the refuge is located. The other two species are the bog turtle, mentioned in the objective above, and the bald eagle.

The Papakating Creek Focus Area contains potential habitat for the federal-listed endangered dwarf wedge mussel. The New Jersey WAP identifies the dwarf wedge mussel as a "species of greatest conservation need" within the Kittatinny Valley. As stated in alternative A, state biologists have surveyed the refuge for dwarf wedge mussels. Although they did not find that species, the habitat conditions are ripe for its introduction.

Indiana bats were found in 2005, hibernating in three areas near Hibernia, N. J., about 20 miles south of the refuge. They also were found at the Great Swamp refuge in Basking Ridge, south of Hibernia. Additional hibernacula sites have been found north of the refuge in Ulster County, N.Y. No Indiana bats have been documented at the Wallkill River refuge, but we have not conducted species-specific surveys there. Both the current and expanded refuge boundaries are part of the bat's summer focus area, where bats could occur during the summer (April 1—September 30). Furthermore, the proposed expansion boundary

comprises a portion of the Indiana bat's maternity colony foraging range. A key consideration for Indiana bats is maintaining suitable roost trees. Therefore, management actions in this draft CCP/EA would benefit Indiana bats, because we propose to increase forested habitat within the current and expanded refuge boundaries, particularly along river corridors.



USFWS

Cows provide a microtopography beneficial to bog turtles.

Two well-known sites in Sussex and Warren counties recently supported the Mitchell's satyr butterfly (USFWS 1998). Sussex County is where the current and expanded refuge boundaries are located, and Warren County is located immediately to the south. The confirmed sites are both fens located in areas of limestone bedrock, which is similar to the habitat type used by bog turtles. The recovery plan goal for New Jersey is to establish one metapopulation in the state.

Strategies

In addition to alternative A and within 5 years of CCP approval:

- Work with our New Jersey Field Office to hire a private contractor to conduct mist net surveys for Indiana bats on Service-owned land and in the expansion area. If found, implement recovery plan tasks.
- Collaborate with Great Swamp refuge to recruit students to conduct research on Indiana bats on Service-owned land. The students could study the various life cycles of the bats, such as when and where they forage, hibernate and roost.
- Survey the expansion area for other potential habitat for federal-listed endangered species.

Within 5–15 years of CCP approval:

- Determine the feasibility of re-establishing populations of dwarf wedge mussel within that species' historic range and, if feasible, introduce it into those areas.
- Collaborate with local colleges and universities to aid the refuge with research on dwarf wedge mussels.
- Begin surveys for Mitchell's satyr butterfly on Service-owned land in appropriate habitats, such as calcareous fens. If found, implement the tasks in the recovery plan.
- Encourage the protection of endangered and threatened species by developing an educational awareness program.

Goal 2: Promote actions that contribute to a healthier Walkill River.

Objective 2.1 (Wetland Restoration)

Restore approximately 843 acres within the current and expanded refuge boundaries to wetland habitat to facilitate the natural hydrologic flow of the Walkill River and provide high quality habitat for migratory waterfowl and shorebirds.

Rationale

The bottomland wetlands associated with the Walkill River offer some of the last undeveloped, large areas of habitat in northwestern New Jersey, and are important contributors to the water quality of the river. Emergent marshes act as natural filtration systems for the watershed, and support diverse marsh-nesting birds. As mentioned in alternative A, many of the wetlands surrounding the Walkill River have been drained, ditched and converted to agricultural fields. Identifying and mapping impediments to hydrologic flow (see alternative A) will provide us the information we need to decide where and how to restore

wetland habitat. Then, we would use that information to restore or recreate a more natural hydrology. We would either restore wetlands by implementing non-intensive, simple wetland restoration techniques or by creating moist soil management units (see objective 1.2 above). Wetland restoration would take place primarily on land adjacent to the Wallkill River, Papakating Creek, or other local stream. We would use site-specific criteria for determining the management actions to employ on any parcel.

Many species of marsh-dependent birds would benefit from wetland restoration at the refuge, including state-listed birds such as the American bittern, least bittern, king rail and black rail. Wetland restoration would also benefit the more than 150 species of land birds, including Neotropical migrants that a recent State Breeding Bird Atlas recorded for the upper Wallkill River Valley as probable or confirmed breeders.

Strategies

In addition to alternative A and within 5 years of CCP approval:

- Evaluate non-forested wetlands on a parcel-by-parcel basis to determine which restoration technique to use. Criteria for evaluation would include:
 - Areas adjacent to a water source, such as the Wallkill River or Papakating Creek
 - Intensity of management
 - Seasonality of natural flooding
 - Sites containing soils suitable for holding water for moderate to extended periods
- Work with Ducks Unlimited to restore seasonal wetlands near the Wallkill River and its tributaries.

Within 5–15 years of CCP approval:

- Plant native hardwood species to help establish a forested floodplain corridor at least 100 meters wide from the riverbank on either side of the Wallkill River wherever other habitat types (e.g., grassland, scrub-shrub) do not take precedence because of specific management goals. Use forest regrowth to assist in the management and reduction of invasive plants.
- Reestablish a native grassland or scrub-shrub vegetative cover in areas where the hydrologic disturbance regime would prevent forest establishment.

Objective 2.2 (Improve Water Quality through Partnerships)

Each year, work in partnership with local communities to improve the biological integrity and environmental health of the Wallkill River and its tributaries through restoration projects and activities that promote river stewardship and protection.

Rationale

Healthy water quality is essential if the Wallkill River is going to continue to provide habitat to riverine species like the dwarf wedge mussel and bog turtle. Non-point-source pollutants pose the largest threat to water quality. Most non-point-source pollutants (e.g., phosphorous, fecal coliform, nitrogen, sediments, metals, oils and greases) come in the form of runoff from land surfaces. In a 2004 report on the Papakating Creek Watershed (Sajdak, et al. 2004), the Wallkill Watershed Management Group identified phosphorus and fecal coliform as the

two pollutants of prime interest for assessment and testing in Papakating Creek. Point-source pollution can also be of concern, depending on the source and the amount of pollution discharged directly into the waterway.

Individual households can contribute to healthy water quality by using environmentally friendly cleaners and updating septic systems. Businesses can educate employees on best management practices. The future health of the Wallkill River and its tributaries depends on the collective effort of everyone who lives and works in the watershed.

Working with the Wallkill Watershed Management Group and Trout Unlimited, we used federal and state maps to identify land within the expansion area that could be used for long-term studies on monitoring water quality. We also worked with those groups to identify recreational opportunities along the Papakating Creek and the Wallkill River, and explored ways to promote those opportunities.

Strategies

In addition to alternative A and within 5 years of CCP approval:

- Work with New Jersey Field Office and the Wallkill River Watershed Coordinator to establish a water quality monitoring protocol. Potential areas to be used for establishing that protocol include road junctions between the Papakating Creek and Gunn Rd./Wykertown Rd., Plains Rd., Armstrong Rd., Pelletown Rd., Roy Rd., McCoys Corner, Route 565 and State Route 23.
- Using GIS, map the Wallkill River, Papakating Creek and other main tributaries within the current refuge and proposed expansion boundary to identify each area's need for restoration and monitoring. Identify areas for chemical inputs, sedimentation, and erosion.
- Establish a cooperative agreement with the Wallkill River Watershed Management Group to implement jointly a DEP Action Now grant, which includes building canoe ramps, conducting riverbank restoration, and controlling invasive species. Also, implement a joint auto tour project.
- Work with Trout Unlimited to promote recreational use and wetland restoration on the refuge.
- Work with the Trust for Public Land and N. J. Green Acres to protect habitat along the river.
- Work with our Ecological Service Program and the Wallkill River Management Group to implement a water-quality monitoring program on wetlands in the current and expanded acquisition boundaries, in voluntary partnership with private landowners.

Within 5–15 years of CCP approval:

- Begin restoration on the most sensitive and most accessible areas of the waterways in and near the refuge.
- Develop partnership models that will result in multi-agency efforts to protect and restore the floodplains in and around the refuge.

Objective 2.3 (Private Lands Biologist)

A private lands biologist stationed at the refuge will work through the Partners for Fish and Wildlife Program and other federal programs to find at least two private landowners annually who will manage their properties within the current and expanded refuge boundaries in conformance to the purposes and goals of the refuge.

Rationale

The refuge is not a closed system. Ecological communities continue across refuge boundaries and onto private and other public land. Federal programs, such as the Partners for Fish and Wildlife Program, enable refuges to work with private landowners to manage adjacent land in concert with refuge land to create the effect of large, contiguous blocks of significant ecological communities. Through that program, the Service works in cooperation with other government agencies, public and private organizations and private landowners to restore, create, or enhance fish and wildlife habitat for federal trust resources. Among other things, the program concentrates on restoring drained or otherwise degraded freshwater wetlands, restoring riparian habitats, restoring habitats of endangered and threatened species, and restoring fish habitats.

Although the area within the current and expanded refuge boundaries has seen a moderate amount of residential development, hundreds of acres of privately owned abandoned agricultural land remain. We could convert them into significant wildlife habitat. Large blocks of wildlife habitat tend to support a larger diversity of wildlife species by reducing edge effects and maintaining a larger core, or interior, habitat.

Strategies

Within 10 years of CCP approval:

- Hire a private lands biologist to work with partners to create, restore or enhance regionally significant ecological communities (specifically, those identified in goal 1), focusing on landowners with large acreages or farmlands.
- A private lands biologist would cooperate with federal, state and local partners to provide technical information to private landowners interested in managing their lands as wildlife habitat. For example, that information could include methods for eradicating invasive species.
- A private lands biologist would provide technical assistance to landowners and municipalities on how to raise awareness of human impacts on significant wetlands (e.g., groundwater withdrawal) and on the importance of vernal pools.
- A private lands biologist would work with landowners to conduct wetland inventories and riparian restoration along the Wallkill River and its tributaries within the proposed expansion boundary.

Goal 3. Increase or improve opportunities for hunting, fishing, environmental education, interpretation, wildlife observation and wildlife photography.

Objective 3.1 (Hunting)

The refuge will provide high-quality opportunities for hunting on Service-owned land within the current and expanded refuge boundaries (New Jersey only), subject to specific refuge regulations. The refuge is an “area of emphasis” for hunting in the region.

Rationale

Same as in alternative A, with the addition of a bear hunt. We are proposing the bear hunt to assist the State of New Jersey in its bear population management and offer a wildlife-oriented recreational opportunity.

Strategies

In addition to alternative A and within 5 years of CCP approval:

- Open Service-owned land within the current acquisition boundary to a black bear hunt consistent with state seasons and regulations.

- Open Service-owned land in the proposed expansion area to public hunting, including black bear hunting, when appropriate conditions exist. Hunting would be prohibited where the refuge identifies it as a threat to public safety, when it poses an unacceptable disturbance to wildlife, or when the acquired area is too small. We would also continue to prohibit hunting in the 335-acre Liberty Marsh complex. Annual hunt plans and updated maps will identify closed areas. An Annual Hunt Plan will also reflect anticipated funding and staffing levels to administer the hunt. Potential hunting areas within the proposed expansion area include the area along Madison Road, Papakating Preserve, and the land south of Wykertown and Meyers roads.
- Expand accessible hunting opportunities at Owens Station.

Objective 3.2 (Fishing)

The refuge will increase fishing opportunities and monitoring of fisheries on Service-owned land within the current and expanded refuge boundaries for able-bodied and disabled anglers.

Rationale

Same as in alternative A

Strategies

In addition to alternative A, and within 5 years of CCP approval:

- Post signs stating fishing regulations at canoe/boat launch areas.
- Expand fishing opportunities in the current refuge boundary by providing fishing access to the Wallkill River from County Route 565 and adding an access site along Lake Wallkill Road, behind refuge quarters no. 5.



The Refuge holds an annual fishing event to introduce more youth to the sport.

- Provide universal access for fishing at Bassett’s Bridge.

Within 5–15 years of CCP approval:

- Institute a voluntary census of anglers.
- Provide fishing opportunities (some with universal access) in the expanded refuge boundary on Service-owned land by building five boating/fishing access sites where major roads intersect with Papakating Creek. Potential sites include Route 23, where it crosses Papakating Creek; Route 565, where it crosses the creek in the northern part of the Papakating Creek Focus Area, and then again farther south; Roy Road, where it crosses the creek; McCoys Corner; Pelletown Rd., and Plains Rd. Plains Rd. has been used as a trout stocking area.

Objective 3.3 (Wildlife Observation and Photography)

Within 15 years of CCP approval, visitation will increase by 15 percent as the refuge increases opportunities for wildlife observation and photography on Service-owned land within the current and expanded refuge boundaries by opening new trails and increasing opportunities for access. The refuge will provide the infrastructure for a quality program by constructing parking areas, observation platforms and photo blinds.

Rationale

During scoping meetings, members of the public expressed concern that, during the hunt season, hunters were permitted to access many non-maintained and

informal trails that the general public was prohibited from accessing. Therefore, during state hunting seasons, when hunters have access to most of the refuge from Monday through Saturday, we will allow the public access to all refuge lands on Sundays, when hunting is prohibited. We also propose to extend some existing refuge trails, create a canoe trail along the Wallkill River, and create a new wildlife observation trail in the north section of the refuge. We will provide additional opportunities for wildlife observation and photography in the proposed expansion boundary.

Strategies

In addition to alternative A, and within 5 years of CCP approval:

- Allow access to Service-owned land on Sundays from September 1 through March 31. Parking at designated refuge parking areas will require the payment of a fee for the parking permit. The refuge would maintain the ability to restrict access in certain areas, such as around the Liberty Loop Trail, to minimize the disturbance of migrating and wintering birds.
- Using grant funds already secured, build a boardwalk and barrier-free canoe/kayak access site at Bassett's Bridge.
- Work with the current owners of the former Lehigh and New England railroad bed to obtain a right-of-way or in-fee acquisition of the railroad bed south of Judge Beach Road for use by the public as a nature trail for wildlife observation.
- Allow dog walking on the entire 2.5-mile Liberty Loop Trail to protect public safety. By allowing dog walking on the entire Liberty Loop Trail, instead of just on the portion of the trail that coincides with the Appalachian Trail (AT), the refuge would eliminate the public safety concern of forcing local residents to walk their dogs along Oil City Road to get to the portion of the trail where dog walking is permitted. Permitting dog walking along the entire trail would also eliminate confusion over which parts of the trail are open or closed to dog walking, and would allow local residents with dogs to walk the entire loop trail instead of forcing them to turn around after walking only two-thirds of it.

Within 5–15 years of CCP approval:

- Construct a photography blind on the Liberty Loop Trail.
- Extend Wood Duck Nature trail approximately 0.75 miles with a footbridge over the Wallkill River.
- Open the former Lehigh and New England railroad bed to foot access from Kelly Road up to Bassett's Bridge to create the 0.75-mile Timberdoodle Trail.
- After completion of restoration on Tract 15r (the former Mt. Bethel property), extend the Timberdoodle Trail north to connect with the Liberty Loop Trail.
- Provide boat/canoe access to Papakating Creek on Service-owned land in the proposed expansion boundary, for wildlife observation where major roads cross the creek, as mentioned in objective 3.2, "Fishing" above.
- Provide wildlife observation and photography opportunities in the proposed expansion area, on Service-owned land, using pullouts and interpretive panels. Potential locations include Route 565; Plains Road; where the proposed expansion area reaches north to Stokes and High Point state parks; Armstrong Bog; Papakating Preserve; and along Gunn Road.

**Objective 3.4
(Interpretation)**

Within 15 years of CCP approval, create and enhance opportunities for interpretation on the refuge so that 90 percent of visitors engaged in those activities report they have a greater understanding of the Wallkill River refuge, the Refuge System, and the Service. More specifically, visitors will recognize the Service as the agency managing the refuge, and will be able to identify the importance of the Wallkill River and its valley to wildlife habitat. Also, increase the number of visitors by 15 percent within 15 years.

Rationale

The Refuge Improvement Act identifies interpretation as a priority public use. It is one of the most important ways we can raise the visibility of the refuge, convey its mission, and identify its significant contribution to wildlife conservation.

Public understanding of the Service and its activities in the State of New Jersey is currently very low. Refuge visitors often confuse our agency with the New Jersey Division of Fish and Wildlife. Many are unaware of the Refuge System and its scope, and most do not understand the importance of the refuge in conserving migratory birds or its role in protecting wetland habitats along the Wallkill River.

Our proposed future programs will achieve our objectives through increased visitor contacts, on-site programs, and new and improved infrastructure. We want people to recognize that the refuge has a priority to manage a variety of habitats to benefit migratory birds and endangered species, with particular emphasis on restoring colonies of nesting birds and the federal-listed threatened bog turtle. Through an expanded interpretive program, visitors will gain a better understanding of the unique, important contribution of this refuge to wildlife and their habitats.

Strategies

In addition to alternative A and within 5 years of CCP approval:

- Increase involvement with local Boy Scout and Girl Scout programs. Provide opportunities on the refuge for awards for skill in performing activities on the refuge.
- Develop new interpretive materials, including animal and plant checklists and trail guides.
- Plan, fund, and install interpretive signs on all refuge nature trails and on the proposed Bassett's Bridge accessible boardwalk.
- Work with Refuge Friends and other refuge partners to increase interpretive programs.
- Continue to develop the refuge website to provide interpretive self-guiding programs and links to sites that offer maps and virtual tours of the refuge and surrounding area.

Within 5–15 years of CCP approval:

- Hire a visitor services professional, as noted in our proposed organization chart, to implement Visitor Services programs.
- Sponsor a series of speakers at the refuge for the public to learn about wildlife and nature.
- Create self-guided pamphlets for the major public access areas to the refuge, including those to be open on Sundays.

- Develop a series of roadside/parking lot displays to interpret the refuge, its resources and the system.
- Prepare handouts that illustrate natural resources and wildlife on the refuge and assist visitors in observing and photographing wildlife.
- Provide river access with signs for increased interpretive activities along the Wallkill River at Scenic Lakes Drive. Develop a permanent parking area and restroom facilities.
- Develop a Wallkill River canoe trail, install signs, and prepare trail brochure.
- Conduct guided walks on refuge trails and the former Lehigh and New England railroad bed south of Kelly Road. Access to former railroad bed on this section will be only through guided walks or by special use permit to conservation and bird groups.
- Work with state partners to convert the old railroad bed that runs through the Papakating Creek Focus Area to a non-motorized, multi-use trail with interpretive opportunities at its many access points.
- Create visitor-based wildlife studies to increase interest and understanding of refuge management techniques.
- Collaborate with a local source that could provide the refuge with real-time weather data and create refuge programs linking weather and climate with migratory birds and other wildlife.

**Objective 3.5
Environmental Education**

Within 15 years of CCP approval, refuge staff will increase environmental education opportunities on Service-owned land and throughout the local community by offering at least four programs, on- or off-refuge, annually. We will stress our role as a facilitator of EE programs, rather than a primary provider.

Rationale

Because of its location in a populated area, the refuge has the opportunity to reach out to thousands of children and young adults. The student enrollment in Sussex and Orange Counties is approximately 64,000. Furthermore, the refuge is located within an hour's drive of the greater New York metropolitan area. The environmental education facility closest to the refuge is more than an hour away. By offering additional environmental education opportunities at the refuge, the community will become more knowledgeable about their own unique natural resources and environmental issues.

The current environmental education program focuses on the facilities available at the headquarters complex. Those include office space in the headquarters building, a large, paved parking area, public restroom facilities, two nature trails, river access and a bridge over the river, an outdoor classroom/pavilion and a pond. Through partnerships, the refuge is offering a limited environmental education program. We will use this planning document to increase that program's scope.

In 2004, regional office staff helped the refuge develop an education facility concept for the Owens Station complex, a group of buildings uniquely located near the Wallkill River. We had planned to develop an education pavilion and a trail at Owens Station that would provide students an opportunity to visit a variety of native habitats, including woodland, shrub/scrub, field and wetland habitats. The concept also included an outdoor classroom area located near the river's edge.

Unfortunately, current financial circumstances prevent that concept from becoming a reality. If complete funding becomes available during the life of the plan, the refuge will pursue that concept for the Owens Station complex. Until then, the refuge will focus mainly on improving its existing environmental education programs.

Strategies

In addition to alternative A and within 5 years of CCP approval:

- Work with partners such as New Jersey Audubon Society to help develop an integrated classroom curriculum in local schools.
- Through an expanded refuge internship program, work with local middle and high school students to increase awareness and career appreciation for wildlife and conservation biology.
- Expand the refuge's partnership with New Jersey Audubon Society. Through that cooperation, have their staff and resources sponsor environmental education classes and public events on the refuge that incorporate the refuge or Service mission. Have NJAS sponsor or lead two or more public programs on the refuge each year.
- Provide at least one "Teach the Teacher" workshop each year.

Within 5–15 years:

- Work with state partners to offer joint environmental education programs focusing on the relationship of state land to federal land.
- If we secure complete funding for Owens Station, look for opportunities to offer EE programs, mainly through partners.

Objective 3.6 (Cultural Resources)

In compliance with the overall management objectives of the Service, refuge staff will encourage and enhance educational, interpretive and research opportunities for cultural resources identified by archaeologists.

Rationale

In addition to protecting cultural resources on Service-owned land, Service policy also encourages us to use information about cultural resources in educational materials for the public. As we state in chapter 2, the Service funded an historical and archeological reconnaissance of the Wallkill River Valley in 1999 (Maymon 2002). That reconnaissance compiles materials on the region's history, and offers valuable information we could include in educational materials and programming for the public.

Although the reconnaissance thoroughly investigated historical sites on and around the refuge, it did not evaluate refuge structures for their historic potential, which this alternative proposes to do. Information about historic structures on the refuge also could be used in education materials for the public.

Strategies

In additional to alternative A, and within 10 years of CCP approval:

- Include cultural resources information in refuge environmental education and interpretation programs. Use results from local excavations, published articles on Wallkill Valley prehistory and the reconnaissance survey to interpret Native American history and prehistory.
- Monitor known prehistoric sites on the refuge to protect them from looting and other ARPA violations.

- Complete evaluations of historic refuge structures for National Register eligibility in compliance with section 110 of the National Historic Preservation Act of 1966.
- Survey potential prehistoric sites (quarries, living/working areas) and share archaeological information through interpretive programs.

Objective 3.7 (Quality Visitor Experience)

Within 5 years of CCP approval, hire a visitor services professional, who will begin to establish protocols for calculating annual visitation and determining maximum visitor carrying capacities associated with maintaining a quality experience for all six priority public uses.



The refuge works with Service professionals in the field and at the Regional Office to improve the visitor experience.

Rationale

The Service is constantly trying to strike a balance between protecting wildlife resources and offering a quality visitor experience. Refuge managers have a responsibility to be good stewards of publicly protected lands and waters. At the same time, the American public is entitled to quality outdoor recreation experiences on refuges when they do not interfere with the mission of the Service or refuge purposes. Some protected public lands are under-used by the American public, while others are over-used, causing concern about public safety, impacts on resources, or loss of quality recreational opportunities. A visitor capacity study is a management tool useful in sustaining quality outdoor recreation opportunities and matching public interests (demand) with available recreation opportunities (supply).

Strategies

In addition to alternative A and within 5 years of CCP approval:

- Obtain better estimates of visitation.
- Identify target audiences.
- Address the possibility of a fee program and/or installing a donation box at the Wood Duck Trail to help fund maintenance work.

Within 5–15 years of CCP approval:

- Monitor the quality of wildlife-viewing opportunities by soliciting oral and written comments from visitors. Work with our regional office staff to develop and implement additional strategies for measuring quality of experience.
- Work with our regional office staff to develop and implement strategies for determining visitor carrying capacity.

Goal 4. Cultivate an informed and conservation-educated public that works to support the goals of the refuge and the mission of the National Wildlife Refuge System.

Objective 4.1 (Outreach)

Increase participation in local events and remain active with conservation commissions and state and local conservation partnerships whose message advocates resource conservation and stewardship and promoting the mission of the National Wildlife Refuge System.

Rationale

Same as in alternative A

Strategies

In addition to alternative A, and within 5 years of CCP approval:

- Increase the visibility of refuge land through boundary posting and increased participation in community events.
- Undertake efforts to strengthen the refuge friends group and, where appropriate, make them a major partner in refuge efforts.
- Strengthen relationships with local businesses, particularly those that can benefit from ecotourism.

Within 5–15 years of CCP approval:

- Increase speaking opportunities about the refuge and its mission at local civic organizations throughout the Wallkill River watershed.
- Encourage local organizations to “adopt” the refuge by serving as advocates and undertaking special projects.

**Objective 4.2
(Communication)**

Increase public awareness and attract visitors through the media and local businesses, including local television, Web page, and local chambers of commerce.

Rationale

Same as in alternative A

In addition to alternative A, and within 5 years of CCP approval:

- Increase the visibility of the refuge within the community through increased participation in community events, such as fairs, festivals and celebrations.
- Strengthen relationships with local businesses, particularly those that can benefit from ecotourism.
- Increase speaking opportunities about the refuge and its mission at local groups throughout the Wallkill River watershed. Encourage refuge staff to be involved with one or more of those groups, based on their interests.
- Encourage local organizations to link appropriate goals with those of the Service and the refuge. Participate in joint publications, media releases and events.

Objective 4.3 (Support Programs)

Maintain programs for volunteers, interns, youths and community service participants to help support all aspects of refuge management including maintenance, biological surveys and public use.

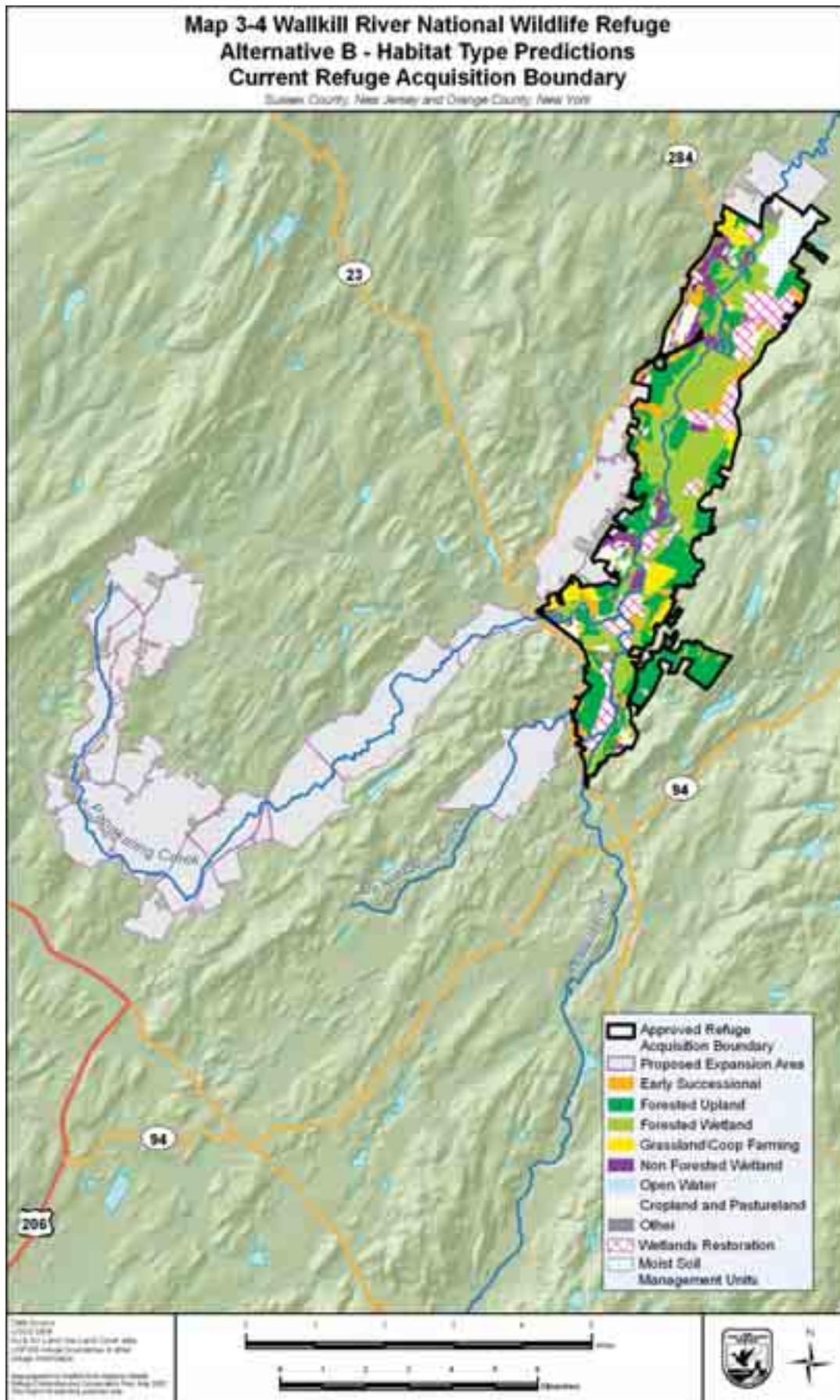
Rationale

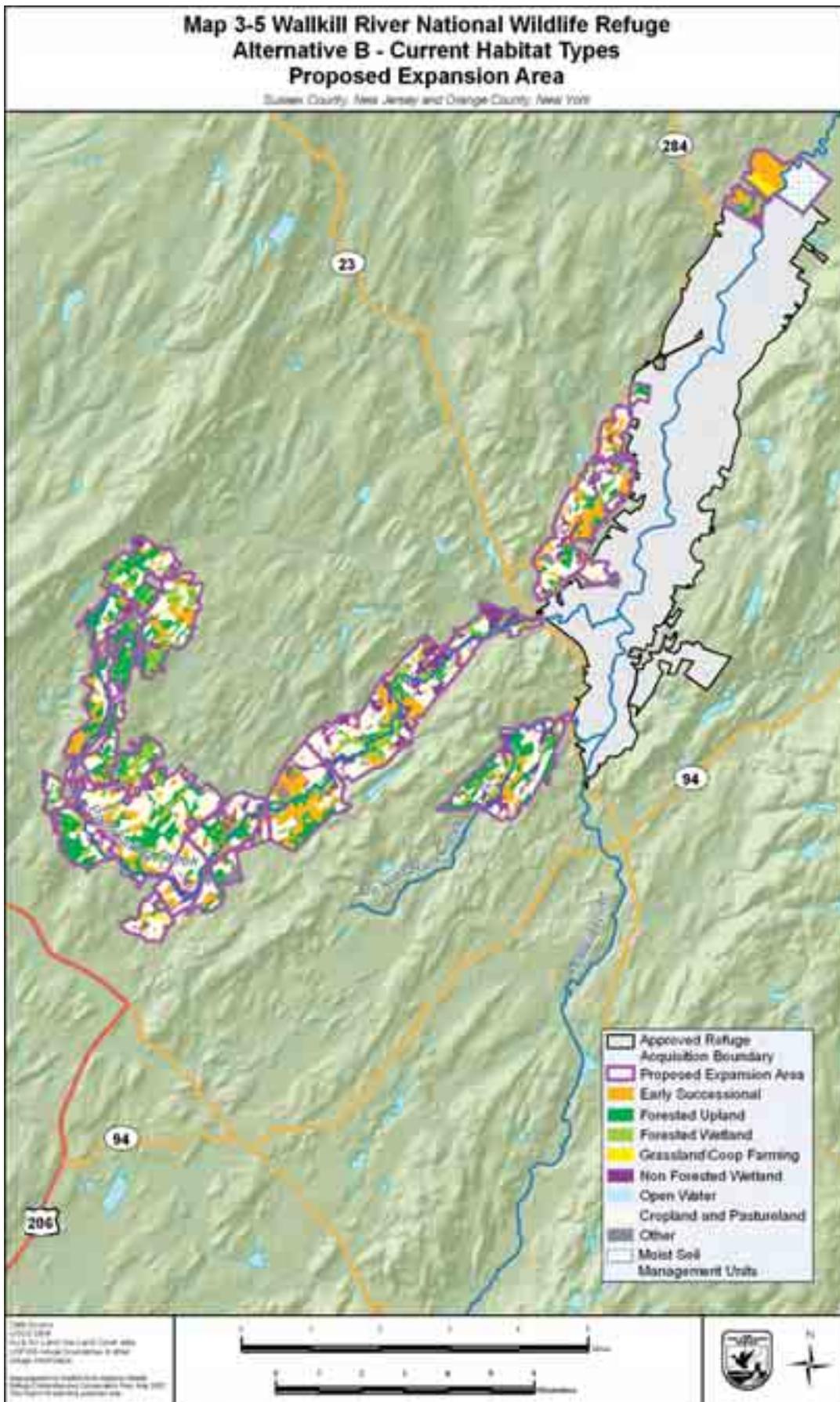
Same as in alternative A

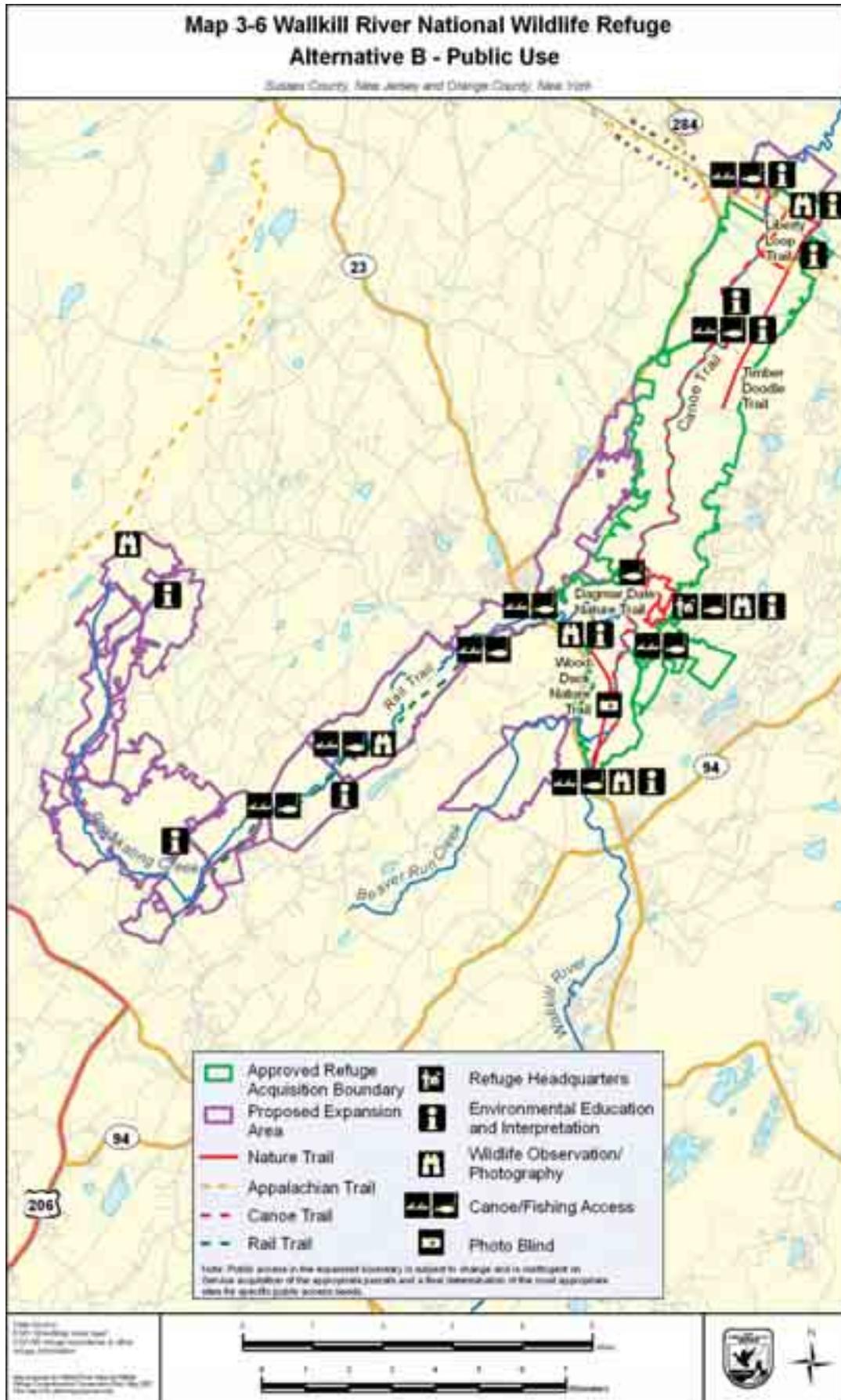
Strategies

In addition to alternative A, and within 5 years of CCP approval:

- Develop an orientation guide and provide liaison between staff, volunteers, and community service participants to work on specific projects.







Alternative C Introduction

The Refuge Improvement Act states that, in administering the Refuge System, the Service shall “ensure that the biological integrity, diversity, and environmental health of the System are maintained...” (603 FW3; also known as the “Integrity Policy”) According to that policy, refuge management should, where possible, restore or mimic natural ecosystem processes or functions and thereby maintain biological diversity, integrity and environmental health. Although we incorporate that philosophy in part into alternatives A and B, we tempered their management actions and strategies with the understanding that, given the continually changing environmental conditions and landscape patterns of the past and present (e.g., rapid development, climate change, sea-level rise), relying on natural processes is neither always feasible nor always the best management strategy for conserving wildlife resources. However, alternative C sets forth a purist’s argument for basing most if not all management actions on the Integrity Policy.

This alternative proposes to restore refuge lands to their historic condition, as they existed in the Wallkill River Valley during the late 1600s, just prior to the Industrial Revolution. In particular, alternative C would, as much as is possible, reestablish the previous, historic plant community structure, richness, and relative composition, with an emphasis on the area defined as the floodplain. That area is thought to have consisted during the late 1600s primarily of a forested matrix dominated by a floodplain forest of red maple, black gum, and Atlantic white cedar (Golet et al. 1993). The uplands were historically a chestnut-oak-hickory association, including such species as American chestnut (all but eliminated due to chestnut blight) white oak, northern red oak, black oak, scarlet oak, chestnut oak, hickory and yellow poplar (Golet et al. 1993).

Another objective is to restore, to the extent practicable, the natural hydrologic regime of the Wallkill River system, including its tributaries. Several studies explaining wetland forest structure determined that water movement was the key factor (Golet et al. 1993). Flooding regimens were the principal natural process shaping those landscapes historically on a large scale. Beaver also played a large part in influencing the landscape until trapping reduced their numbers. Less significant, but still influential in shaping the historical landscape, were fires, hurricanes, high winds, and ice storms.

Our objectives strive to achieve a mixed forested-shrub-emergent-wetland matrix throughout the floodplain, taking soils and elevation into consideration. A bottomland hardwood forest component would be established on more than 70 percent of the area. The forests would consist predominantly of red maple swamps established by actively advancing succession or allowing unimpeded natural succession. The forests would occur in patches exceeding 49 acres to maximize breeding bird richness (Golet et al. 1993). Various successional stages of red maple swamp would be evident at any given



Edward HEnry/USFWS

Alternative C focuses on the 1997 Refuge Improvement Act’s concept of Biological Integrity.

time. Forested stands would maintain a canopy cover of 80 percent. The shrub layer within the forest, important for species richness, would maintain at least 50 percent canopy cover to provide habitat for shrub species identified in Golet et al. 1993. Wildlife species associated with intact, riverine, forested floodplains would directly benefit under this alternative.

Sites prone to continuous flooding likely would be sustained as emergent marsh and shrub land; their presence is very desirable for the diversity they afford the landscape. Beaver should be considered as a tool for maintaining wetlands.

Upland sites, approximately half of the refuge, likely would revert to a mixed mid-Atlantic hardwood forest association (oak, hickory, birch, beech, hemlock, sugar maple). Select upland sites would be maintained as created openings and shrub habitat to promote wildlife-viewing opportunities. Croplands would be converted to forested native wildlife habitat.

Intensive control of invasive plants with this alternative would ensure that native plants dominate 80 percent of refuge land. The protection and management of bog turtle sites would remain one of the highest habitat management priorities. We would not permit grazing on the refuge, except in treating invasive plants in bog turtle habitat.

Implementing alternative C would include removing all of the drainage or impounding characteristics of ditches, dikes, and other water control structures not essential to protect private property or refuge infrastructure. The purpose would be to reestablish the natural hydrological flooding regimes associated with the Wallkill River to the extent possible and practicable. In general, removing all fabricated features on the refuge would be a priority, unless essential for administrative purposes, to prevent the loss of private property, to ensure safety, or to support a priority public use. That could mean the removal of various farm buildings, debris, wood duck and bluebird nesting boxes as well as various ditches and dikes.

Public use opportunities would remain the same as in alternative A. Over the long-term, priority public use opportunities, with the exception of fishing, would diminish, as natural flooding would preclude access to much of the interior of the refuge. That would particularly affect hunting opportunities. In a landscape dominated by red maple swamp, opportunities for wildlife viewing and photography would also diminish.

Alternative C proposes to expand the refuge by about 7,609 acres divided into two focus areas: Papakating Creek and Adjoining North: two of the four focus areas proposed for acquisition in alternative B. Acquiring land in those two focus areas would enable us further to restore the natural hydrologic regimen of the Wallkill River system. The Adjoining North Focus Area adjoins the river in southern New York, and the Papakating Creek Focus Area buffers the entire main stem of the Papakating Creek, a major tributary of the Wallkill River. As in alternative B, the ability of the Service to acquire land depends on the availability of funds, and the method of acquisition depends on the needs and desires of each willing seller.

Although alternative C likely would result in a more homogenous vegetated landscape in terms of its composition and pattern than today, biological diversity may decrease as a result. However, management over the long-term would be simplified, and environmental health would be improved over current conditions as natural processes and functions, such as flooding, would be restored to the extent practicable.

The 15-year scope of this CCP/EA falls short of the decades used to measure the vegetative succession of grassland, scrub-shrub and forested habitats. The

habitat management objectives in this alternative require our consideration of a much longer period within which to measure and achieve results. We suspect that accomplishing the habitat management objectives in this alternative would take at least 50 years, based on our prediction of how long it would take to restore refuge lands to historic conditions. In the context of this CCP, we will also examine actions we could complete within the 15-year span of this CCP, or at least measurable subsets of the appropriate strategies in those objectives.

Staffing under alternative C would be the same as alternative B.

Maps 3-7 and 3-8 illustrate the proposed habitat management strategies for alternative C, and map 3-9 illustrates the proposed public use strategies. These maps appear at the end of the alternative C write-up.

We developed the following objectives in alternative C for the Wallkill River refuge.

Goal 1. Protect and enhance habitats for federal trust species and other species of special management concern, with particular emphasis on migratory birds and bog turtles.

Objective 1.1 (Scrub-shrub Habitat)

Within 50 years of CCP approval, maintain 1,488 acres of scrub-shrub habitat within the current and expanded refuge boundaries to provide breeding habitat for shrubland-dependent birds of high conservation priority such as the golden-winged warbler and prairie warbler. At least 75 percent of this area will have a dominant cover (>50 percent) of native shrubland and saplings.

Rationale

Same as in alternative B, objective 1.1 (scrub-shrub habitat)

Strategies

Within 15 years of CCP approval:

- Manage 719 acres of land within the current acquisition boundary as scrub-shrub habitat.
- Acquire from willing sellers 769 acres within the proposed expansion area and manage fee land as scrub-shrub habitat according to the above objective (objective 1.1).
- Manage wetland forest areas to allow shrub land habitat throughout the floodplain at sites prone to continuous flooding and unable to support a forest over the long-term.

Throughout the life of the CCP and beyond:

- Maintain pockets of shrubland in the upland forest to mimic natural disasters like hurricanes and wind throw (if needed).

Objective 1.2 (Non-forested Wetlands)

Within 50 years of CCP approval, maintain 1,082 acres of non-forested wetland habitat within the current and expanded refuge boundaries to provide stopover habitat for migratory birds.

Rationale

We should be able to manage most of the sites for this objective as non-forested wetlands within the 15-year period of the CCP, as they are not dependent on forest regeneration. Sites prone to flooding would be maintained as emergent marsh or shrub land. In the absence of water control structures, we would use beaver for maintaining those habitat types.

Strategies

Within 15 years of CCP approval:

- Manage 523 acres of land within the current acquisition boundary as non-forested wetland habitat.
- Acquire from willing sellers 559 acres within the proposed expansion area, and manage fee land as non-forested wetland habitat according to the objective above (objective 1.2).
- Remove all water control structures associated with moist soil management units.
- Plug all ditches and drains located in moist soil management units to allow floodwaters to flow over the land in natural cycles.

Throughout the life of the CCP and beyond:

- Monitor forest development in neighboring areas, identify where wood ducks and various songbirds use edge habitats, and maintain those edge habitats, where appropriate.

Objective 1.3 (Grassland Management)

This alternative does not propose active grassland management. In the 1600s, grasslands, or open areas resulted from natural disasters such as fires, hurricanes, high winds, or ice storms. Should such natural disasters reoccur, we would allow the open spaces that resulted to progress through natural stages of vegetative succession. We predict that, at any given time, the grassland habitat due to natural causes will total about 450 acres in the current and expanded acquisition boundaries.

Objective 1.4 (Forested Communities)

Within 50 years of CCP approval, mature forest will occupy about 75 percent, or 11,258 acres, of Service-owned land within the current and expanded refuge boundaries. About 6,814 acres would be managed as palustrine, mature (80+ years), deciduous floodplain forest and 4,443 acres would be managed as mixed upland forest to support nesting and interior-nesting forested land birds of concern, such as the cerulean warbler, worm eating warbler, wood thrush, eastern wood peewee, Baltimore oriole, Louisiana water thrush, Kentucky warbler, and scarlet tanager. We would maintain forest patches of 50 acres or more with a minimum canopy cover of 80 percent to maximize breeding bird richness (Golet et al. 1993).

In only the 15-year period of this CCP, it is not possible to re-establish mature forests. As forest communities return, they will go through many phases of succession, providing a variety of habitats for migratory birds and other wildlife. Refuge staff will work to maximize the usefulness of those mid-successional stages, while looking to the forest's future.

Rationale

Same as in alternative B, objective 1.4, "Forested Communities."

Strategies

Within 15 years of CCP approval:

- Manage 3,294 acres of land within the current acquisition boundary as forested wetland habitat and 2,148 acres as forested upland habitat.
- Acquire from willing sellers 5,816 acres within the proposed expansion area, and manage 3,520 acres as forested wetland habitat and 2,296 acres as forested upland habitat according to the objective above (objective 1.4).
- Manage sapling and scrub-shrub phase of forest regeneration to benefit migratory birds.

Throughout the life of the CCP and beyond:

- Maintain upland forested sites, approximately half of the refuge, as an oak-hickory forest association.
- Maintain select upland sites as created openings and shrub habitat to promote wildlife-viewing opportunities.
- Maintain bottomland forested sites as predominantly red maple swamps by actively advancing succession or allowing unimpeded natural succession.

Objective 1.5 (Bog Turtle Management)

Protect and maintain the northern population of bog turtles and their associated habitats on Service-owned land within the current and expanded refuge boundaries to aid in efforts that will result in the eventual delisting of the species.

Rationale

Although alternative C focuses on biological integrity and the reestablishment of the valley landscapes in the 1600s, the Service would continue to have a responsibility to meet recovery plan objectives for endangered species management. See alternative A, objective 1.5, “Bog Turtle Management,” for additional rationale.

Strategies

Within 15 years of CCP approval:

- Continue efforts to acquire the one known bog turtle site on private land within the current refuge boundary.
- Discourage poaching of bog turtles by conducting routine and random site visits.
- Control invasive plant species at the one known and two potential bog turtle sites on refuge land using grazing, mechanical, and biological controls.

Objective 1.6 (Other Threatened and Endangered Species)

Identify the presence of and habitat potential for threatened and endangered species on Service-owned land within the current and expanded refuge boundaries.

Rationale

The dwarf wedge mussel, Indiana bat and Mitchell’s satyr butterfly are three of five species the New Jersey WAP identifies as “wildlife of greatest conservation need” within the Skylands Landscape, where the refuge is located. Lands within the current and expanded refuge boundaries have the potential to support any or all of these species.

Strategies

Within 15 years of CCP approval:

- In conjunction with state biologists, continue surveys for dwarf wedge mussels, Indiana bat and Mitchell’s satyr butterfly on Service-owned land.

Goal 2. Promote actions which contribute to a healthier Wallkill River

Objective 2.1 (Wetlands Restoration)

Within 50 years of CCP approval, restore to wetland habitat approximately 2,000 acres within the current and expanded refuge boundaries to facilitate the natural hydrologic flow of the Wallkill River wherever possible.

Rationale

The bottomland wetlands associated with the Wallkill River offer some of the last undeveloped, large areas of habitat in northwestern New Jersey. As we mentioned in alternative A, many of the wetlands around the Wallkill River have been drained, ditched, and converted to agricultural fields. Identifying and mapping impediments to hydrologic flow will provide us with the information we

need to decide where and how to restore bottomland hardwood forests. We would restore wetlands by implementing simple, non-intensive wetland restoration techniques such as ditch plugging, which would allow floodwaters to flow and recede naturally over the land. We would allow natural succession in those wetlands so that, eventually, they would convert naturally to forested wetlands.

Strategies

Within 5 years of CCP approval:

- Develop a wetland restoration plan for Service-owned land within the current and expanded acquisition boundaries to restore natural hydrology and allow all fields in the floodplain to succeed naturally to forest.
- Identify and map in GIS the impediments to historic hydrologic flow, including flooding regimes, on refuge land. Include all drainage ditches, impoundments, farmed lands, dikes, excavations, tertiary roads, and berms affecting that flow.
- Develop RONS projects to restore natural flow, re-create, or enhance wetland conditions where feasible, and where it does not affect other priority projects.

Within 15 years of CCP approval:

Work with Ducks Unlimited and other wetland restoration groups to restore natural wetlands at the refuge, especially along the Wallkill River and its tributaries.

Objective 2.2 (Partnering to Improve Water Quality)

Each year, collaborate with local communities to improve the biological integrity and environmental health of the Wallkill River and its tributaries through restoration projects and other activities that promote river stewardship and protection.



USFWS

Partnerships are a key part of Wallkill's monitoring programs.

Rationale

Same as in alternative B

Strategies

Same as in alternative B

Objective 2.3 (Private Lands Biologist)

A private lands biologist stationed at the refuge will work through the Partners for Fish and Wildlife Program and other federal programs to find at least two private landowners annually who will manage their properties within the current and expanded refuge boundaries in conformance to the purposes and goals of the refuge.

Rationale

Same as in alternative B

Strategies

Same as in alternative B

Goal 3. Increase or improve opportunities for hunting, fishing, environmental education, interpretation, wildlife observation and wildlife photography.

Objective 3.1 (Hunting)

The refuge will provide accessible, high quality opportunities for hunting white-tailed deer and Canada goose on Service-owned land (New Jersey only) within the current and expanded refuge boundaries.

Rationale

Same as in alternative A

Strategies

Throughout the life of the CCP:

Allow deer hunting and resident goose hunting according to state seasons. To reduce the administrative burden under this alternative, the refuge would not require a permit for hunting. As in all the alternatives, hunters still would have to obtain all necessary state permits.

Objective 3.2 (Fishing)

Maintain fishing opportunities within the current refuge boundary and, within 15 years of CCP approval, increase opportunities for able-bodied and disabled anglers to fish on Service-owned land within the expanded refuge boundary.

Rationale

Same as in alternative B

Strategies

In addition to alternative A, and within 5 years of CCP approval:

- Post signs about state fishing regulations at canoe/boat launch areas.

Within 15 years of CCP approval:

- Provide fishing opportunities in the expanded refuge boundary on Service-owned land by building boating/fishing access sites where major roads intersect with Papakating Creek. The potential sites include Route 23, where it crosses over Papakating Creek; Route 565, where it crosses the creek in the northern portion of the Papakating Creek Focus Area and again farther south; and Roy Road, where it crosses the creek.

Objective 3.3 (Wildlife Observation and Photography)

Maintain opportunities for wildlife observation and photography within the current refuge boundary and, within 15 years of CCP approval, provide additional opportunities on Service-owned land within the expanded refuge boundary.

Rationale

In addition to hunting and fishing, the Refuge Improvement Act also identifies wildlife observation and photography as priority public uses. Providing opportunities for the public to engage in those activities on the refuge promotes visitor appreciation and support for refuge programs and helps raise public awareness of the need for protecting migratory bird habitat.

Wildlife observation on the refuge is available on the Wood Duck Nature Trail, the Liberty Loop Nature Trail and Dagmar Dale Nature Trail, and by motorized boat, canoe, kayak, or rowboat along the Wallkill River.

Strategies

In addition to alternative A and within 15 years of CCP approval:

- Provide boat/canoe access to Papakating Creek on Service-owned land within the proposed expansion boundary for wildlife observation where major roads cross the creek, as mentioned in objective 3.2 “Fishing,” above.
- Provide opportunities for wildlife observation and photography, including three to five photo blinds, in the proposed expansion area, on Service-owned land, using pullouts and interpretive panels. Potential locations include Route 565, Plains Road, and where the proposed expansion area reaches north to the Stokes and High Point state parks.
- Work with state partners to convert the old railroad bed that runs through the Papakating Creek Focus Area to a non-motorized multi-use trail.

**Objective 4.4
(Interpretation)**

Work with partners to provide wildlife interpretation opportunities on and off the refuge, offering at least two programs annually.

Rationale

Same as in alternative A

Strategies

Same as in alternative A

**Objective 3.4
(Environmental Education)**

Work with partners to provide environmental education opportunities on and off the refuge, offering at least two programs annually.

Rationale

Same as in alternative A

Strategies

Same as in alternative A

**Objective 3.5 (Cultural
Resource Management)**

Protect, maintain, and plan for the use of Service-managed cultural resources for the benefit of present and future generations.

Rationale

Same as in alternative A

Strategies

Same as in alternative A

Goal 4. Cultivate an informed and conservation-educated public that works to support the goals of the refuge and the mission of the National Wildlife Refuge System.

Objective 4.1 (Outreach)

Continue to participate in local events, and remain active with conservation commissions and state and local conservation partnerships whose message advocates resource conservation and stewardship and promoting the mission of the Refuge System.

Rationale

Same as in alternative A

Strategies

Same as in alternative B

**Objective 4.2
(Communication)**

Increase public awareness and attract visitors through media and local businesses, including local television, Internet, and local chambers of commerce.

Rationale

Same as in alternative A

Strategies

Same as in alternative A

**Objective 4.3 (Support
Programs)**

Maintain programs for volunteers, interns, youths and community service participants to help support all aspects of refuge management including maintenance, biological surveys and public use.

Rationale

Same as in alternative A

Strategies

Same as in alternative A

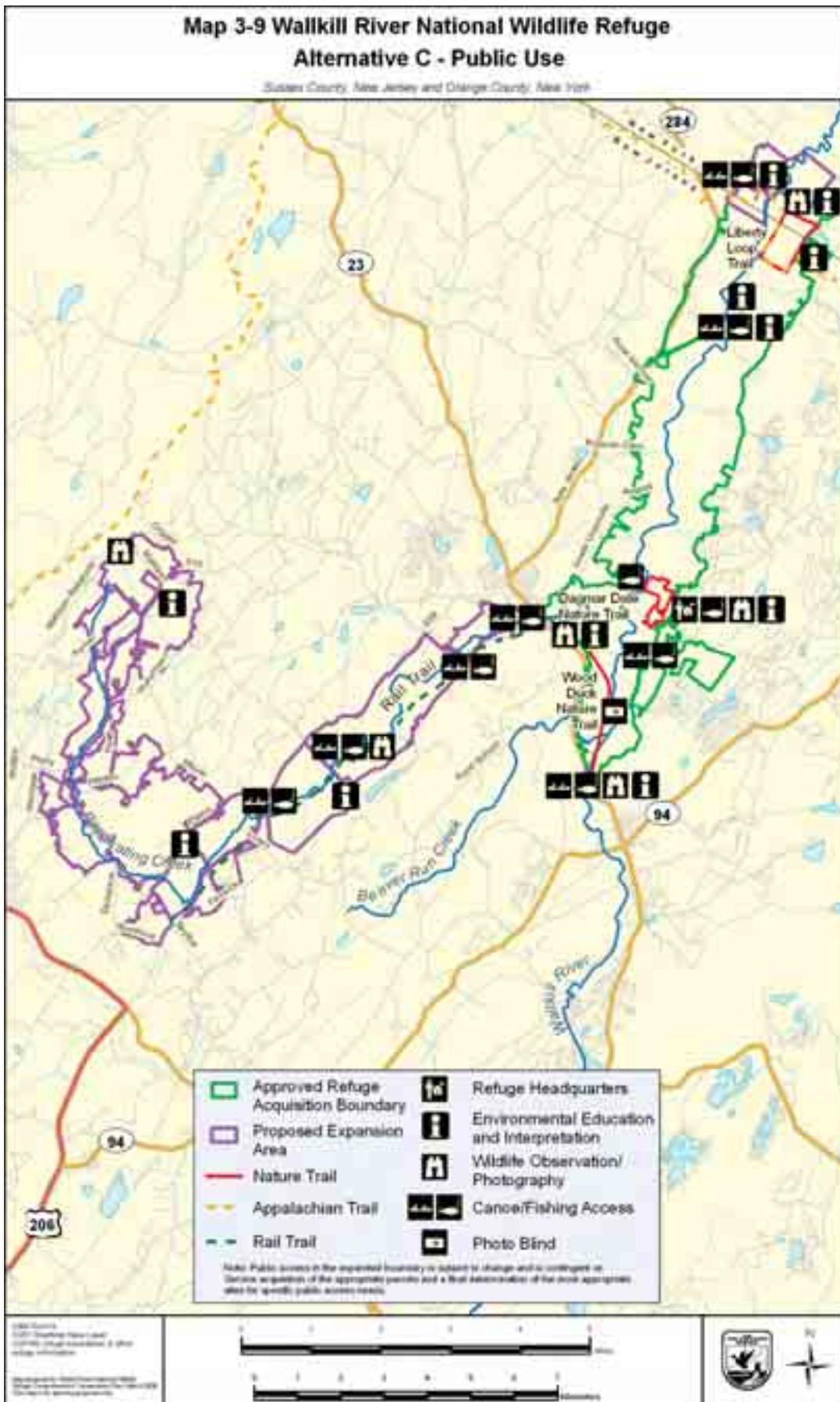


Table 3.2. Alternatives Comparison Matrix.

Common to All Alternatives		
<p><u>Bog turtles</u>: Active management of bog turtle sites, including continual monitoring of known sites to prevent illegal collection of individual animals, monitoring the status of and threats to known sites, controlling invasive plants and setting back succession using a variety of habitat management techniques.</p> <p><u>Habitat Management</u>: Using a variety of management tools, including prescribed burns, haying, mowing, grazing, to enhance habitat for migratory birds, grassland birds, waterfowl, and Federal threatened species.</p> <p><u>Invasive Plants</u>: Control invasive plants such as purple loosestrife and Phragmites through mowing, biological control agents and herbicides. Within 10 years of CCP approval, develop an Invasive Plant Management Plan.</p> <p><u>Nuisance Wildlife</u>: Manage resident Canada geese and white-tail deer populations through hunting. Manage beaver and muskrat populations through trapping. Obtain permits to addle mute swan eggs. Within 10 years of CCP approval, obtain appropriate permits to reduce Canada geese populations and eliminate mute swans on the refuge. Develop an integrated Animal Population Management Plan.</p> <p><u>Land acquisition</u>: Continue Service acquisition of land from willing sellers within the existing approved refuge boundary.</p>		
Alternative A Current Management	Alternative B The Service-Preferred Alternative	Alternative C
Early Successional Habitat		
<p>Continue managing 899 acres of Service-owned land within the existing, approved refuge boundary as early successional habitat in patches of two acres or larger to provide nesting habitat for shrub land-dependent birds such as the golden-winged warbler, field sparrow, eastern towhee, and woodcock</p> <p>Allow grasslands less than 40 acres in size to revert to early successional habitat</p> <p>Acquire from willing sellers 100 acres of land still in private ownership within the existing, approved refuge boundary and manage as early successional habitat</p> <p>Continue annual woodcock surveys refugewide</p>	<p><i>In addition to alternative A and within 5 years of CCP approval:</i></p> <p>Manage a total of 730 acres of land within the current acquisition boundary as early successional habitat</p> <p>Map all existing scrub-shrub fields >2 acres and evaluate each to determine appropriate management strategies</p> <p>Determine whether golden-winged warblers, a high-priority species, are breeding on or near the refuge</p> <p><i>Within 5–15 years of CCP approval:</i></p> <p>Acquire from willing sellers 978 acres within the proposed expansion area and manage fee land as early successional habitat</p>	<p>Manage 719 acres of land within the current acquisition boundary as early successional habitat</p> <p>Acquire from willing sellers 769 acres within the proposed expansion area and manage fee land as early successional habitat</p> <p>Maintain pockets of shrub land in the upland forest to mimic natural phenomena</p>
Non-Forested Wetland Habitat		
<p>Continue managing 693 acres of Service-owned land within the existing, approved refuge boundary as emergent wetland habitat to provide spring and fall migratory waterfowl and shorebird habitat, and wintering raptor foraging habitat</p> <p>Continue to maintain 335 acres of moist soil units at Liberty Marsh</p> <p>Acquire from willing sellers 523 acres of land still in private ownership within the existing, approved refuge boundary and manage as emergent wetland habitat</p> <p>Complete inter-Regional Impoundment study from 2005-2008</p> <p>Conduct waterfowl and shorebird surveys to evaluate response to management</p>	<p><i>In addition to alternative A and within 15 years of CCP approval:</i></p> <p>Manage a total of 1,420 acres within the current acquisition boundary as non-forested wetland habitat</p> <p>Acquire from willing sellers 1,904 acres within the proposed expansion area and manage fee land as non-forested wetland habitat. Consider converting Service-owned, non-forested wetlands to moist soil management units where the appropriate conditions exist</p>	<p>Manage 523 acres of land within the current acquisition boundary as non-forested wetland habitat</p> <p>Acquire from willing sellers 559 acres within the proposed expansion area and manage fee land as non-forested wetland habitat</p> <p>Remove all water control structures that alter natural drainage associated with refuge land</p>

Alternative A Current Management	Alternative B The Service-Preferred Alternative	Alternative C
Grassland Habitat		
<p>Continue managing 610 acres of Service-owned land within the existing, approved refuge boundary as grassland habitat in patches of 50 acres or larger to provide nesting habitat for grassland-dependent migratory birds such as savannah sparrow, grasshopper sparrow, bobolink and eastern meadowlark</p> <p>Continue using mowing, cooperative haying, prescribed burns, herbicides, and livestock grazing as grassland maintenance tools</p> <p>Acquire from willing sellers 23 acres of land still in private ownership within the existing, approved refuge boundary and manage as grassland habitat</p> <p>Exchange information with local farmers on Best Management Practices such as rotational grazing, herbicide application and prescribed fire</p> <p>Conduct annual breeding grassland bird surveys and mid-winter raptor surveys</p>	<p><i>In addition to alternative A and within 5 years of CCP approval:</i></p> <p>Within the current acquisition boundary, manage a total of 590 acres of grassland habitat divided into three grassland focus areas. Apply a rotational treatment schedule to create a variety of successional stages and vegetation diversity</p> <p>Establish criteria and monitor effectiveness of cooperative haying and grazing</p> <p><i>Within 10-15 years of CCP approval:</i></p> <p>Acquire from willing sellers 791 acres within the proposed expansion area and manage fee land as grassland habitat</p> <p>Create grassland focus areas in the expansion area where the appropriate conditions exist</p> <p>Incorporate grassland management into a Habitat Management Plan (HMP) and a Monitoring and Inventory Plan with a focus on maintaining the existing diversity of nesting and wintering grassland birds</p>	<p>There would be no management for grassland habitats under this alternative. Allow grassland habitats to succeed to shrub land and forest</p>
Forested Communities		
<p>Continue managing 2,863 acres of Service-owned lands within the existing, approved refuge boundary as forested communities, including 1,742 acres of palustrine, mature (>80 years) deciduous floodplain forest in large patches (>100 acres) and 1,121 acres of mixed upland forest, to sustain habitat for forest-dependent Neotropical migrants such as cerulean warbler and Louisiana water thrush</p> <p>Acquire from willing sellers 795 acres of land within the existing, approved refuge boundary and manage 356 acres as forested wetland habitat and 439 acres as upland forested habitat</p> <p>Continue annual land bird surveys following Regional protocol in the forested habitats of the refuge</p>	<p><i>In addition to alternative A and within 5 years of CCP approval:</i></p> <p>Within the current acquisition boundary, manage a total of 2,339 acres of forested wetland habitat and 1,831 acres of forested upland habitat</p> <p>Map and inventory stand conditions in all mature deciduous forested stands greater than 10 acres</p> <p>Establish and manage a minimum 100-meter mature forest buffer on both sides of Walkkill River except where the refuge is managing for large grassland complexes</p> <p>Monitor woolly adelgid outbreaks and implement control methods when necessary</p> <p>Develop an HMP and Monitoring and Inventory Plan for the refuge to maximize forest health and support mature (>80 years old) forest-dependent species on the existing refuge forest</p>	<p>Manage 3,294 acres of land within the current acquisition boundary as forested wetland habitat and 2,148 acres as forested upland habitat</p> <p>Acquire from willing sellers 5,816 acres within the proposed expansion area and manage 3,520 acres as forested wetland habitat and 2,296 acres as forested upland habitat</p> <p>Maintain select upland sites as created openings and shrub habitat to promote wildlife-viewing opportunities</p>

Alternative A Current Management	Alternative B The Service-Preferred Alternative	Alternative C
Forested Communities (cont'd)		
Continue long-term monitoring of the refuge's 26 or more vernal pools and their associated amphibian populations	<p>Incorporate the Atlantic white cedar swamp in the HMP</p> <p>Acquire from willing sellers 5,590 acres within the proposed expansion area. Manage 3,135 acres of fee land as forested wetlands and 2,455 acres as forested uplands</p>	Maintain bottomland forested sites as predominantly red maple swamps by actively advancing succession or allowing natural succession to occur unimpeded
Bog Turtle Management		
Continue efforts to acquire the one known bog turtle site on private land within the current boundary	<i>In addition to alternative A and within 5 years of CCP approval:</i>	Continue efforts to acquire the one known bog turtle site on private land within the current refuge boundary
Conduct surveys of known, historical and potential bog turtle habitat	Develop a site management and monitoring plan for occupied sites on Service-owned land	Protect bog turtles from poaching activities by conducting routine and random site visits
Monitor the status of and threats to populations and habitat, including changes in hydrology, encroachment of development, successional changes, and the introduction and spread of invasive native and exotic plants	Complete field survey of all suitable refuge habitat sites for presence of bog turtles, using Service protocol	
Continue radiotelemetry study to monitor population trends and detect signs of recruitment and reproduction, seasonal movements, home range	<i>Within 5–15 years of CCP approval:</i>	
Work with the Service's Field Office and our state partners to improve the effectiveness of regulatory reviews in protecting bog turtles and their habitats	Based on surveys, develop site management and monitoring plans for potential refuge sites that could support reintroduction of bog turtles with active management	
Coordinate with bog turtle recovery team, New Jersey and New York state biologists, and conservation partners to insure the best available science for management decisions	Work with partners to implement a tagging program for local bog turtles that would help identify these turtles if they are illegally captured	
Protect bog turtles from poaching activities by conducting routine and random site visits		
Threatened and Endangered Species		
Continue land acquisition within the current refuge boundary to maintain undeveloped river shoreline and reduce continued degradation of water quality	<i>In addition to alternative A and within 5 years of CCP approval:</i>	In conjunction with state biologists, continue surveys for dwarf wedge mussels, Indiana bat and Mitchell's satyr butterfly on Service-owned land
In conjunction with state biologists, continue surveys for dwarf wedge mussel and other bivalve species	Work with the New Jersey Field Office to hire a private contractor to conduct mist net surveys for Indiana bats on Service-owned land	
	Collaborate with Great Swamp refuge to recruit students to conduct research on Indiana bats on Service-owned land	
	Survey expansion area for potential habitat for other federal-listed endangered species	

Alternative A Current Management	Alternative B The Service-Preferred Alternative	Alternative C
Threatened and Endangered Species (cont'd)		
	<p><i>Within 5–15 years of CCP approval</i></p> <p>Determine the feasibility of re-establishing dwarf wedge mussel populations within the species' historic range</p> <p>Begin surveys for Mitchell's satyr butterfly on Service-owned land</p>	
Wetland Restoration		
<p>Identify and map drainage ditches across the refuge to evaluate impediments to natural hydrologic flow and floodplain regimens and to identify future wetlands restoration projects</p> <p>Restore 25 acres of adjacent wet meadow habitat at Bassett's Bridge and allow natural hydrology to maintain the site</p>	<p><i>In addition to alternative A and within 5 years of CCP approval:</i></p> <p>Consider wetland restoration techniques where wetlands lie adjacent to a water source, (such as the Wallkill River or Papakating Creek), where the least intense management would be needed and where there is seasonal flooding</p> <p>Work with Ducks Unlimited to restore refuge wetlands</p> <p><i>Within 5–15 years of CCP approval:</i></p> <p>Plant native hardwood species to help establish a forested floodplain corridor at least 100 meters wide on either side of the Wallkill River</p> <p>Reestablish a native grassland or scrub-shrub cover in areas where the hydrologic disturbance regime would prevent forest establishment</p>	<p>Develop a wetland restoration plan for Service-owned land within the current and expanded acquisition boundaries to restore natural hydrology</p> <p>Identify and map in GIS impediments to historic hydrologic flow</p> <p>Develop RONS projects to restore natural flow or re-create or enhance wetland conditions</p> <p>Work with Ducks Unlimited and other NGOs to restore wetlands at the refuge</p>
Partnering to Improve Water Quality		
<p>Continue to work with the Wallkill Watershed Coordinator to measure water quality through various studies and tests</p> <p>Continue working with the State of New Jersey and New York State to promote healthy water quality</p> <p>Continue working with local governments and agencies to reduce non-point source pollution and sedimentation</p> <p>Maintain Ducks Unlimited partnership and continue to restore and enhance wetlands</p>	<p><i>In addition to alternative A and within 5 years of CCP approval:</i></p> <p>Work with local public and private organizations to establish water quality monitoring protocol in the current and expanded refuge boundaries</p> <p>Using GIS, map the Wallkill River, Papakating Creek and other main tributaries within the current refuge and proposed expansion area to identify each area's need for restoration and monitoring</p>	<p>Same as in alternative B</p>

Alternative A Current Management	Alternative B The Service-Preferred Alternative	Alternative C
Partnering to Improve Water Quality (cont'd)		
	<p>Work with local public and private organizations to promote recreational use on the river, encourage wetland restoration and protect riverine habitats</p> <p>Within 10 years of CCP approval, hire a Private Lands Biologist to work with partners to create, restore or enhance regionally significant ecological communities, focusing on landowners with large acreages or farmlands</p> <p>Within 5–15 years of CCP approval, begin restoring the most sensitive and accessible areas of the waterways in and near the refuge</p>	
Hunting		
<p>Continue hunt programs for deer, spring and fall turkey, migratory bird, woodcock, and resident geese during New Jersey state seasons</p> <p>Continue youth hunting programs</p> <p>Continue to provide barrier-free hunting opportunities to disabled hunters upon request</p> <p>Continue to collect refuge permit application fees from all refuge hunters except youth hunters</p> <p>Continue the prohibition of stocking of game species and night hunting</p>	<p><i>In addition to alternative A and within 5 years of CCP approval:</i></p> <p>Open Service-owned land within the current acquisition boundary to a black bear hunt according to state seasons and regulations</p> <p>Open Service-owned land in the proposed expansion area to public hunting, including black bear, when appropriate conditions exist</p> <p>Expand accessible hunting opportunities at Owens Station</p>	<p>Subject to refuge regulations, allow deer and resident Canada goose hunting according to New Jersey state seasons. No refuge permits would be required</p>
Fishing		
<p>Maintain Wallkill River fishing access sites at Oil City Road (NY), Bassett's Bridge, and County Route 565, on the pond adjacent to refuge headquarters and on the Dagmar Dale Nature Trail</p> <p>Complete the development of a parking area at the Wallkill River on Rte. 565</p> <p>Continue to allow anglers to fish anywhere from river shoreline, which can be accessed from boats on the river or from designated footpaths</p> <p>Continue to stock the pond near refuge headquarters with native fish only for National Fishing Day Sponsor or other youth/family events</p>	<p><i>In addition to alternative A, and within 5 years of CCP approval:</i></p> <p>Expand fishing opportunities in the current refuge boundary by providing fishing access to the Wallkill River from an access site along Lake Wallkill Road</p> <p>Provide universal access for fishing at Bassett's Bridge</p> <p>Within 5–15 years of CCP approval, provide fishing opportunities (some with universal access) in the expanded refuge boundary on Service-owned land by building five boating/fishing access sites where major roads intersect with Papakating Creek</p>	<p><i>In addition to alternative A, and within 5 years of CCP approval:</i></p> <p>Post signs at canoe/boat launch areas about state fishing regulations</p> <p>Provide fishing opportunities in the expanded refuge boundary on Service-owned land by building boating/fishing access sites where major roads intersect with Papakating Creek</p>

Alternative A Current Management	Alternative B The Service-Preferred Alternative	Alternative C
Wildlife Observation and Photography		
<p>Continue to provide foot access to the refuge via the Wood Duck Nature Trail, Dagmar Dale Nature Trail, Liberty Loop Trail</p> <p>Continue to provide boat access to the Wallkill River at Oil City Road, Bassett's Bridge, and Route 565</p> <p>Continue to allow dog walking only on the Appalachian Trail that coincides with part of the Liberty Loop Trail</p> <p>Continue to maintain photography blind on Wood Duck Nature Trail and observation platform at Liberty Loop Trail</p>	<p><i>In addition to alternative A, and within 5 years of CCP approval:</i></p> <p>Allow access by permit to Service owned land on Sundays from September 1 through March 31</p> <p>Build a boardwalk and barrier free canoe/kayak access site at Bassett's Bridge</p> <p>Work with the current owners of the former Lehigh New England railroad bed to obtain a right of way or in fee acquisition of the railroad bed south of Judge Beach Road for public use</p> <p>Allow dog walking on the entire 2.5-mile Liberty Loop Trail</p> <p><i>Within 5–15 years of CCP approval:</i></p> <p>Construct a photography blind on the Liberty Loop Trail</p> <p>Extend Wood Duck Nature trail approximately 0.75 miles with a footbridge over the Wallkill River</p> <p>Open the former Lehigh and New England railroad bed to foot access from Kelly Road up to Bassett's Bridge to create the 0.75-mile Timberdoodle Trail</p> <p>After completion of restoration on Tract 15r (former Mt. Bethel property), extend the Timberdoodle Trail north to connect with the Liberty Loop Trail</p> <p>Provide boat/canoe access to Papakating Creek in the proposed expansion boundary, on Service owned land, for wildlife observation</p> <p>Provide wildlife observation and photography opportunities in the proposed expansion area, on Service owned land, using pullouts and interpretive panels</p>	<p><i>In addition to alternative A, and within 15 years of CCP approval:</i></p> <p>Provide boat/canoe access to Papakating Creek in the proposed expansion boundary, on Service-owned land, for wildlife observation where major roads cross the creek</p> <p>Provide wildlife observation and photography opportunities in the proposed expansion area, on Service-owned land, using pullouts and interpretive panels</p> <p>Work with state partners to convert the old railroad bed that runs through the Papakating Creek Focus Area to a non-motorized, multi-use trail</p>
Interpretation		
<p>Continue to provide training opportunities for college students through refuge internship program</p> <p>Continue public events like National Fishing Day</p> <p>Maintain 5 kiosks with up-to-date information about the refuge</p>	<p><i>In addition to alternative A and within 5 years of CCP approval:</i></p> <p>Develop new interpretive materials, including animal and plant checklists and trail guides</p> <p>Plan, fund, and install interpretive signs on all refuge nature trails and on the proposed Bassett's Bridge accessible boardwalk</p>	<p>Same as in alternative A</p>

Alternative A Current Management	Alternative B The Service-Preferred Alternative	Alternative C
Interpretation (cont'd)		
Continue to provide updated brochures on trails, bird checklists, and on the Service in general	<p>Work to increase membership in the Friends Group and Scout programs</p> <p>Continue to develop the refuge website</p> <p><i>Within 5–15 years of CCP approval:</i></p> <p>Hire a visitor services professional</p> <p>Sponsor a speaker series at the refuge for the public to learn about wildlife and nature</p> <p>Create self guided pamphlets and other handouts for public access areas on the refuge</p> <p>Develop a series of roadside/parking lot displays</p> <p>Develop a Wallkill River canoe trail, install signs, and prepare trail brochure</p> <p>Conduct guided walks on refuge trails and former Lehigh and New England railroad bed south of Kelly Road</p> <p>Work with state partners to convert the old railroad bed that runs through the Papakating Creek Focus Area to a non motorized, multi use trail</p>	
Environmental Education		
Continue to conduct occasional on and off site presentations	<i>In addition to alternative A and within 5 years of CCP approval:</i>	Same as in alternative A
Continue to work with partners to develop a more comprehensive environmental education program	<p>Work with partners such as New Jersey Audubon Society to help develop an integrated classroom curriculum in local schools</p> <p>Through an expanded refuge internship program, work with local middle and high school students to increase awareness and career appreciation for wildlife and conservation biology</p> <p>Expand the refuge’s partnership with New Jersey Audubon Society to allow them to sponsor environmental education classes and public events on the refuge</p> <p>Provide at least one “Teach the Teacher” workshop each year</p> <p><i>Within 5–15 years, work with state partners to offer joint environmental education programs</i></p>	

Alternative A Current Management	Alternative B The Service-Preferred Alternative	Alternative C
Cultural Resources		
Continue to comply with section 106 of the National Historic Preservation Act of 1966	<i>In addition to alternative A, and within 10 years of CCP approval:</i>	Same as in alternative A
Continue to promote and encourage academic research on, or relating to, refuge land	Include cultural resources information in education and interpretation programs	
Add Antiquities Resource Protection Act (ARPA) language to appropriate public use materials to warn visitors about illegal looting	Monitor known prehistoric sites on the refuge to protect from looting and other ARPA violations	
Maintain law enforcement personnel trained in ARPA enforcement	Complete evaluations of historic refuge structures for National Register eligibility Survey potential prehistoric sites (quarries, living/working areas) and share archaeological information through interpretive programs	
Visitor Services Protocol (alternative B only)		
	<i>In addition to alternative A and within 5 years of CCP approval:</i>	
	Obtain better estimates of visitation	
	Identify target audiences	
	Address the possibility of a fee program and/or installing a donation box at the Wood Duck Trail to help fund maintenance work	
	<i>Within 5–15 years of CCP approval:</i>	
	Monitor the quality of wildlife viewing opportunities by soliciting oral and written comments from visitors. Work with the Service’s Region 5 Regional Office staff to develop and implement additional strategies for measuring quality of experience	
	Work with the Service’s Region 5 Regional Office staff to develop and implement strategies for determining visitor carrying capacity	
Outreach		
Implement public use program in accordance to draft Visitor Services Plan prepared in 1997	<i>In addition to alternative A, and within 5 years of CCP approval:</i>	Same as in alternative B
Increase public awareness and attract visitors through use of media and local businesses	Increase the visibility of the refuge by posting its boundary and increasing participation in community events	
Continue to participate in annual special events such as Vernon Earthfest and Orange County Conservation Field Days	Undertake efforts to strengthen the refuge Friends group and, where appropriate, make them a major partner in refuge efforts	
Continue to partner with Bergen County Audubon Society through the “Audubon Refuge Keeper” program	Strengthen relationships with local businesses, particularly those that can benefit from ecotourism	

Alternative A Current Management	Alternative B The Service-Preferred Alternative	Alternative C
Outreach (cont'd)		
Continue to participate, upon request, on local and regional committees	<p><i>Within 5–15 years of CCP approval:</i></p> <p>Increase speaking opportunities about the refuge and its mission at local civic organizations throughout the Wallkill River watershed</p> <p>Encourage local organizations to “adopt” the refuge by serving as advocates and undertaking special projects</p>	
Communication		
<p>Continue to maintain refuge website</p> <p>Continue to distribute media releases, media alerts and television advertisements</p> <p>Continue to hold media events at the refuge and provide tours to members of the local media upon request</p> <p>Continue to participate in local Chamber of Commerce events</p>	<p><i>In addition to alternative A, and within 5 years of CCP approval:</i></p> <p>Increase the visibility of the refuge by participating in community events, such as fairs, festivals, and celebrations</p> <p>Strengthen relationships with local businesses that can benefit from ecotourism</p> <p><i>Within 5–15 years of CCP approval:</i></p> <p>Increase speaking opportunities about the refuge and its mission at local civic organizations</p> <p>Encourage local organizations to “adopt” the refuge by serving as advocates and undertaking special projects</p>	Same as in alternative A
Support Programs		
<p>Continue to work with independent, local volunteers as opportunities arise</p> <p>Offer internship opportunities to qualified college students</p> <p>Continue to foster the new refuge Friends Group, founded in 2006</p> <p>Continue scouting programs</p> <p>Continue to provide training opportunities for college students through refuge internship program</p> <p>Continue working with Sussex County Probation Office’s community service program to maintain trails, grounds, and structures</p>	<p><i>In addition to alternative A, and within 5 years of CCP approval;</i></p> <p>Develop orientation guide and provide liaison between staff, volunteers, and community service participants to work on specific projects</p>	Same as in alternative A