

## Chapter 4

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*Osprey at Montezuma National Wildlife Refuge*

# Environmental Consequences

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## Introduction

This chapter describes the foreseeable consequences to the environment that would result under each of the three alternatives we propose in chapter 3: alternative A (Current Management) which serves as the baseline to which alternative B (Management for Focal Species and Improved Visitor Services (Service-preferred)) and alternative C (Less-active Habitat Management) are compared. Where detailed information is available, we present scientific, analytical comparisons of the alternatives and their consequences, which we term “impacts” or “effects.” In the event that detailed information is unavailable, we base those comparisons on our professional judgment and experience.

Our discussion focuses on the impacts associated with the goals and issues identified in “Chapter 1, Purpose of, and Need for, Action”. Direct, indirect, short-term, beneficial, and adverse, and cumulative effects likely to occur during this 15-year plan are discussed. Beyond the 15-year planning scope, we give a more speculative description of the direct, indirect, and cumulative effects. At the end of this chapter, table 4.3 summarizes the effects predicted for each alternative and provides a side-by-side comparison. This chapter also identifies the irreversible and irretrievable commitment of resources from our proposed actions. The relationship between short-term uses of the environment and long-term productivity of proposed actions, their cumulative effects, and the relationship to environmental justice are also described.

Per Council of Environmental Quality and Service regulations on implementing NEPA, we assess the importance of the effects of the alternatives based on their context and intensity. The scale of their context ranges from site-specific to local, landscape, or regional. Although the area of the refuge is only a small percent of the context in its ecosystem or region, we developed all of our management alternatives to contribute to the many conservation goals in those larger contexts. For each alternative, we based our evaluation of the intensity of the effects on the following factors:

- The expected degree or percent of change in the resource from current conditions.
- The frequency and duration of the effect.
- The sensitivity of the resource to such an effect or its natural resiliency to recover from such an effect.
- The potential for implementing effective preventive or mitigating measures to lessen the effect.

The duration of those effects varies, from those occurring only once for a brief period in the 15-year period of this plan, for example the effects of remodeling the visitor contact station, to those occurring repeatedly or frequently during a given season of the year, for example observing wildlife from refuge trails.

The following list of management activities are not analyzed in detail in this document because they are both trivial in effect and common to all alternatives. These would qualify for categorical exclusion under applicable regulations if independently proposed:

- Operations and maintenance of existing infrastructure and facilities (unless major renovation is involved)
- Issuance of new or revised management plans when only minor changes are planned
- Law enforcement activities
- Environmental education and interpretative programs (unless major construction is involved, or a significant increase in visitation is expected)
- Research, resource inventories, and other resource information collection activities
- Routine, recurring management activities and improvements, including managing invasive plants
- Small construction projects (for example, fences, berms, small stream and wetland restoration projects, trail maintenance, interpretative kiosks, and development of access for routine management purposes)
- Minor vegetation plantings
- Reintroducing native plants and animals
- Minor changes in amounts or types of public use

Extraordinary circumstances in 43 CFR 46.215 are exceptions to our categorical exclusions. If any of these exceptions apply, we would conduct a further NEPA analysis of the proposed action.

Actions that are not categorically excluded and that may require additional NEPA analysis beyond this document are:

- Implementing changes to the hunt program
- Future major habitat restoration projects
- Expanding the Wildlife Drive to connect to the MAC
- Constructing a new visitor contact station and office
- Other activities (e.g., opening discovery areas and creating vehicle pulloffs for more than five cars)

We organized this chapter by major resource headings. Under each heading, we discuss the context of the resource and management actions that may affect the environment, then the beneficial and adverse effects regardless of which alternative we select, and last the beneficial and adverse effects of each of the alternatives. For more information on the impacts relating to the refuge's hunt program, refer to "Appendix E, Montezuma NWR Hunt Program EA."

## Effects on Land Use

Under each alternative, the refuge would continue to acquire lands from willing sellers. Most of the lands potentially available in the current acquisition boundary are farmed wetlands. Hence, land use would change at the local scale from privately owned agricultural land to publicly owned conservation land. However, this impact is expected to be minor, as it would only affect a small fraction of the total land use within Cayuga, Seneca, and Wayne Counties. The greatest impact would be on the local towns where acquisition would occur. Regionally, approximately 74 percent of the land is used for agriculture. Even if all the lands in the current acquisition

boundary were acquired and taken out of production through conversion to more natural habitats, it would account for less than 1 percent of the total land surface in agricultural production in the tri-county area.

### **Impacts on Land Use Common to Alternatives B and C**

Under alternatives B and C, we propose an expanded acquisition boundary as detailed in the LPP (see appendix F). The proposed expansion area would increase the current refuge acquisition boundary by approximately 1,421 acres. We expect effects on land use associated with the expansion to be minimal for the following reasons: 1) This area was already identified for land protection under NYSDEC in the 1991 EIS for the MWC (USFWS and NYSDEC 1991); and 2) it represents a small proportion of the total land base in the area. In fact, the proposed expansion area includes about 0.09 percent of Seneca County, 0.01 percent of Cayuga County, and 0.31 percent of Wayne County. If all lands within the expansion area were acquired from willing sellers and converted to natural habitats, it would represent only 0.14 percent of the total land surface within the tri-county area.

As discussed in chapter 2, the purpose of the cooperative farming program is to keep fields open and relatively free of invasive plants in preparation for conversion to native plants. Under alternatives B and C, we would restore lands currently in the refuge's cooperative farming program to habitats dominated by native plants.

## **Effects on Climate Change**

Climate change has been identified by the Service as a serious issue, as further detailed in chapter 2. Overall, impacts to climate change are expected to be minimal, but likely beneficial because lands that are managed in a manner that mimics a more natural state generally are not significant sources of greenhouse gases.

### **Benefits**

Under each of the alternatives the refuge is expected to have positive, albeit small, net effects with respect to greenhouse gas emissions and associated climate change.

The refuge will continue to acquire and protect lands, thereby increasing the acreage of land covered with natural vegetative communities. Plants absorb carbon dioxide and as a result, vegetated areas can act as an important carbon sink (Heath and Smith 2004). This process, whereby plants take up atmospheric carbon dioxide and store it as biomass, is commonly referred to as carbon sequestration. Generally, the highest rate of carbon sequestration occurs during succession to forest, and the rate of sequestration declines as trees mature (Heath and Smith 2004). Under each of the alternatives, some areas would succeed to forest, with the greatest acreage expected under alternative C (see "Effects on Upland Habitats" section below).

In addition, as part of Federal mandates, various energy efficiencies have been incorporated into the refuge headquarter buildings during the past few years, including; an upgraded boiler with a variable speed circulator, additional insulation in the attics and roofing (shop building),

double/triple pane windows, on-demand controls for heating/cooling offices, energy star compliant equipment, and timers for turning off equipment outside of regular work hours.

### **Adverse Impacts**

Under each alternative, the refuge would continue to use equipment, machinery, and vehicles in support of maintenance operations and general habitat and wildlife management activities. These would include 4-wheel all-terrain vehicles (ATV), weed eaters, lawn mowers, etc. that use gasoline, as well as diesel-powered bulldozers, backhoes, excavators, and tractors. The refuge uses ultra-low sulfur diesel fuel. In compliance with Section 141 of the 2007 Energy Independence and Security Act (which requires Federal agencies to acquire low greenhouse gas emitting vehicles), the refuge would continue to replace older vehicles with hybrid or other low emission models, where feasible. Additionally, the refuge would continue to implement the Service's 2010 Fleet Action Plan (USFWS 2010c), with concomitant benefits to air quality. In summary, emissions associated with the sources discussed above, are expected to have minimal impacts on air quality.

Refuge visitation is likely to rise, regardless of alternative, with an associated increase in the number of vehicles on the refuge. However, the number of vehicles visiting the refuge is not expected to create a noticeable effect on emissions or climate change particularly compared to the effects from I-90.

As described in chapter 3, prescribed burning would continue to be a valuable habitat management tool, under all alternatives. The primary gases released during prescribed fire include carbon dioxide, carbon monoxide, and water vapor, with other gases present in trace amounts (EPA 40 CFR Part 5). Based on our experience, and as described in appendix H, prescribed burning is not expected to have noticeable, long-term negative impacts on climate change.

Because of the importance of impoundments as habitat for a range of priority bird species, the maintenance of these managed wetlands would be an important component of refuge management under all of the alternatives. Although wetlands can act as carbon sinks (by incorporating decaying vegetation into sediment) (Armentano and Menges 1986), they also release methane, a powerful greenhouse gas (NOAA 2010b). Methane remains in the atmosphere for approximately 9 to 15 years and is over 20 times more effective in trapping heat in the atmosphere than carbon dioxide over a 100-year period (EPA 2010). Natural wetlands are responsible for the majority of global methane emissions from natural sources, accounting for an estimated 200 million tons of methane per year globally (EPA 2010). Actual effects of refuge wetlands on greenhouse gases are unknown at this time.

The use of mowing as a habitat management tool would continue under each alternative. Grasslands can function as carbon sinks if plant biomass is converted to soil (Buyanovsky and Wagner 1998). However, on the refuge a portion of the grasses would be removed following mowing as part of a cooperative haying program; if cut plant material were left on the grasslands it could prevent proper regrowth of favorable grass species. The hay would be fed to livestock or used for bedding, resulting in a degree of conversion to carbon dioxide and methane. Of the approximately 60 to 360 acres of grassland on the refuge, depending on the alternative, roughly

30 acres would be hayed annually. Thus, in total, we expect that grasslands on the refuge are a net sink of greenhouse gases, but the area is so small that there would be negligible impacts on climate change.

By protecting land from development and restoring and conserving natural habitat we expect to have a negligible, but overall beneficial, effect on atmospheric greenhouse gases.

## **Effects on Air Quality**

“Chapter 2, Affected Environment,” discusses the status of air quality in the landscape around the refuge. For the purposes of this draft CCP/EA, we did not estimate the relative amounts of potential air pollutants that would be emitted under each alternative. However, we believe that the impacts of refuge management on air quality would not vary significantly under any of the alternatives. Hence, the discussion of beneficial and adverse effects on air quality has been combined in this section. We predict that refuge land management, regardless of the alternative, would have a net positive effect on air quality. Maintaining vegetative cover, improving energy efficiencies, and limiting public uses to those that are appropriate, compatible, and wildlife-dependent would collectively help reduce any air quality impacts.

We evaluated the management actions the alternatives propose for their potential to improve air quality locally, throughout the region, and globally. The benefits we considered include

- the potential of continuing and expanding our energy efficiency practices to reduce the refuge contribution to emissions;
- the potential to adopt energy efficient practices to reduce the refuge’s contribution to emissions and use the Service’s Strategic Plan for Responding to Climate Change (USFWS 2010b);
- the potential of refuge land acquisition and protection to reduce the growth of development, reduce loss of vegetation; and
- the potential of refuge forest management practices, such as reforestation/succession, to contribute to carbon sequestration and reduce greenhouse gases.

The potential adverse effects of the management alternatives we evaluated include

- increasing emissions from vehicles or equipment;
- applying herbicides to control invasive plants;
- particulates from burning prescribed fires as a management tool; and
- accumulation of dust and air-borne particles during construction and renovation.

Regardless of which management alternative we select, refuge management activities should not adversely impact regional air quality. None of the alternatives would violate EPA standards and all three would be in compliance with the Clean Air Act.

## **Benefits**

Maintaining natural vegetation on the refuge would continue to provide benefits to air quality with respect to the six air pollutants for which 1990 National Ambient Air Quality Standards (40 CFR part 50) have been established by the EPA. Trees have been shown to reduce the concentration of ozone, sulfur dioxide, nitrogen dioxide, carbon monoxide, and particulate matter less than 10 and 2.5 microns in diameter, primarily through direct uptake and adhesion to stems and leaves (Escobedo et al. 2007).

The Service would continue to acquire land from willing sellers as funding and parcels become available. Newly acquired lands would be protected from development. In addition, these lands would likely be restored to more natural habitats that incorporate native vegetation. There would be an associated benefit to air quality since natural habitats, once restored, would likely require less herbicide application and less use of mechanized equipment compared to farming and would provide more vegetation (and associated air quality benefits) than developed areas.

## **Adverse Impacts**

Under each alternative, the refuge would continue to use equipment, machinery, and vehicles in support of maintenance operations and general habitat and wildlife management activities. Vehicles and motorized equipment release several air pollutants. However, the frequency and intensity of use of refuge vehicles and machinery are relatively low. In addition, a major interstate (Interstate 90) bisects the refuge and the contribution of the refuge to air pollution is expected to be negligible.

Traffic on I-90, which passes through the refuge, affects air quality on the refuge. Interstate 90 traffic is largely independent of refuge visitation, though some visitors may use it to access the refuge. Refuge visitation is likely to rise, regardless of alternative, with an associated increase in the number of vehicles on the refuge. However, the number of vehicles on the refuge at any given time is not expected to be sufficiently large to create a noticeable impact to air quality particularly compared to the impacts from I-90.

As described in chapter 2, prescribed burning would continue to be a valuable habitat management tool, under all alternatives. With fire, the pollutant of primary concern is particulate matter. Particulates can reduce visibility or cause negative effects on the health of people with respiratory illnesses. Appropriate smoke management can minimize or nearly eliminate both of those negative effects. The consideration of the wind speed, direction, and mixing heights is important in managing smoke. In planning our prescribed burns, we would consider all those factors, and other environmental and geographical factors, as detailed in the refuge's fire management plan EA (see appendix H). Based on our experience, and as described in appendix H, we expect prescribed burning would not have noticeable, long-term negative impacts to air quality.

Alternatives B and C propose new trail and infrastructure construction, and removal of dikes that would cause short-term, localized effects from dust and from the exhaust of construction vehicles and other equipment. Tables 4.1 and 4.2 provide an overview of proposed construction activities under these alternatives. Given the presence of I-90 and current baseline emissions on and near the refuge, we expect any negative effects associated with these activities to be minimal.

Table 4.1. Alternative B Proposed Construction Projects.

1. Extend the Wildlife Drive to connect to the Montezuma Audubon Center.
2. Construct and/or update kiosks at all trailhead areas within the refuge; develop at least two new wildlife observation trails; expand the proposed Oxbow trail; explore connecting with Cayuga-Seneca and Erie Canalway trails.
3. Construct observation area and tower at the Dry Marsh Restoration Site.
4. Designate up to two discovery areas.
5. Repair the existing photography blind (located off of the Wildlife Drive) and develop and construct a second photography blind site.
6. Construct up to five new pulloffs for observation and photography opportunities.
7. Build new visitor contact station and administrative facility (refer to appendix J for example conceptual design plans).
8. Evaluate the need for outdoor facility for environmental education and interpretation (e.g., pavilion, amphitheater).

Table 4.2. Alternative C Proposed Construction Projects.

<b>In addition to table 4.1 projects 1-6:</b>
1. Breach or remove dikes.
2. Expand the visitor contact station.

## Effects on Hydrology and Water Quality

As discussed in chapter 2, the hydrology on most of the refuge has been altered. Management actions proposed for the refuge's CCP alternatives were evaluated and compared based on their potential to help maintain and improve the hydrology and water quality of the wetlands and impoundments.

We evaluated the benefits of the following actions that would protect or restore hydrology or maintain or improve water quality:

- Land acquisition and conservation that would provide watershed benefits by limiting land clearing and changes in local hydrology
- Wetland and riparian forest restoration projects
- Improvements in local hydrology through road/trail reconstruction, breaching or removing the dike system in some areas
- Improved water quality monitoring for early problem detection
- Improved cooperation with other landowners in watershed to influence water quality

We evaluated the effects of the following actions with the potential to cause adverse effects on hydrology and water quality:

- Use of herbicides to manage invasive species
- Constructing administrative and visitor services facilities
- Changes in recreational use that may lead to increased siltation into refuge waterways

## **Impacts on Hydrology and Water Quality Common to All Alternatives**

Regardless of which alternative is selected, we would take a number of steps to ensure that we have sufficient scientific data to support the management decisions regarding refuge hydrology and water quality. Water quality on the refuge is largely influenced by land use practices upstream of the refuge.

### ***Benefits***

We would expect an increase in hydrology and water quality benefits from continued protection and restoration of refuge lands. Acquisition of additional lands within the acquisition boundary and conservation of the existing 9,184 acres of upland forest, wetlands, and other lands within the refuge would further benefit water resources because acquisition would increase watershed protection to ensure the integrity of wetland habitats in the MWC.

Service actions at the refuge would not affect pollution levels from point or nonpoint sources. However, the refuge would continue to benefit water quality in the Great Lakes watershed by limiting development in that part of the watershed and acting as a buffer against nonpoint source pollution in the surrounding landscape. The benefits of wetlands to water quality are well established, and include trapping, recycling, and exporting sediments, nutrients, organic materials, and contaminants (Carter 1996). The existing and restored wetlands would filter water moving into the river and help improve water quality.

Under each alternative, impoundment management aims to reverse the adverse impacts on hydrology caused by the construction and maintenance of the canal system. Through the careful management of impoundments, the refuge has increased the availability of wetlands. The hydrology of central New York was drastically and permanently altered by the construction of the Erie Canal and agricultural activities long before the refuge was established; therefore, a return to historic hydrologic conditions would be nearly impossible. However, careful water level management within impoundments can mimic natural hydrologic periods as closely as possible, benefitting species associated with these managed wetlands.

Under all of the alternatives, we would continue to work with partners to complete our goal of protecting 19,510 acres within the approved acquisition boundary. In doing so, we would prevent their conversion to uses that may negatively affect water quality and hydrology. Historically, the MWC contained about 50,000 acres of contiguous wetland habitat (see chapter 2, “Current Land Use”). With the development of the NYS Canal System in the early 1900s, the water table dropped several feet, which allowed thousands of acres of wetlands to be drained for agriculture. Today, agriculture is the primary land use in the area. By acquiring and protecting land, we would help improve water quality and hydrology by restoring many of these areas into functional natural habitats.

### ***Adverse Impacts***

In managing the refuge, we would closely monitor and mitigate all of our routine activities that may result in chemical contamination of water directly through leakage or spills or indirectly through soil runoff. These include control of weeds and insects around structures, use of chemicals for deicing walkways and roads, and use of soaps and detergents for cleaning vehicles and equipment. Our personnel take precautions to minimize the potential for chemicals and

petroleum products from becoming a water quality problem. As part of regular maintenance activities, some grease and cleaning chemicals could be washed off vehicles and equipment. This is not expected to impact water quality because we would use best management practices (e.g., ensure vehicles are cleaned away from refuge wetlands and nearby waters) to minimize potential impacts.

Regardless of the alternative selected, we would continue to aggressively identify and control invasive plant species before they cause large changes on the landscape. We would use integrated pest management, which employs a variety of mechanical, biological, and chemical means of controlling invasive plants, but our experience to date suggests that the use of herbicides would continue to be part of our invasive species control program.

Please refer to the “Effects on Soils” section to review the herbicides we use on the refuge. The risk that other herbicides used on the refuge reach open water is small. The level of review that Service policy requires before we can apply any chemical on a refuge ensures that the environmental risk is minimized, and that all facets of the proposed use have been examined and justified. All products are used according to label instructions to minimize impacts on ground and surface waters. In addition, only herbicides specifically approved for aquatic application are used on or near refuge waters. When used appropriately, these products should not have direct or indirect negative impacts on water quality.

Under each alternative, refuge visitation is expected to increase. However, vegetation trampling and associated soil erosion and possible impacts to water quality are expected to be minimal. Most public use is restricted to established roads and trails, but some visitors (e.g., hunters, researchers) are allowed access off trail. These would continue to be controlled through special use permits, and refuge staff is not aware of any adverse effects to water quality or hydrology associated with these activities to date. We would continue to monitor the refuge for potential impacts and would take steps to limit access or close areas as needed to protect refuge resources.

Impoundment maintenance and restoration projects are expected to occur to some degree under each alternative. These could include the construction or removal of portions of some dikes and installing or removing water control structures and culverts. Some soils would enter the water and sediments would be disturbed, and these are expected to increase turbidity. Consequences to water quality are expected to be minor, short-lived, and localized. As with other activities, the refuge would continue to follow best management practices to minimize potential impacts to water quality and hydrology (e.g., installing silt fencing to help control soil erosion).

## **Impacts on Hydrology and Water Quality of Alternative A (Current Management)**

### ***Benefits***

Continued monitoring of water levels would allow the refuge to continue to improve management of its impoundments, benefitting these areas. By comparing proposed water levels with actual recorded levels, the refuge can adapt its wetland management based on water availability. Many of the impoundments are influenced by the water level in the adjacent canals and can only be drained or filled when the canals are at the desired water level. Much of the lands in the vicinity of the NYS Canal System have seen water tables lowered as a result of the

canals, and intensive impoundment management would prevent many of these wetlands from drying out.

Under alternative A, we would continue to restore about 44 acres of refuge lands to riparian forest. Riparian forests have a beneficial effect on the hydrology of a watershed by moderating the flow of water. Vegetated areas absorb water during heavy rains and reduce overland flow, thereby minimizing flooding and erosion (Kundt and Hall 1988, Smardon and Felleman 1996).

### **Adverse Impacts**

Adverse impacts are the same as those discussed under “Impacts on Hydrology and Water Quality Common to All Alternatives.”

## **Impacts on Hydrology and Water Quality of Alternative B (Service-preferred)**

### **Benefits**

Under alternative B, an additional 120 acres of riparian forest would be restored and maintained compared to alternative A. Benefits would be similar to those described under alternative A, but would be somewhat greater because more area would be restored. Also, removing or breaching the dikes at the North and South Spring Pools would further improve hydrologic connectivity in these areas. There would be fewer impediments to water draining off the site, reducing water-retention times. Alternative B also proposes improve communication with the NYS Canal Corporation so refuge staff would know when they plan to raise or lower water levels in the canal to help improve management of the refuge’s impoundments. In addition we would work with NYSDEC and the NYS Canal Corporation to determine if there are ways water level management in the canals can be altered to benefit wildlife and habitat while also protecting property and aiding navigation.

The potential expansion of the refuge’s acquisition boundary proposed under alternative B (see “Appendix F, Montezuma NWR Land Protection Plan”) is likely to have some additional, minor positive effects on the area’s water quality, compared to alternative A. Once acquired by the Service, land use practices that have the potential to contribute to water pollution would no longer occur. Additionally, these newly acquired areas would be restored to native plant communities, which can help improve water quality. Vegetation and associated microbial communities remove nitrogen and phosphorus compounds which can act as fertilizers (causing harmful algae blooms) when they enter open water. Furthermore, runoff flowing through vegetated areas tends to have reduced levels of suspended particulates, a potential source of water pollution (Spruill 2004).

### **Adverse Impacts**

Potential short-term and long-term effects from building dikes and restoring habitat include sedimentation and altered hydrology. As discussed in chapter 2, the hydrology on the refuge and the surrounding lands has already been highly altered. Refuge impoundments and habitats are intended to more closely resemble natural hydrologic cycles and should not have any additional adverse impacts on the already highly-altered hydrology on and around the refuge. The refuge would adhere to best management practices for site determination and construction in order to minimize any adverse impacts to water quality and hydrology.

There are higher risks of short-term adverse effects on water quality associated with new construction of trails, kiosks, observation areas, and expanding the Wildlife Drive, when compared to alternative A. There are also potential increases associated with construction of the outdoor facility for environmental education and a new office facility. In all cases, appropriate permits would be obtained, and best management practices would be followed to minimize any potential adverse effects. As discussed in the introduction to this chapter, additional NEPA analysis would be necessary for at least some of the larger projects proposed under this alternative (e.g., extending the Wildlife Drive, building a new visitor contact station and administration building).

In comparison to alternative A, alternative B would provide additional opportunities for public use, resulting from increased outreach efforts and expanding public use programs and opportunities. This could result in higher levels of vegetation trampling, soil disturbance, and erosion, potentially affecting water quality. However, we expect these impacts to be localized and of minimal consequence. All users would be able to roam off trail in the discovery area(s), and hunters are allowed off trail during hunting season. While the exact location and dimensions of the discovery areas have not been determined yet, one is proposed near the Swampside Trail (see map 3.5). This location was selected because it is in an upland area and does not contain sensitive habitat. Hunting would continue to be controlled through special use permit and monitored to ensure refuge resources are protected. Other visitors are limited to established roads and trails or other visitor facilities (e.g., observation towers); therefore, only minor adverse impacts to water quality would be expected. There are no anticipated long-term adverse impacts specific to this alternative.

### **Impacts on Hydrology and Water Quality of Alternative C (Less-active Habitat Management)**

#### ***Benefits***

Under alternative C, hydrologic processes would be restored by breaching or removing farm dikes, thereby reducing the acreage of emergent marsh and increasing the acreage of forested wetlands. Compared to alternatives A and B, alternative C offers additional floodplain forest and would restore connectivity to existing hydrology. This could offer additional flood protection and could potentially improve water quality by increasing natural filtration, and reducing sediment loads in flood waters.

Once the hydrology is restored, wetland plants typically emerge without any planting necessary. Those wetlands then act as sponges, soaking up storm water and allowing it to percolate slowly into the ground, rather than quickly running off into the nearest stream. That function can replenish ground water supplies and reduce the amount of sediments and nutrients that would have ended up in adjacent waters.

#### ***Adverse Impacts***

Under this alternative, hydrological conditions on the refuge would be controlled by the NYS Canal Corporation. This agency focuses water level management on navigational and property protection (from flooding) purposes rather than for wildlife or to mimic natural hydrologic

conditions. This may have negative effects on the refuge's hydrology if water levels are not linked to natural conditions. Refuge wetlands connected to the existing hydrology would also be more vulnerable to contamination from canal waters, particularly if there were a spill of any kind in the canal.

## Effects on Soils

Soils are the structural matrix and nutrient source for plant productivity at the refuge and must be protected to sustain a variety of wetland, riparian, and upland habitats that would meet our habitat and species management goals. Overall, the soils on the refuge are productive and in good condition. They have little contamination and are able to support the diversity of habitats that would meet our biological management goals. We would continue to manage them to minimize human disturbance, by prohibiting off-road vehicle use by the public, for instance.

We evaluated and compared the management actions proposed for each of the alternatives based on their potential to benefit or adversely affect upland soils, and soils of the refuge's floodplains, wetlands, and riparian areas.

We compared the benefits of the alternatives from actions that would protect soils from erosion, compaction, or contamination or that would restore eroded, compacted, or contaminated soils, including the

- protection of refuge lands from development; and
- enhancing soils formerly in agricultural production by re-establishing native vegetation and restoring wetlands.

The potential adverse soil effects of the refuge management alternatives that were evaluated included impacts from

- construction of buildings, observation platforms, pulloffs, and interpretive trails;
- removal of breaches and dikes;
- forest and early-succession management activities, including mowing and prescribed fire; and
- providing opportunities for authorized public uses (e.g., hunting, fishing, wildlife observation, photography, environmental education, and interpretation).

## Impacts on Soils Common to All Alternatives

### **Benefits**

We would continue to maintain native vegetation cover on the refuge that stabilizes and minimizes soil losses through erosion. All the land the Service now owns or would purchase within the refuge acquisition boundary would remain under Service management, thereby eliminating the potential for soil impacts of development or other uses. We would continue to purchase lands within the approved acquisition boundary from willing sellers, as funding becomes available. This would greatly benefit soils, as acquired lands would no longer be

subjected to plowing, fertilizer treatments, and other activities typical of land in production. We would continue to prohibit recreational activities such as all-terrain vehicles that would damage soils on the refuge. Public use of trails, fishing sites, wildlife observation areas, parking lots, and other high-use areas would be designed and maintained to minimize impacts on refuge soils. We would continue to monitor and mitigate any erosion problems during routine refuge management.

Managing and restoring forests and wetlands would benefit soil quality and help restore soil structure and improve the biological productivity of soil. By restoring the native vegetation, we encourage the natural soil formation processes. Overall, the protection, maintenance, and restoration of habitats on the refuge are expected to benefit soils. Restoration projects would consider natural landform and transitional zones with project designs to replicate transitional soil characteristics, soil stability, and hydrology when feasible. The refuge would consider beneficial uses of any extra soils excavated onsite.

Regardless of which alternative is selected, we would continue to use best management practices in all management activities that might affect refuge soils to ensure that we maintain or improve soil productivity and minimize erosion.

### ***Adverse Impacts***

Within each of the alternatives, construction or maintenance of dikes would continue to manage impounded wetlands, causing some soil disturbance. The exact number and length of dikes is unknown at this time because most of this work would be performed on lands that have yet to be acquired. These construction and maintenance activities would require placement of fill-dirt to be deposited on existing soils and other actions that would disturb soils. Although some soils would be altered, the affected areas would represent a relatively small proportion of all refuge soils, and would constitute a minimal impact.

*Impoundment Management*—By artificially controlling flooding in the impoundments, less sediment is deposited on wetland soils. Dikes can block floodwaters, which help build soils and replenish nutrients. They can also restrict the flow of water off the land, causing extended periods of inundation which can result in the loss of plant species that require periods of drying.

*Construction and Restoration Activities*—Maintenance of trails, parking lots, the Wildlife Drive, and other public use areas would have some negative consequences to soils (e.g., soil disturbance, compaction, etc.). However, we expect these impacts to be localized and cover areas that are relatively small compared to the acreage of undisturbed land on the refuge. These projects would be sited to minimize potential negative effects, including locating them in previously disturbed areas whenever feasible. Overall, we anticipate these impacts to be minor.

*Prescribed Fire*—We would reserve the option to use prescribed fire in all alternatives for controlling invasive plants if necessary, for managing grasslands as well. We would conduct all prescribed burns under a strict prescription and in optimal weather conditions to minimize concerns about smoke and the risk of wildfire. We would maintain all fires within their prescriptions to minimize the degradation of resources, although impacts could occur in small areas.

Considering all the potential methods of treatment, we expect negligible direct or indirect impacts on upland soils, as the effects are limited due to short duration and low to moderate intensity, and confined to the project area. We expect none of the proposed actions to adversely affect soils or water quality over the long term. Potential effects of fire management on the refuge are addressed in appendix H.

*Mowing and Brush Hogging*—Depending on the soil conditions and vegetative ground cover, mowing can affect soils through rutting and compaction, and through the removal of soil protective vegetation. Tracked equipment is not used in mowing operations, and this work is not done when soils are saturated. In addition, brush hogging would be conducted on a rotational basis approximately every 5 years to maintain grassland habitat while minimizing any soil impacts. This activity poses little additional impact to current grassland management activities by refuge personnel.

*Invasive Plant Control with Herbicides*—Herbicides currently used by the refuge include glyphosate, imazamox, and triclopyr butoxyethyl ester (triclopyr). Cooperative farmers use the following herbicides on croplands: imazethapyr and thifensulfuron-methyl.

Glyphosate is a broad spectrum herbicide, meaning it is effective at controlling a wide range of plants, and is the herbicide used most often on the refuge, typically in wetlands. Glyphosate is degraded by microbial action in both soil and water. It degrades in soil with an estimated half-life of 30 days. It is highly soluble, but adsorbs rapidly and binds tightly to soil (U.S. Forest Service 2007).

Imazamox, which can be used to control invasive wetland species, is moderately persistent in the environment and degrades aerobically in the soil to a nonherbicidal chemical. It is also degraded when exposed to light. Imazamox is broken down by soil microbes to nonherbicidal compounds. Test results indicate that imazamox is practically nontoxic to avian species, finfish, aquatic invertebrates, and honeybees following acute exposure (EPA 1997).

Triclopyr breaks down by sunlight and by microbial action in the soil. It can be toxic to fish and should not be used in areas where it can contaminate open water. It is practically nontoxic to birds and bees (National Pesticide Information Center 2002).

Imazethapyr presents negligible risk to wild birds, mammals, bees, earthworms, fish, amphibians, aquatic invertebrates and algae because concentrations in the environment are expected to be at levels that are not harmful (Extension Toxicology Network 1996).

Thifensulfuron-methyl has been found to be nontoxic to fish, aquatic invertebrates, soil micro- and macroorganisms, birds, mammals, and insects (Russell et al. 2002).

In all of the alternatives, we would continue to follow all Service protocols (i.e., Pesticide Use Proposal process) and Service-approved herbicides to control invasive plants. Service protocols for herbicide and pesticide use are established to ensure protection refuge and local resources (including wildlife, habitat, soils, and water quality) and people. Because we adhere to Service

procedures and follow all applicable label instructions, we expect negative effects associated with invasive species control to be minimal.

*Public Use*—Visitor use of observation towers, photography blinds, fishing areas, and subsequent trail use on the refuge would adversely impact soils through compaction, erosion, and sedimentation. In all alternatives the refuge would allow hiking and walking on designated trails. Although it is unlikely foot travel would create highly erosive conditions, lug soles on hiking boots can exacerbate the problem.

Under all alternatives, hunters would continue to be allowed to hunt off trail; however, vegetation trampling and associated soil erosion and compaction are expected to be minimal. Hunting is controlled through special use permits, and refuge staff is not aware of any adverse effects to water quality or hydrology associated with this activity to date. Parking areas for hunting are located in upland areas to minimize risks of erosion and impacts to sensitive wetland habitats. We would continue to monitor the refuge for potential impacts and would take steps to limit access or close areas as needed to protect resources.

## **Impacts on Soils of Alternative A (Current Management)**

### ***Benefits***

Benefits to soils under alternative A are the same as those discussed in “Impacts on Soils Common to all Alternatives.”

### ***Adverse Impacts***

In areas where wetland restoration activities would occur, such as restoring Sandhill Crane Unit, or 22 acres of Dry Marsh, the refuge would follow best management practices to minimize adverse impacts to soils. Short-term localized adverse impacts to soils would be expected where the refuge would plant native tree species in efforts to reforest agricultural lands and maintain continuity in forested tracts. Based on restoration methods, soil compaction and loss would be minimal.

Over the long term, the risk of erosion and sedimentation problems that might affect these habitats could increase with increased visitor usage and trail use. We are not aware of substantial adverse effects to date, and believe that the current trails and infrastructure are located and designed to support current and projected increases in public use.

## **Impacts on Soils of Alternative B (Service-preferred)**

### ***Benefits***

Benefits to soil would be similar to, although somewhat greater than, those described under alternative A. Reconnecting the hydrology in some areas would help improve soils as flood waters could redeposit silt and organic matter. Acquiring and restoring additional lands under alternative B would also provide increased benefits to area soils as native vegetation is planted or allowed to naturally recolonize areas.

In addition, under this alternative dog walking would be limited to around the refuge headquarters area and on the 1-mile long Seneca Trail and dogs would be required to be on leashes 6 feet or less. Refuge staff is not aware of any impacts to soils associated with dog walking. So, while there could be some benefits to soils around other refuge trails by restricting dog walking, these are expected to be negligible.

### **Adverse Impacts**

The types of impacts related to dike construction would be similar to those described under “Impacts on Soils Common to All Alternatives.” However, under this alternative the intensity of disturbance to soils would likely be increased compared to alternative A, as more dike construction is proposed in order to restore additional wetlands. These areas usually have been already been disturbed by farming, so adverse impacts would be minimal.

Alternative B proposes construction of additional facilities including: two new trails, small trail expansions, observation areas, kiosks, fishing access, and other small improvements. During the construction of these structures some upper layers of soils would be disturbed and compacted. Most, if not all, small project construction would be located where high levels of soil disturbance from visitors already exist. They would increase soil compaction and erosion only in these already disturbed areas. As with other activities on the refuge that have the potential to disturb soils, the refuge would implement best management practices, including soil protection plans as necessary, to minimize any negative effects on soils including erosion and compaction.

Under alternative B, there would be localized soil compaction and loss of productive soil where soils are removed or surfaced for the five additional pulloffs. Each pulloff would be located in a previously disturbed area, e.g., located along the Wildlife Drive and Route 31, and be large enough to accommodate two to five vehicles. The discovery areas would each be between 2 and 5 acres. No additional construction is necessary for the creation of these areas; however, because soils within the discovery area would be exposed to increased foot traffic, compaction and minor erosion may result.

Compared to alternative A, public use is expected to increase on the refuge as more visitors become aware of the refuge through our outreach efforts and as a result of the increased public use opportunities and programs. This would increase the potential for soil disturbance and compaction resulting from foot traffic. Most uses would be restricted to established trails and the Wildlife Drive, limiting those impacts. An increase in the number of hunters (who are permitted to move off trail) would increase the potential for soil disturbance. This use is controlled through special use permits and we would monitor the refuge for potential impacts and would take steps to limit or close access to areas as needed to protect soils. Therefore, we expect these effects to be minimal (see “Appendix E, Montezuma NWR Hunt Program EA” for additional details).

Under alternative B, the refuge is proposing to build a new administrative and visitor services facility to collocate with the Service’s NYES office. The refuge may decide on a combined administrative and visitor contact station (about 15,000 to 17,000 square feet), or two separate buildings: one administrative building, which includes NYES office and Montezuma NWR staff (about 9,000 to 10,000 square feet) and one stand-alone visitor contact station (about 3,000 square feet). The location of these facilities has not been proposed yet. The refuge would

minimize adverse impacts by selecting a suitable location and utilizing best management practices. Additional NEPA analysis would be completed upon site selection and facility design. See appendix J for example conceptual design plans.

Bicycle wheels can cause physical impacts to the soil surface. Cessford (1995) notes the shearing action of wheels creates damage to roads and trails, which increases when trail conditions are wet or when traveling up a steep slope. However, bicycling at Montezuma NWR would only be allowed where automobiles are allowed, including the Wildlife Drive. They would not be allowed on refuge trails. The Wildlife Drive is located along a dike where soils are already compacted. It is maintained as a gravel surface designed to accommodate motor vehicles; therefore, opening the refuge to bicycling is expected to have little or no impacts to the refuge's soils.

### **Impacts on Soils of Alternative C (Less-active Habitat Management)**

#### ***Benefits***

The types of benefits to soils would be similar to those described under alternative A. However, this alternative would benefit more acres of unimpounded wetlands in terms of soil compared to alternative A.

#### ***Adverse Impacts***

There would be similar impacts as discussed under alternative B with regard to construction of public use sites, albeit on a smaller scale. Impacts associated with increased visitation would be similar to those described under alternative B.

## **Effects on Wetlands**

Wetlands management and conservation is a management priority for the refuge. It supports the refuge's establishing purpose and is consistent with our CCP goals. We evaluated the management actions proposed for each of the refuge CCP alternatives for their potential to benefit or adversely affect open water and wetland habitats, including emergent marsh, shallow water/mudflats, forested wetlands, and associated focal species.

We evaluated the benefits of the management actions under the three alternatives that would conserve or restore the open water and wetlands habitats or conserve and enhance breeding or migrating habitat for focal species, including the

- acquisition and subsequent restoration of muckland areas to functioning wetlands;
- management to prevent the spread of invasive species;
- continuation of the refuge's hunting and furbearer management programs to protect sensitive plant communities and enhance habitat for the refuge's focal species;
- forested wetland restoration;
- water level management on impoundments;
- maintenance of diked impoundments; and
- removal of diked impoundments.

We evaluated the potential for adverse impacts from

- actions causing soil, hydrology, and water quality impacts that might adversely affect open water biota and wetlands maintenance and productivity;
- activities of refuge visitors that might directly impact wetlands habitats;
- activities in wetlands that could lead to impacts to rare plant communities and species;
- increased recreational use of wetlands that could lead to habitat impacts;
- forested wetland restoration;
- water level management on impoundments;
- maintenance of diked impoundments; and
- removal of diked impoundments.

## **Impacts on Wetlands Common to All Alternatives**

### ***Benefits***

*Land Protection and Habitat Management*—Across all alternatives, refuge land acquisition and protection and public outreach to private landowners would provide maximum protection for wetlands. A significant focus is on restoring mucklands to functioning wetland habitats. We would also maintain vegetated buffers between wetlands, open water, and uplands where certain land use activities, such as agricultural runoff and soil erosion from recreation or construction, pose a threat to the vegetation or food sources. Buffers also provide an indirect benefit by preventing wetlands from receiving high levels of nutrients, pesticides, or solids, which affect the quality and health of aquatic plant and animal life. Increased nutrients often benefit invasive species, and can cause eutrophic conditions, siltation, and the erosion of soil into wetlands and open water. These can suffocate fish eggs and prevent sunlight from reaching submerged vegetation.

Regardless of which alternative is chosen, we would continue to conserve over 2,800 acres of refuge wetlands as one of the highest priorities for refuge management. We would continue to manage water levels in the refuge's impounded wetlands to mimic natural hydrologic periods and promote growth of native species. We would continue to restore about 22 acres of Dry Marsh (in the Main Pool) to further improve the quality of this habitat to benefit migratory waterfowl, shorebirds, and other wetland species.

We would continue to manage the muskrat population at optimal levels which benefits emergent marshes. At appropriate densities, muskrats help create or maintain hemi-marsh conditions by creating openings in otherwise dense stands of cattail. Without management, muskrat densities can become too high, resulting in large open patches, thereby limiting wildlife values, where the rodents have removed all the vegetation. Maintaining optimal densities of muskrats allows the refuge to provide diverse hemi-marsh conditions for migrating waterfowl and breeding marshbirds. Muskrats and beavers can burrow into dikes and block water control structures. Consequently, targeted removal of muskrats and beavers also has a beneficial effect by protecting refuge infrastructure from damage, thus ensuring management capabilities over wetlands.

We would continue to eradicate or control invasive species to protect wetland habitats on the refuge. Invasive plants, if allowed to establish and spread, can cause damage to native plant communities and the wildlife they support. Under all alternatives, we would continue to monitor for invasive species and focus on early detection where we have the greatest likelihood of successful treatments and on populations that threaten rare or significant plant communities. Key among the invasive plant species which currently occur in refuge wetlands are purple loosestrife, reed canary grass, common frogbit, flowering rush, and common reed. The primary biological control on the refuge is aimed at purple loosestrife, using *Galerucella* beetles which have been shown to have no adverse impacts on native plant communities (Blossey et al. 1994). We would continue to take proper care in cleaning and maintaining all refuge equipment to avoid introduction or transport of invasive plants, implement visitor outreach and education programs, and actively support State and partner initiatives including working with the State to prevent introduction of invasive species to all habitats on the refuge. These efforts benefit refuge resources by minimizing risks of introduction and spread of invasive species on and near the refuge.

*Impacts from Public Uses*—White-tailed deer hunting is expected to have direct positive impacts on refuge wetlands, particularly forested areas, because a reduction in the number of deer should allow for increased regeneration of native plants. More detailed information on potential effects of hunters on refuge habitats is presented in “Appendix B, Findings of Appropriateness and Compatibility Determinations,” and “Appendix E, Montezuma NWR Hunt Program EA.”

In general, visitors that participate in authorized public uses on the refuge enjoy the resource and gain an improved understanding and appreciation for wetland habitat management. This would enhance the visitor’s knowledge of natural resource management programs and ecological concepts for better understanding the problems facing our natural resources, what effect the public has on wildlife resources, and to learn about the Service’s role in conservation. Additionally, visitors would be more aware of biological facts upon which Service wetland management is based and why wetlands are important to people and wildlife. This would help increase public support for wetland management and wetland protection, as well as the Service and the Refuge System.

### **Adverse Impacts**

*Impacts from Public Uses*—Under each alternative, refuge visitation is expected to increase. However, impacts to wetland habitats are expected to be minimal. Vegetation trampling is expected to be minimal because most visitors would be restricted to designated roads and trails, which are located along dikes or in upland areas away from wetlands. The refuge also has a number of observation areas and photography blinds. These are designed to provide viewing access to refuge habitats, primarily wetlands, with minimal impact to those habitats.

Authorized activities that allow visitors to access off-trail areas (e.g., hunting) may also have minor, short-term negative effects on refuge habitats, including wetlands. Off-trail public use can have direct negative impacts on wetland habitats by vegetation trampling, and indirect impacts by compacting and eroding soil which impedes regeneration. Short-term effects consist of the deterioration of plant material, whereas long-term effects of trampling include direct and indirect effects on vegetation and soils like diminishing soil porosity, aeration, and nutrient availability

through soil compaction (Roovers et al. 2004, Kuss 1986). Compaction of soils limits the ability of plants, particularly rare and sensitive species, to revegetate affected areas (Hammit and Cole 1998). Kuss (1986) found plant species adapted to wet or moist habitats are the most sensitive, and increased moisture content reduces the ability of the soil to support recreational traffic. Off-trail use by hunters is not expected to cause any significant vegetation disturbance because hunters usually spread out over a relatively large area and the hunt seasons are confined to a short timeframe (fall and winter) when most plants are dormant. To discourage unauthorized activities and enforce regulations, hunters are required to check-in and checkout daily. The State conservation officer and the Service's law enforcement officers also patrol the refuge during hunting season. Waterfowl hunters confine their activities to boats in the refuge impoundment(s) and usually do not directly affect refuge habitats. More detailed information on potential effects of hunters on refuge habitats is presented in "Appendix B, Findings of Appropriateness and Compatibility Determinations," and "Appendix E, Montezuma NWR Hunt Program EA."

Potential impacts of fishing on open water and wetland habitats are expected to be similar to those described for other public uses above. Anglers are limited to designated fishing areas, which have associated access trails, and in some cases parking areas and other facilities. Additional information on potential effects of allowing fishing access are detailed in the compatibility determination for fishing access found in appendix B.

Roads can have adverse impacts on wetland habitats. The impervious quality of a paved road, such as the entrance road and around the visitor contact station and headquarters can divert the natural flow of surface water, and can impact the subsurface water flow in a wetland by lowering the water table and affecting the amount of groundwater available (Darnell et al. 1976). This depression can affect many water-dependent fauna and plants. Vehicle access and use along these paved roads and the gravel Wildlife Drive could contribute to pollution from stormwater runoff and minor downstream sedimentation from dust and erosion. Pollutants emitted from vehicle exhaust, such as hydrocarbons and carbon monoxide, can negatively impact the aquatic environment of a wetland. Roads can also facilitate the introduction and spread of invasive and exotic plant species via the transport from motor vehicles. In wetland areas, where roads have been constructed, the native plants are already stressed from disturbance in flood frequencies and therefore are more susceptible to colonizers (Mitsch and Gosselink 1993).

*Impacts from Service Activities*—Wetlands may be at some minimal risk of indirect effects from habitat management activities in upland areas that drain into them from leaks or spill accidents involving chemicals or petroleum products in refuge management operations. Our leak and spill prevention and emergency cleanup procedures should ensure that such occurrences are rare, and are addressed immediately, limiting those short-term effects to the immediate location. Regardless of which alternative we select, we would implement our Habitat Management Plan (USFWS 2008b) for wetland habitats, and would mitigate any potential for major unplanned changes in vegetation by continuously monitoring our vegetation types and updating our Geographic Information System database.

The refuge's furbearer management program could result in direct impacts from the activity of placing and retrieving traps as these could damage vegetation both locally where traps are placed and when trappers go off established trails to set and retrieve traps. To ensure minimal adverse

effects, the refuge manages the number of trappers by requiring trappers to obtain special use permits. Trappers are also required to stay within specific management units, and abide by a variety of stipulations to ensure there are minimal adverse effects on refuge resources.

There would continue to be potential for minimal, short-term adverse impacts associated with habitat restoration and improvement projects and general maintenance including maintaining or repairing dikes. These include potential trampling of wetland vegetation and increased siltation associated with dike maintenance and repair (if needed). Whenever possible, habitat restoration and dike maintenance and repair work are staged and completed from existing roads or access points to minimize potential adverse impacts. We employ established best management practices to minimize potential negative effects on wetlands associated with these activities including erosion prevention.

Invasive species control in wetland habitats includes mechanical, biological, and chemical control methods that may present some potential adverse effects. The control of invasive plants in wetland habitats is managed by handpulling, herbicide treatment, or biological control (*Galerucella* spp. beetles). Across all alternatives, we would implement early detection-rapid response efforts to help preserve native cover and control the spread of invasive species before they become established. Mechanical methods easily disturb the soil environment and can increase sedimentation in aquatic environments; however these impacts are short term and temporary. Please refer to the section “Effects on Soils” to review herbicides and protocols we use on the refuge. The review of their effects on soils also incorporates their effects on water resources. Few of the herbicides used on the refuge are labeled for use in aquatic areas, the exception being some formulations of glyphosate and imazapyr to control phragmites. We only use herbicides approved for aquatic use in wetland areas.

## **Impacts on Wetlands of Alternative A (Current Management)**

### **Emergent Marsh, Open water, Shallow Water, and Mudflats**

#### ***Benefits***

In addition to benefits discussed under common to all, under alternative A, refuge staff would continue to manage up to 4,275 acres of emergent marsh, open water, and mudflats within the existing refuge boundary. Refuge staff would continue using a system of diked impoundments to restore emergent marsh habitats and mimic natural hydrologic periods. Continuing management in refuge impoundments would create a mosaic of habitats in different stages of marsh development, providing conditions for a diversity of wetland plant species. Based on the time of year and intended wildlife use, drawdowns and subsequent water level manipulations would promote the growth of annual or perennial wetland plants or provide mudflats. Physical and chemical methods may also be used to set back succession. This level of management maintains structural heterogeneity within these wetlands to benefit priority species.

#### ***Adverse Impacts***

Same as “Impacts on Wetlands Common to All Alternatives.”

## **Bottomland Floodplain Forest**

### ***Benefits***

Forested wetlands (excluding riparian forests) would be maintained at 1,792 acres under this alternative, following continued habitat restoration efforts. The dike separating Unit 17 east and Unit 17 west would continue to be allowed to succeed to forest.

Prior to adoption of the refuge's current HMP (USFWS 2008b), we occasionally flooded the interiors of Unit 17 east and Unit 17 west. Research suggests that long periods of inundation can negatively impact forested wetlands, leading to decreases in tree vigor and growth (King 1995, Schlaegel 1984), and regeneration (Young et al. 1995). There is also evidence that the extended flooding regimes can shift tree species composition towards more flood-tolerant species (Karr et al. 1990, King 1995, King and Allen 1996). Continuing current management (i.e., not flooding the interior of these areas) would improve the quality of the habitat, by improving conditions for forest recruitment. Continued reforestation efforts would further increase the acreage of this habitat. By allowing natural tree fall gaps, the quality of this habitat should continue to improve, with the development of a more heterogeneous forest structure.

### ***Adverse Impacts***

In addition to the adverse impacts discussed under "Impacts on Wetlands Common to All Alternatives," there would continue to be adverse impacts due to the combination of invasive species and overbrowsing by deer. Some forested areas on the refuge are showing little to no tree regeneration due to overbrowsing by deer (Rawinski 2008). Research has also shown that as densities of deer increase, the species composition of the forest becomes dominated by species that are avoided by deer (Horsley et al. 2003). Often, deer prefer to eat native plant species rather than nonnative plant species (New Jersey Division of Fish and Wildlife 2008). Refuge staff has observed that, as mature trees die and fall, they are being replaced by nonnative invasive species (e.g., common buckthorn). Continuing the deer hunt as it is currently implemented would likely continue the degradation of these habitats because we may not be able to maintain the deer population at optimal densities to allow restoration efforts to be successful or sufficient forest regeneration to maintain existing forested areas. For more information refer to "Appendix E, Montezuma NWR Hunt Program EA."

## **Riparian Forest Corridor**

### ***Benefits***

Under alternative A, we would maintain 1,077 acres of riparian forest. This includes about 40 acres along the Seneca Trail area that are currently being restored. Restoration efforts would continue to include planting native tree species that are currently at the northern edge of their range since these species should be better able to tolerate future increases in average temperatures due to climate change.

### ***Adverse Impacts***

Adverse impacts would be similar to those described under "Bottomland Floodplain Forest" above and "Impacts on Wetlands Common to All Alternatives." As discussed previously in the section on soils, we follow best management practices to minimize any potential adverse effects.

## Impacts on Wetlands of Alternative B (Service-preferred)

### Emergent Marsh, Open Water, Shallow Water, and Mudflats

#### **Benefits**

Management of emergent marsh habitat would continue to be our highest priority under alternative B. Compared to alternative A, additional benefits to emergent marshes are expected under this alternative because additional resources would allow increased habitat restoration and invasive species control. Approximately 126 additional acres of these habitats would be restored. We also expect the quality of some existing emergent marsh habitat to improve. For example, we would restore about 53 more acres within the Dry Marsh (in the Main Pool) compared to alternative A. Restoration efforts would include creating depressions to restore this area to high quality wetland habitat, thereby creating a mix of emergent marsh and open water habitat that would improve biological diversity and productivity. A meandering channel would connect the newly created depressions to the rest of the Main Pool thus permitting water flow and water level management.

As under alternative A, the emergent marshes on the refuge would be maintained in a series of successional stages from mudflats and open water to dense emergent vegetation, including areas of hemi-marsh. Increased data on water levels and bathymetry would allow more informed management decisions to be made which should support the development of hemi-marsh, a desired wetland habitat type. Additionally, if we improve communication with the NYS Canal Corporation regarding the timing of water level changes in the canal, we would be able to manage water levels in the refuge's impoundments more efficiently.

#### **Adverse Impacts**

Adverse impacts under alternative B would be similar to those discussed under "Impacts on Wetlands Common to All Alternatives" and alternative A. There would be slightly higher short-term negative effects associated with the habitat enhancement (53 more acres) and restoration (126 more acres) activities compared to alternative A. These would be offset by the long-term increase and improvement in habitat quantity and quality. There would be higher risks of inadvertent impacts to vegetation associated with increases in invasive species control efforts both in the wetland habitats and from runoff from increased management in upland areas. Alternative B also includes construction of additional kiosks, observation areas, and pulloffs, all of which have the potential to adversely affect wetland habitats. As discussed previously, this infrastructure primarily would be located in already disturbed upland areas, although some may be adjacent to wetlands. We would employ established best management practices to minimize any potential adverse impacts associated with Service activities.

There would be temporary, short-term negative impacts associated with the Dry Marsh restoration, including impacts on wetland soils from the operation of heavy machinery and displacement of vegetation. However, best management practices would be used during restoration efforts. For more detailed information regarding the Dry Marsh Restoration Project, refer to the refuge's HMP (USFWS 2008b).

We would continue our furbearer management program according to State seasons and current refuge regulations under alternative B. Anticipated effects are the same as described under “Impacts on Wetlands Common to All Alternatives.” However, as described under alternative A, we expect impacts on these habitats to be minimal.

Adverse effects from opening areas to off-trail use (e.g., opening discovery areas) are also expected to be minimal. While exact boundaries have not been established, one of the discovery areas would be located near the Swampside Trail. This site was chosen, in part to avoid impacts to sensitive wetland habitats. The potential location for the other discovery area has not been determined yet. Avoiding proximity to sensitive habitats like wetlands would be one of the factors used to determine where to establish this area as well. We would make every effort to avoid adverse effects on these sensitive habitats, and would monitor these areas for potential adverse impacts. We would take appropriate measures to correct any adverse impacts should they occur, for example: limiting the number of people allowed access to these areas, closing affected areas to public access, and implementing erosion control measures.

Bicycle use along the Wildlife Drive would have minimal adverse impacts on wetlands because the drive is maintained to support motorized vehicle use and minimize potential adverse environmental effects such as erosion and sedimentation and to provide safe conditions for public access.

Potential adverse effects of increased public use would also be similar to alternative A, although we expect these to be slightly higher under alternative B. Because we intend to expand public use programs (e.g., offering more hunting opportunities and fishing locations, opening discovery areas to off-trail use, opening the Wildlife Drive to bicycles and pedestrians in the summer), we expect visitation to increase more under alternative B compared to alternative A.

## **Bottomland Floodplain Forests**

### ***Benefits***

Under this alternative, there would be additional benefits to forested wetlands on the refuge compared to alternative A. The acreage of this habitat would increase by approximately 233 acres, excluding riparian zones, and would be maintained at around 2,025 acres. The quality of existing habitat and speed at which new areas can be reforested would improve as a result of efforts to minimize deer herbivory by increasing efforts to control the deer population. Additional resources, if provided, would allow for more control of invasive species, further improving forested habitat conditions.

### ***Adverse Impacts***

There could be short-term adverse impacts from planting green ash, red maple, and silver maple seedlings in the affected units. Impacts would be minimized by hand-carrying and hand-planting vegetation rather than using heavy equipment. We also expect short-term impacts from breaching or removing dikes in Unit 17, however the refuge would take care to use best management practices and minimize any adverse impacts.

Under this alternative, we would open the refuge to a youth and fall turkey hunt. This expansion in public use would increase the potential for adverse effects on this habitat somewhat since we would expect an increase in off-trail use of the refuge during turkey hunting season. However, the maximum number of daily hunt permits that can be issued is based on a variety of factors, including areas open to hunting. This ensures that the number of hunters is kept at levels that have only negligible impacts on refuge resources, including refuge habitats. We would continue to monitor the refuge for potential impacts and would take steps to limit access or close areas as needed to protect resources.

Other adverse impacts for this habitat are expected to be similar to those described under alternative B, adverse impacts on “Emergent Marsh, Open Water, Shallow Water, and Mudflats” above, and the adverse impacts for “Bottomland Floodplain Forests” described under alternative A.

### **Riparian Forest Corridor**

#### ***Benefits***

Compared to alternative A, this habitat would increase slightly as a result of the management actions proposed under alternative B. The acreage of riparian forest is expected to increase about 120 acres up to 1,197 acres. As with bottomland flood plain forest habitat, the quality of this habitat is expected to improve through a reduction in the deer herd to levels that would allow more forest recruitment to occur as a result of decreased browsing and increased invasive species control.

#### ***Adverse Impacts***

Adverse impacts would be the same as those described for this alternative under “Bottomland Floodplain Forest” above.

### **Impacts on Wetlands of Alternative C (Less-active Habitat Management)**

#### **Emergent Marsh, Open Water, Shallow Water, and Mudflats**

#### ***Benefits***

Under this alternative, we would maintain about 2,884 acres of impounded wetlands, focused mostly on Tschache Pool and the Main Pool. As described under alternative B, we would restore about 53 more acres within the Dry Marsh (in the Main Pool) compared to alternative A. Much of the refuge’s remaining wetlands would be connected to the canal system and water levels would be controlled by water levels in the canal system. Other benefits are the same as those described under “Impacts on Wetlands Common to All Alternatives.”

#### ***Adverse Impacts***

As discussed previously, the NYS Canal Corporation manages the canal system primarily for navigation and flood control purposes. We expect this to lead to lower water levels and shorter periods of flooding on the refuge; ultimately resulting in succession from emergent marsh to forested wetland. In other words, we expect 1,428 acres (33 percent) of emergent marsh, open water, and mudflat habitats would be converted to some type of forest habitat compared to

alternative A. We expect 1,554 fewer acres of these habitats compared to alternative B. This would reduce the availability of this habitat type on the refuge and in the region.

### **Bottomland Floodplain Forest**

#### ***Benefits***

Under alternative C, the amount of forested wetlands is expected to more than double compared to alternative A (3,651 acres expected under alternative C compared to 1,792 acres under alternative A, excluding riparian areas). This would increase the habitat available to deer and, in combination with the proposed expanded deer hunt, may help decrease the density of deer on the refuge. This would help maintain and restore forested habitat on the refuge by improving natural regeneration and minimizing loss of planted seedlings from deer browsing.

#### ***Adverse Impacts***

Adverse impacts for alternative C are described under “Impacts on Wetlands Common to All Alternatives” and alternative B, except alternative C includes opening portions of the refuge to the State’s spring turkey hunt. As described under alternatives A and B, most public use is restricted to established roads and trails, but some visitors (e.g., hunters, researchers) would be allowed access off trail. These would continue to be controlled through special use permits. We would monitor the refuge for potential impacts and would take steps to limit access or close areas as needed to protect refuge resources.

### **Riparian Forest Corridor**

#### ***Benefits***

Approximately 1,251 acres of riparian forest would be restored and maintained under alternative C. Benefits under this alternative are expected to be similar to those described under alternative B, although slightly more area would be converted to riparian forests (approximately 174 acres more than alternative A, and 54 more than alternative B).

#### ***Adverse Impacts***

Adverse impacts would be the same as those described under alternative C, bottomland floodplain forest above.

## **Effects on Upland Habitats**

The forested, scrub-shrub, and grassland habitats of the refuge provide diverse habitat components to support breeding birds and other wildlife. We evaluated the benefits and adverse impacts of the management actions under the three alternatives on upland habitats. We considered the benefits from

- restoring upland areas by planting native species;
- allowing natural succession in existing upland areas;
- maintaining early-successional habitats;
- restoring agricultural lands; and

- white-tailed deer hunting program.

We considered the potential for adverse impacts from

- mowing, cooperative farming, prescribed fires, and applying herbicides to maintain early successional upland habitats;
- allowing natural succession to deplete or remove grassland or scrub-shrub habitats;
- general trail maintenance and increasing trail miles for public recreation use; and
- increased public use of uplands on the refuge.

### **Impacts on Upland Habitats Common to All Alternatives**

Regardless of the alternative selected, we use standard and effective habitat management techniques to conduct forest, shrubland, and grassland management activities in the refuge uplands. These best management practices would protect sensitive habitat components such as focal species nesting sites. Whenever practicable, we would replace nonnative plant species with native species to restore the ecological integrity of the refuge.

The refuge would use a variety of tools to help protect, maintain, enhance, or create wildlife habitat, including:

- Planting native species
- Conducting prescribed fires
- Applying herbicides
- Prescribed fire
- Hydroaxing and use of heavy equipment for tree removal or construction and renovation activities

### **Benefits**

*Land Protection and Habitat Management*—Similar to wetland habitats, regardless of which alternative we select, we would take the necessary measures to protect and enhance rare upland plant communities on the refuge. Invasive plants, if allowed to establish and spread, can cause damage to native plant communities and the wildlife they support. We would take the necessary steps to ensure that invasive species do not become established to degrade upland habitats by monitoring for invasive species and treating them where they occur. Of primary interest are pale swallow-wort, Canada thistle, nonnative honeysuckles, autumn olive, common buckthorn, oriental bittersweet, and multiflora rose. We would take proper care in cleaning and maintain all refuge equipment to avoid introduction or transport of invasive plants, implement visitor outreach and education programs, and actively support State initiatives and continue to work with the State to prevent the introduction of invasive species to habitats on the refuge.

*Impacts from Public Uses*—Under all alternatives, we would offer a hunt program that includes the harvesting of white-tailed deer. As we attempt to improve the integrity of upland habitats on the refuge, controlling the white-tailed deer population is imperative. When white-tailed deer overpopulate, they overbrowse their habitat, which changes the habitat structure and plant composition. The negative impacts of dense deer populations on forest regeneration and the composition and diversity of the herbaceous understory have been well documented (see Latham et al. 2005 for a summary) and observed at Montezuma NWR (Rawinski 2010). Due to deer overbrowsing, the natural diversity of understory plants and natural abundance of woody species regeneration has been reduced, thus altering the habitat the refuge was created to protect. Failure to control the white-tailed deer population would have negative impacts on forested habitats and, subsequently, on future resident and nonresident populations. Positive effects on the vegetation would result from maintaining the refuge’s white-tailed deer hunt program. Hunting can effectively control deer and produce striking changes in the forest vegetation (Behrend et al. 1970). For more information on beneficial impacts to uplands from white-tailed deer management refer to “Appendix E, Montezuma NWR Hunt Program EA.”

Reforestation of management areas would focus on increasing forest block sizes, improving connectivity between forest patches, and reducing habitat fragmentation. Reforestation of these areas would further support nesting waterfowl (in forested wetlands), songbirds, amphibians, and bats.

As discussed under “Impacts to Wetlands Common to All Alternatives,” visitors that participate in authorized public uses on the refuge enjoy the resource and gain an improved understanding and appreciation for upland habitats and habitat management. This would enhance the visitor’s knowledge of natural resource management programs and ecological concepts for better understanding the problems facing our natural resources, what effect the public has on wildlife resources, and to learn about the Service’s role in conservation. Additionally, visitors would be more aware of biological facts upon which Service upland habitat management is based and why upland habitats are important to people and wildlife. This would help increase public support for habitat management and protection, as well as the Service and the Refuge System.

By providing visitor viewing opportunities and interpretation, visitors would be able to view changes in plant communities and wildlife response to management actions over time. In turn, this would increase understanding of the importance of shrubland vegetation and wildlife communities not only within the Montezuma NWR, but also regionally. Visitor participation in refuge environmental education programs would also increase awareness and support of management activities on the refuge.

### **Adverse Impacts**

*Habitat Management and Refuge Activities*—There would continue to be potential for minimal, short-term adverse impacts associated with habitat restoration and improvement projects and general maintenance including maintaining or repairing trails. These include potential trampling of vegetation and clearing vegetation from road and trails as needed. Whenever possible, habitat restoration and maintenance and repair work are staged and completed from existing roads or access points to minimize potential adverse impacts. We employ established best management

practices to minimize potential negative effects on refuge habitats associated with these activities.

*Impacts from Public Uses*—All alternatives predict some increase in annual visitor numbers based on improvements to visitor infrastructure and increased opportunities for wildlife observation and photography. Upland communities could experience direct, adverse impacts from pedestrians (including wildlife observers, wildlife photographers, hunters, anglers, etc.) crushing plants where they exist on designated trails and in some cases off-trail (e.g., discovery areas, during hunting season). Short-term effects consist of the deterioration of plant material; whereas, long-term effects of trampling include direct and indirect effects on vegetation and soils like diminishing soil porosity, aeration, and nutrient availability through soil compaction (see “Impacts on Soils Common to All Alternatives”). We anticipate that there would be minimal adverse impacts to upland plant communities on designated routes. Designated trails for pedestrian travel consist of hardened surfaces or are existing trails that have been used for many years.

## **Impacts on Upland Habitats of Alternative A (Current Management)**

### **Forests**

#### ***Benefits***

Under this alternative, upland forest acreage would be maintained at approximately 563 acres by allowing artificial openings to succeed to forest and continuing reforestation. In addition, existing upland forests would continue to convert to older age stands. Upland forest structure would improve and become more heterogeneous. The refuge would continue to rely on natural tree fall gaps within the mature forest to create a multilayered forest structure with a diversity of dead and down woody debris. This habitat would also benefit from efforts to reduce fragmentation, thereby limiting forest edge and invasion by nonnative species.

#### ***Adverse Impacts***

In addition to the adverse impacts identified under “Impacts to Uplands Common to All Alternatives,” there would continue to be adverse impacts due to the combination of invasive species and overbrowsing by deer. The current deer hunt program may not be sufficient to control the deer population on the refuge, leading to deer overbrowsing. Some forested areas on the refuge are showing little to no tree regeneration because of overbrowsing by deer (Rawinski 2008). Often, deer prefer to eat native plant species rather than nonnative plant species (New Jersey Division of Fish and Wildlife 2008). As mature trees die and fall, they are being replaced by nonnative invasive species (e.g., common buckthorn).

Reforestation efforts may cause short-term, adverse impacts such as trampling vegetation and soil disturbance; however, we would minimize impacts by hand-carrying and hand-planting native species rather than using heavy equipment when feasible.

## **Shrublands**

### ***Benefits***

We would continue to maintain 401 acres of shrubland habitat. We would treat each unit by removing woody vegetation using a brush hog, hydroaxe, prescribed burns, or herbicides about every 15 years. Management of shrublands benefits numerous wildlife species that depend on this habitat, especially brown thrasher, field sparrow, and blue-winged warbler. By staggering treatments of shrublands between units, the refuge would provide a mosaic of this habitat in different stages of succession, increasing spatial heterogeneity and providing a range of microhabitats that can be utilized by a diversity of species.

### ***Adverse Impacts***

Under alternative A, some units that have a lot of edge habitat, which is ideal for shrubland management, would convert to forest. In addition, succession would be set back by infrequent treatment of entire units rather than more selectively removing undesirable species (e.g., invasive shrubs and trees). This approach leads to a more homogeneous vertical structure within the treatment area and is less desirable for many species that depend on this habitat type such as the blue-winged warbler.

The direct impacts would be the temporary removal of vegetation because of brush hogging, prescribed burns, or applying herbicides. Active management is necessary to maintain this early successional habitat. Refuge shrublands would experience some short-term negative effects from these management actions. Management actions are intense, but would be relatively infrequent (i.e., every 15 years). Their direct effects would be of short duration, in that vegetation regrows quickly during the growing season. Many of these management methods are nonselective; therefore, some desired species may be removed to control woody invasive species at the most effective times of the year. The impacts of Service-approved herbicides are discussed under “Impacts to Soils Common to All Alternatives” and we would employ best management practices during the use of any heavy equipment and herbicides.

## **Grasslands**

### ***Benefits***

Within alternative A, we would maintain a minimum of 363 acres of grasslands in patches of 50 acres or more. The gradual removal of a few hedgerows and small patches of shrubs and trees would create larger areas of contiguous grassland habitat. Control of goldenrod would further improve the quality of refuge grasslands.

The direct benefits of a grassland management program under alternative A include the reintroduction or reappearance of native herbaceous and grass species in the field being maintained in early succession, and the long-term persistence of high quality early successional habitats, which provide valuable breeding habitat for songbirds. Other direct benefits to vegetation result from prescribed fire, including: the return of nutrients to the soil by combustion of dead plant material, reduction of litter, and creation of openings where grasses and fire-adapted herbaceous vegetation can establish.

A potential indirect benefit of grassland management is the increase in populations of native plants where they become self-sustaining population sources. Another benefit is the provision of overwintering habitat for pollinators, upon which many plants depend for reproduction.

### ***Adverse Impacts***

Management under the current scenario would mean that many hedgerows and treelines would not be removed so open habitats on the refuge would continue to be fragmented. In addition, some units with a lot of edge due to their position on the landscape would continue to be maintained as grasslands.

We would implement best management practices for prescribed burns, haying, and mowing, herbicide application, and other management practices that affect grassland soils, vegetation, and wildlife. The Service is required to develop and adhere to detailed burn plans to ensure that risks associated with prescribed burns remain low. Effects of the refuge's fire program are addressed in more detail in appendix H. We take strict precautions in applying herbicides to ensure that they affect only the targeted plants.

Although we have made every effort to avoid or minimize potential adverse effects on grassland vegetation, some indirect adverse effects are likely. One is the potential loss of some plant species that are not adapted to fire when a unit is included in a prescribed fire regime. That would apply more to high seed producing annuals that do not develop robust root systems or regenerative structures below ground, as perennials do. Their mortality would be more of a function of the depth of organic and mineral soil and the severity and duration of the fire at a given spot (Miller 2000). Repeated use of prescribed fire shifts the balance from less fire tolerant communities or species to fire-tolerant communities. However, fire rarely completely consumes all the biomass in a burn unit; instead, the result is a patchy distribution of completely or partially burned and unburned vegetation.

Authorized activities that allow visitors to access off-trail areas may also have minor, short-term negative effects on grassland habitats. Off-trail public use can have direct negative impacts by vegetation trampling, and indirect impacts by compacting and eroding soil which impedes regeneration. Under alternative A, off-trail use by refuge visitors is controlled through special use permits to ensure this use would have negligible impacts on refuge resources. We would continue to monitor the refuge for potential impacts and would take steps to limit access or close areas as needed to protect refuge resources.

## **Impacts on Upland Habitats of Alternative B (Service-preferred)**

### **Forests**

#### ***Benefits***

Beneficial impacts to upland habitats would increase in alternative B, in comparison to alternative A, through increased restoration, invasive plant control, and increased white-tailed deer harvest on the refuge. Under alternative B, the refuge would increase the deer harvest by opening additional areas of the refuge to deer hunting, opening the refuge to Sunday hunting, increasing the number of hunters allowed on the refuge, and working with the NYSDEC to

implement their DMAP program, if necessary, whereby the taking of an antlerless deer could be required before the taking of an antlered deer. If available, additional resources would allow for more control of invasive species, further improving forested habitat conditions. Finally, reforestation activities would be strategically focused on the landscape to decrease edge and increase connectivity of forested habitats.

Compared to alternative A, increasing public use opportunities and facilities on the refuge would increase awareness, understanding, and support of management activities on the refuge.

### **Adverse Impacts**

Adverse impacts to upland forests are expected to be slightly greater in alternative B in comparison to alternative A. Under this alternative there would be 535 acres of upland forest habitat, a decrease of approximately 28 acres compared to alternative A. This is about 5 percent of the refuge's projected upland forest habitat and is not expected to have noticeable impacts on refuge plant or wildlife populations.

Adverse effects associated with public use are expected to be similar to those described under common to all and alternative A, but would be slightly greater because of increases in the number of trails, trail miles, visitor infrastructure, and visitor use. Construction and maintenance of trails would be focused in uplands resulting in the direct loss of upland habitat acres. Increased opportunities for white-tailed deer and turkey hunting, the anticipated increase in visitation, and allowing off-trail use of the discovery areas, could increase negative impacts on the soil environment and upland forest communities. Potential adverse effects from hunting are expected to be minimal because the maximum number of daily hunt permits that would be issued is limited. This ensures that the number of hunters is kept at levels that have only negligible impacts on refuge resources. Discovery areas would be located to avoid sensitive habitat. We would continue to monitor the refuge for potential impacts of public uses and would take steps to limit access or close areas as needed to protect resources.

### **Shrublands**

#### **Benefits**

Under this alternative, the units that would be maintained as shrublands are more suited to scrub-shrub dependent species based on their position in the landscape. Units with a lot of edge due to surrounding land uses would be maintained as shrublands. These areas are ideal for scrub-shrub dependent species that tend to prefer a lot of edge. Using a brush hog every 5 years and selective herbicides would allow the refuge to maintain a more desired shrubland structure than using hydroaxe every 15 years.

Compared to alternative A, the refuge would focus scrub-shrub habitat management on units where this early successional habitat type does not cause increased fragmentation of the landscape.

Under this alternative, some shrublands would be restored or allowed to succeed to forested habitats, while some grasslands would be restored or allowed to succeed to shrubland. Maintaining shrubland habitat requires fewer resources than maintaining grassland. Similarly,

maintaining forested habitats requires fewer resources than maintaining shrublands. This overall shift towards late successional stages would decrease the amount of active management (e.g., prescribed burns, herbicide application, hydroaxing) associated with these habitats, with a commensurate decrease in their associated adverse effects.

### **Adverse Impacts**

Under alternative B, there would be 291 acres of shrubland on the refuge, a net loss of 110 acres compared to alternative A.

In general, adverse effects associated with habitat management would be similar to those already described above under alternative A. Localized adverse effects from mowing include soil compaction and rutting where wet soils are encountered and damage and loss of vegetation, displacement of foraging wildlife, and inadvertent take of small mammals, reptiles, amphibians, insects, and young birds. The refuge would minimize these potential adverse effects by performing management actions when plants are dormant. The refuge would follow best management practices to minimize soil damage and loss of vegetation.

We expect some potential additional minimal adverse impacts with the addition of discovery areas and increased visitation, as well as additional hunting opportunities. The exact size and locations of the discovery areas has not been determined; however, areas with the least potential to incur adverse impacts would be preferred. Discovery areas would be located to avoid sensitive habitat. Potential adverse effects from hunting are expected to be minimal because the maximum number of daily hunt permits would be limited. This ensures that the number of hunters is kept at levels that have only negligible impacts on refuge resources. We would continue to monitor the refuge for potential impacts and would take steps to limit access or close areas as needed to protect resources.

Impacts associated with other public uses would be similar to those described under “Impacts on Soils Common to All Alternatives” and “Impacts to Uplands Habitats Common to All Alternatives” for this alternative.

### **Grasslands**

#### **Benefits**

Under this alternative, the refuge would maintain approximately 287 acres of grassland habitat, in patches greater than 50 acres, to benefit grassland obligate nesting birds and winter raptors, especially short-eared owl. Although alternative B proposes a net loss of 76 grassland acres compared with alternative A, the quality of existing grasslands would improve through increased efforts to remove hedgerows, decreasing fragmentation, and the introduction of a summer haying program to reduce cover in dense, warm season grass stands. Many studies have found a link between small field size (less than 50 acres) and an increase in predation rates of grassland songbird eggs and fledglings (Herkert et al. 1993). Actively managing small, fragmented grassland habitats may be detrimental to grassland songbird reproductive success and not contribute to their population objectives. Managing larger patches of grassland habitat would improve the quality of this habitat, and would be more valuable to wildlife. In addition, the refuge would work with adjacent landowners, through education and outreach, to encourage late

haying and mowing. This would improve nesting success of grassland birds nesting in these fields by allowing their young to fledge. Delayed haying and mowing on farmlands off the refuge might achieve an overall positive effect on grassland bird reproduction in the MWC, since fledglings are better able to avoid injury or death from haying than nestlings are.

The refuge would manage a variety of grasslands in various successional stages to provide cover and foraging opportunities for breeding grassland songbirds and migratory land birds.

### **Adverse Impacts**

This alternative would result in the loss of about 75 acres (about 21 percent) of grassland habitat compared to alternative A. This decrease could be considered adverse to the overall objective of maintaining the grassland type, but that impact would be negligible when considered in the context of the more focused management of grasslands in larger contiguous areas in this alternative. The remaining grassland would be surrounded by open habitats, thus maximizing our management activities for these labor intensive habitats.

As described under “Impacts to Upland Habitats Common to All Alternatives,” we would follow best management practices for prescribed burns, haying, mowing, and other management practices that could affect grassland soils and cause localized habitat damage. Long-term management to promote the habitat would offset any localized, short-term, adverse effects.

Impacts from public uses would be the same as the adverse impacts described for “Shrublands” above.

## **Impacts on Upland Habitats of Alternative C (Less-active Habitat Management)**

### **Forests**

#### **Benefits**

Under alternative C, upland forest habitat would increase to 931 acres. This equates to a 65 percent over alternative A and 74 percent increase over alternatives B. This approach would benefit forest communities such as oak-hickory and beech-maple-basswood stands. Allowing upland early successional habitats to convert to forests would require less management, decreasing potential adverse effects associated with these activities including a small decrease in carbon emissions due to the decreased use of equipment.

Measures to control invasive species and increase white-tailed deer harvest on the refuge are similar to alternative B. An indirect benefit would be increased opportunities over several portions of the refuge for the recruitment of forest (plant and wildlife) species as a result of larger, contiguous tracts, improved habitat quality, and more forest interior areas.

#### **Adverse Impacts**

In addition to the impacts discussed under “Impacts on Upland Habitats Common to All Alternatives” and under alternative B, opening the refuge to spring turkey hunting could have additional impacts. As with alternative B, any additional impacts are expected to be negligible because hunters tend to travel in dispersed patterns over wide areas and the maximum number of

daily hunt permits would be limited. This ensures that the number of hunters is kept at levels that have only negligible impacts on refuge resources. We would continue to monitor the refuge for potential impacts and would limit access or close areas as needed to protect resources.

## **Shrublands**

### ***Benefits***

Sixty-six acres of shrublands would be maintained on forest edges to provide a more gradual transition from forested areas to roads and to provide some habitat for scrub-shrub dependent species.

Maintaining early successional habitats, like shrublands, requires active management. This includes resources (equipment, funding, herbicides) and staff time. By substantially reducing the number of shrublands maintained on the refuge, we would save valuable staff time and funding which could be reallocated to other projects and programs (e.g., invasive species monitoring and removal). We would also decrease risks of adverse impacts associated with habitat management tools used to maintain this habitat. That is, we would reduce short-term risks associated with prescribed burns, mowing, herbicide application and other habitat management methods since we would not be maintaining as many acres.

### ***Adverse Impacts***

Under alternative C, there would be a substantial decline in shrublands compared to alternatives A and B. Alternative C would result in a net loss of 335 acres (83.5 percent) and 225 acres (77.3 percent) compared to alternatives A and B, respectively. As described above, there would be long term adverse impacts to shrubland dependent species (see discussion under “Effects on Landbirds”).

## **Grasslands**

### ***Benefits***

Alternative C would provide the least benefits to managed grasslands on the refuge. Only one patch totaling 68 acres would be maintained as grasslands. These fields have high use by obligate grassland breeding birds and are adjacent to Tschache Pool; therefore, they are well positioned in the landscape for grassland management. As in alternative B, the trees between these areas and Tschache Pool would be removed to improve connectivity between these two habitat types (i.e., the grassland areas and emergent marsh habitat in Tschache Pool).

Effects of decreasing active habitat management are the same as those presented under “Shrublands” above.

### ***Adverse Impacts***

Under this alternative, over 200 acres of grasslands would be allowed to succeed to upland and riparian forest habitat. Only one 68-acre patch would remain. There would be long-term adverse impacts to grassland dependent wildlife species (see discussion in “Effects on Landbirds”). Unmanaged grasslands, through changes in vegetation type and structure, would become less desirable to grassland dependent wildlife species and eventually would displace them entirely.

Although small grassland patches may continue as a varying component due to natural disturbance on the refuge, our part in actively sustaining grassland habitats in the region would diminish substantially.

## Effects on Waterbirds

Wetlands management and conservation is a priority on the refuge, consistent with the original refuge establishment purpose, and our first two CCP goals. It is a priority in large part because wetlands support Service trust species, such as waterfowl, shorebirds, wading birds, and marshbirds. These are the highest priority species for management on this refuge. We evaluated the management actions proposed for each of the refuge CCP alternatives for their potential to benefit or adversely impact waterbirds.

We evaluated the following proposed actions for their potential to cause beneficial impacts on waterbirds:

- Acquiring and restoring additional wetlands
- Conducting public outreach and education on wetlands
- Managing and preventing the growth of invasive species
- Managing water levels
- Continuing the refuge's hunting and furbearer management programs
- Restoring forested wetlands by allowing natural succession or planting native species
- Maintaining diked impoundments
- Removing diked impoundments

We evaluated the following proposed actions for their potential to cause adverse impacts on waterbirds:

- Activities of visitors and users that might directly impact wetlands habitats or disturb waterbirds
- Expanding waterfowl hunt program
- Managing and preventing the growth of invasive species
- Maintaining diked impoundments
- Removing diked impoundments
- Managing water level

## Impacts on Waterbirds Common to All Alternatives

Other than losses or gains in acreage due to management activities, we anticipate other impacts may result from changes in water quality of the rivers, floods or droughts, direct human disturbances, or spread of invasive species.

### **Benefits**

*Land Protection and Habitat Management*—Across all alternatives, invasive plant species would be controlled. Waterbirds benefit from the control of nonnative invasive species and the

maintenance of native plant communities. For example, the black tern, a State-endangered species, was a common breeder on the refuge in the 1950s when 500 young were sometimes produced in a single year. By the early 1990s, there were none nesting on the refuge, in part because their habitat was dominated by the nonnative invasive plant, purple loosestrife. By 1998, when purple loosestrife cover was greatly reduced by the introduction of biological control agents, black terns were nesting on the refuge again, although in low numbers. In 2009, 22 nesting pairs were observed (USFWS 2008b). Diving and dabbling ducks would also experience direct benefits of controlling invasive plants in wetlands from the restoration or maintenance of the diversity of food plants on which waterfowl depend. Other wetland birds would also experience direct benefits from the protection of preferred nesting substrate and associated insects for forage during breeding seasons. Whenever possible, nonmechanical methods are used to control invasive species on the refuge. For example, in 2010 more than 1,500 pounds of the invasive plant common frogbit were removed by hand from refuge impoundments. When chemical treatments are necessary, only herbicides and surfactants approved for use in marshes are used.

Our furbearer management program offers dual benefits to waterfowl by: 1) supporting the presence of beaver ponds which benefit waterfowl during breeding, migrating, and wintering periods (Ringelman 1991), and 2) allowing greater water level management capabilities by decreasing damage to infrastructure caused by beavers and muskrats.

*Impacts from Public Uses*—Under all alternatives, we would continue to offer opportunities for visitors to engage in wildlife observation, photography, interpretation, environmental education, fishing, and hunting. Visitors who participate in the refuge's public use programs or those who utilize the visitor infrastructure, including our photography blinds and observation towers, gain an improved understanding and appreciation for the numerous species which depend on the refuge for breeding, foraging, and during migration. Additionally, visitors would be more aware of biological facts upon which Service management is based and why these species are important to people and other wildlife. This would help increase public support for refuge management and habitat protection, as well as the Service and the Refuge System.

### **Adverse Impacts**

*Habitat Management and Refuge Activities*—We use hand and aerial applications of herbicides in wetland areas August through September to help control phragmites. Wintering waterfowl would avoid most negative impacts, as they do not arrive on the refuge until late October or early November. By that time, most marshbirds have completed their breeding cycle. Some migratory wetland birds, such as rails and bitterns, may be present during the spraying period, and may experience direct contact with the herbicide if they do not flush ahead of the helicopter or power sprayer in time, or if the spray misses the targeted patch. The herbicides and surfactants approved for use in marshes are not toxic to birds, and would wet them only temporarily, if at all. We do not expect that as a frequent occurrence, as those species show no strong affiliation with monocultural stands of phragmites.

There are minimal adverse impacts to birds from our furbearer management program because the trapping season is during a time when few birds are present. Management of this activity is regulated by the NYSDEC which has established seasons for New York's furbearers. Nontarget

species may occasionally be killed, but the experience of the trappers and types of traps used limit these events.

There would continue to be potential for minimal, short-term disturbance to waterbirds associated with habitat restoration and improvement projects and general maintenance including maintaining or repairing dikes. Whenever possible, these activities are timed to avoid critical times of year for these species (e.g., spring and fall migration, breeding seasons).

*Impacts from Public Uses*—Hunting of waterfowl has occurred on refuge lands for decades, including prior to refuge establishment. The refuge’s hunt program follows Federal and State regulations for annual harvest levels and seasons by species. These regulations are set by the Service for each state based on what harvest levels can be sustained for a species without adversely affecting its overall Atlantic Coast Flyway population. As such, hunting results in individual losses, but the projected cumulative harvest would not jeopardize the viability of any harvested species’ population. Some disturbance to nontarget wildlife species may occur; however those impacts should be minimal because hunting pressure is low and occurs outside the breeding season.

An increase in visitation is likely to occur under any alternative. We would continue to work with the State in implementing a public education and outreach program and planning law enforcement activities to ensure refuge regulations are followed under all of the alternatives. See appendix B for additional information on the beneficial and adverse impacts related to the refuge’s authorized public uses.

Resources and Environmental Control completed a document on “The Effects of Recreation on Birds: A Literature Review” in April 1999 (Bennett and Zuelke 1999). We refer to the following information from that document:

“Several studies have examined the effects of recreationists on birds using shallow water habitats adjacent to trails and roads through wildlife refuges and coastal habitats in the eastern United States (Burger 1981, 1986, Klein 1993, Burger et al. 1995, Klein et al. 1995, Rodgers and Smith 1995, 1997, Burger and Gochfeld 1998). Overall, the existing research clearly demonstrates that disturbance from recreation activities always has at least temporary effects on the behavior and movement of birds within a habitat or localized area (Burger 1981, 1986, Klein 1993, Burger et al. 1995, Klein et al. 1995, Rodgers and Smith 1997, Burger and Gochfeld 1998). The findings these studies report appear in summary below in terms of visitor activity and avian response to disturbance:

- Presence: Birds avoided places where people were present and when visitor activity was high (Burger 1981, Klein et al. 1995, Burger and Gochfeld 1998).
- Distance: Disturbance increased with decreased distance between visitors (Burger 1986), though exact measurements were not reported.
- Approach Angle: Visitors directly approaching birds on foot caused more disturbance than did visitors driving by in vehicles, stopping vehicles near birds, or stopping vehicles and getting out without approaching birds (Klein 1993).

- Direct approaches may also cause greater disturbance than tangential approaches to birds (Burger and Gochfeld 1981, Burger et al. 1995, Knight and Cole 1995, Rodgers and Smith 1995, 1997).
- Type and Speed of Activity: Joggers and landscapers caused birds to flush more than anglers, clammers, sunbathers, and some pedestrians, possibly because the former groups move quickly (joggers) or create more noise (landscapers). The latter groups tend to move more slowly or stay in one place for longer periods, and thus birds likely perceive these activities as less threatening (Burger 1981, 1986, Burger et al. 1995, Knight and Cole 1995). Alternatively, birds may tolerate passing by with unabated speed whereas if the activity stops or slacks birds may flush (Burger et al. 1995).
- Noise: Noise caused by visitors resulted in increased levels of disturbance (Burger 1986, Klein 1993, Burger and Gochfeld 1998), though noise was not correlated with visitor group size (Burger and Gochfeld 1998)."

Additional impacts of public use are discussed in "Impacts on Landbirds Common to All Alternatives."

## **Impacts on Waterbirds of Alternative A (Current Management)**

### **Waterfowl and Marshbirds**

#### ***Benefits***

Waterfowl and marshbirds would benefit from the restoration of 182 acres of emergent marsh, open water wetland, and mudflat habitat. During years of average rainfall, continuing management of emergent marsh to create a mosaic of dense marsh, hemi-marsh, and open water, benefitting a range of migrating waterfowl, would be a management priority. For instance, dabbling ducks have been shown to prefer hemi-marsh, especially in the spring and summer (Murkin et al. 1997). In contrast, diving ducks tend to utilize areas with more open water and less vegetation (Murkin et al. 1997). We would also continue to provide long-term benefits to spring migrating geese utilizing the marshes.

As described under "Impacts on Wetlands," artificial management of water levels is the only current means to provide abundant high quality emergent marsh habitat in most of the MWC. The water level in the surrounding landscape is largely influenced by the water level in the NYS Canal System, which is managed artificially by the NYS Canal Corporation for navigation and flood control purposes. Under alternative A, we would continue to manage water levels in refuge wetlands within diked impoundments to mimic natural hydrologic periods or to provide optimal habitat for focal waterbird species. This management has proven highly successful in the 70-plus-year history of the refuge.

Habitat conditions that benefit migrating waterfowl during spring and fall would also benefit marshbirds. Pied-billed grebe, least bittern, rails, and American bittern breeding opportunities would continue to be provided. These breeding marshbirds require hemi-marsh, which is expected to remain at current levels under this alternative through direct habitat management and by maintaining optimal densities of muskrat. We believe that the marsh life cycle pattern that creates a favorable interspersed of vegetation and open water (a 50:50 ratio has been considered

optimal) would continue to be provided during the breeding season under this alternative. Suitable conditions would continue to be provided for habitat generalists that can utilize a wide range of marsh conditions, such as American coot and common moorhen (Allen 1985, Bannor and Kiviat 2002).

Whenever feasible, impoundment maintenance and construction projects would be planned during times of the year when use by waterbirds would be relatively low or when the impoundment is drained and not providing waterbird habitat.

### ***Adverse Impacts***

In addition to the adverse impacts discussed in “Impacts on Waterbirds Common to All Alternatives,” drawdowns of each impoundment every 3 to 7 years (up to 2,000 total acres annually) would continue to displace some waterfowl. Some black terns and other obligate marshbirds preparing to nest would have to seek other habitat as some impoundments were drained (typically in May). However, suitable habitat would be available elsewhere on the refuge and in the wetland complex, and the effect is expected to be minor.

### **Shorebirds**

#### ***Benefits***

Shallow water mudflats are relatively rare in the vicinity of the refuge, and maintenance of diked impoundments is necessary to provide this habitat type. This management has proven successful on the refuge. For example, in 2010 the number of shorebirds using refuge impoundments peaked at more than 1,700 individuals of 20 species. Under alternative A, the refuge would continue to benefit interior migrating shorebirds by providing approximately 100 acres of resting and foraging areas consisting of shallow water or mudflats with sparse vegetation during the spring and the summer and fall migrations. Additionally, habitat is expected to remain available for American woodcock, a species of conservation concern that requires forest openings, shrubby areas, and successional forests.

#### ***Adverse Impacts***

Adverse impacts under alternative A are the same as those discussed in “Impacts on Waterbirds Common to All Alternatives.”

### **Impacts on Waterbirds of Alternative B (Service-preferred)**

#### **Waterfowl and Marshbirds**

#### ***Benefits***

In general, benefits to waterfowl and marshbirds would be similar to those described under alternative A. In addition, migrating waterfowl and breeding marshbirds would benefit from the increase in hemi-marsh that would result from additional restoration efforts associated with the Dry Marsh project and from improved habitat conditions as a result of more invasive plant control efforts.

As we discussed in chapter 2, under “Wetlands,” the historical habitat within the MWC has been significantly altered through the construction and management of NYS Canal System. The most common habitat on the refuge is emergent marsh, which provides valuable habitat for waterfowl and marshbirds. Since the establishment of the refuge, these areas have been managed as impoundments, where water is retained through a dike system and water levels are artificially controlled through water control structures. Waterfowl and marshbirds would benefit from our efforts to improve water level monitoring and management to maintain a matrix of heterogeneous habitats.

The current management of water levels in the NYS Canal System is not based on natural hydrological processes. If successful, increased communication between the refuge and the NYS Canal Corporation about actively managing canal water levels to better maintain quality emergent marsh habitat would greatly benefit numerous breeding, foraging, and migrating waterfowl. Improving this relationship would also provide a long-term benefit to waterfowl because it would facilitate refuge management of water levels in the refuge’s impoundments. Waterfowl and marshbirds would benefit from an increase of 126 acres more of emergent marsh compared to alternative A, as well as an additional 233 acres of bottomland floodplain forest and 120 additional acres of riparian forest compared with alternative A.

### ***Adverse Impacts***

Compared to alternative A, there would be minor, short-term increases in adverse effects on waterbirds associated with increased restoration efforts. There could also be minor, short-term increases in adverse effects associated with construction of additional facilities (e.g., pulloffs, kiosks, trails) if located near wetland habitats.

The presence of pedestrians and bicyclists on the Wildlife Drive would cause an increase in short-term disturbance to wildlife near the road. The impact is expected to be minor since these uses are limited to minimize disturbance to wildlife during critical times of the year.

Bicycle and pedestrian use of the Wildlife Drive would only be permitted during low wildlife-use periods of the year, namely summer and winter, when sensitive wildlife have migrated through and are no longer present. Summer is also the period of time when vegetation along the Wildlife Drive and in the Main Pool offer optimum cover, so that if waterfowl should flee due to human disturbance, they would have to travel less distance to find cover than they would in spring or fall.

Under this alternative, off-trail use of refuge lands would be increased by opening discovery areas, expanding the current deer hunt, and opening the refuge to turkey hunting during the youth (currently one weekend in April) and fall (currently October to mid-November) seasons. While the deer hunt program would expand, impacts on waterbirds are expected to be minimal. Hunters would cause little disturbance to migratory waterfowl since there is little overlap in with waterfowl habitat. Some refuge impoundments would be open to deer and turkey hunting in the fall, but only after they are frozen and no longer provide good habitat for waterfowl. There would be little disturbance to marsh and wading birds since deer and turkey hunters do not usually hunt in emergent marsh habitat, and wooded areas with active heron rookeries would not be open to hunters.

For more specific information on public uses proposed under alternative B, refer to appendix B and appendix E.

## **Shorebirds**

### ***Benefits***

Benefits to shorebirds using mudflats would be similar to those under alternative A. Shorebirds would further benefit under this alternative from an increase in habitat resulting from additional habitat restoration efforts. Mudflat habitat quality would also be enhanced from the increased management capabilities that would result from an increase in the biological staff.

Under this alternative, we would work to increase the suitability and availability of shallow water mudflats, potentially allowing a greater number of shorebirds to utilize the refuge. The management decision to not keep impoundments flooded for more than 4 months prior to shorebird migration, grading approximately 8 acres, and the possibility of restoring additional shorebird habitat would further benefit migrating shorebirds.

### ***Adverse Impacts***

American woodcock, a forest shorebird, require an interspersion of shrubland and grassland habitat (Sepik et al. 1993) and would be expected to decline slightly as a result of approximately 110 acres of shrubland succession to emergent marsh, riparian forest, or bottomland floodplain forest under this alternative.

## **Impacts on Waterbirds of Alternative C (Less-active Habitat Management)**

### **Waterfowl and Marshbirds**

#### ***Benefits***

The continued management of the Main Pool and Tschache Pool as emergent marsh would provide habitat for migrating waterfowl and breeding marshbirds, benefiting these species.

#### ***Adverse Impacts***

Of all the alternatives, alternative C would have the greatest adverse impacts on waterbirds. In addition to adverse impacts discussed under “Impacts on Waterbirds Common to All Alternatives” and alternative B, the acreage of emergent marsh habitat would decrease between 30 and 34 percent compared to alternatives A and B. Emergent marsh acreage would decline by 1,391 acres compared to alternative A and 1,523 acres compared to alternative B. Results of waterfowl surveys on the refuge indicate that this would have an adverse impact on migrating waterfowl. For example, during a spring 2011 waterfowl survey, only 28 percent of the waterfowl using the refuge were in one of the units that would be managed as emergent marsh under alternative C. Similar adverse impacts to breeding marshbirds are expected as they rely on the same habitat type.

This alternative would result in a reduction in available habitat for species that use emergent marsh. This management would displace most waterfowl, marshbirds, and shorebirds in favor of species that require large tracts of forested habitat. Consequently, because of substantial loss of

habitat, we anticipate a decline in species that require emergent marsh and hemi-marsh habitat (e.g., grebes, least bittern, and black tern) on the refuge. It is unclear at this time, what effects this would have on regional populations of these species as a whole.

## **Shorebirds**

### ***Benefits***

Continuing to manage the Visitor Center Wetland for migrating shorebirds would benefit these species.

### ***Adverse Impacts***

Many species of shorebirds travel thousands of miles in their biannual migrations. Northbound migrants pass through the MWC in April and May. The southbound migration is much more protracted because in many species, failed breeders depart a week or more before successful breeders, adult females up to a week before adult males, and adult males a week or more before juveniles (O'Brien et al. 2006). At Montezuma NWR, the fall migration may last from the beginning of July to mid-November. Since there would be fewer units available to manage for shorebirds under this alternative, it would not be possible to provide mudflat/shallow water habitat during the entire shorebird migration. If the Visitor Center Wetland were drained for the beginning of the shorebird migration in July, it would be too vegetated to provide habitat for shorebirds from August through November. In addition, at any given time, the acreage of mudflats would be significantly less than under alternatives A and B.

Adverse impacts on American woodcock would be more pronounced than described under alternative B as most of the refuge's shrublands would revert to forest.

Adverse effects associated with public use would be similar to alternative B, but somewhat reduced since we expect somewhat smaller increases in visitation and are proposing fewer new visitor facilities.

## **Effects on Landbirds (Raptors, Migratory Songbirds)**

The conservation and management of upland habitats in the Montezuma NWR is a priority of the refuge (although a lower priority than wetland habitats), one consistent with the refuge's establishing purpose and our CCP goals. We evaluated the management actions proposed for each of the refuge CCP alternatives for their potential to benefit or adversely impact landbirds.

We evaluated the following proposed actions for their potential to cause beneficial impacts on landbirds:

- Restoring agricultural and other lands by planting native species
- Expanding riparian forests and improving interior forests
- Managing or expanding early successional habitat or allowing its succession back to forest
- Controlling invasive species

- Acquiring and protecting strategic land
- Increasing public awareness through environmental education
- Hunting program

We evaluated the potential of the proposed actions to cause adverse effects on upland habitats or species, including:

- Public use disturbing wildlife
- Placement of facilities affecting habitat quality
- Treatments to control invasive species or maintain grasslands that might adversely affect wildlife
- Managing or expanding early successional habitat or allowing its succession back to forest

## **Impacts on Landbirds Common to All Alternatives**

### ***Benefits***

*Land Protection and Habitat Management*—The objectives and strategies in chapter 3 for protecting land, monitoring and abating diseases of wildlife and plants, controlling invasive or pest species, and promoting the succession of native upland plant communities all contribute direct and indirect benefits to the habitat needs of various species of landbirds of conservation concern. A primary goal in any alternative is providing quality breeding, migrating, and wintering habitat for migratory birds. For landbirds, that translates into acquiring and managing lands dominated by native plant communities.

Protecting and managing current refuge land and acquiring land from willing sellers within the refuge acquisition boundary would generally benefit all wildlife species that use forest, shrubland, and grassland habitat for a portion of their life cycle.

Improvements to forest stands affected by prior agricultural activity would also be part of the habitat management program under each alternative. Forest birds would also benefit by the expansion of forested riparian zones that would create more habitat for roosting, foraging, or seeking cover, and possibly breeding. The acreage would depend on the alternative selected.

Controlling and managing invasive species is a strategy for maintaining the biological integrity and diversity of all habitats. The selective treatment of invasive species that grow in early successional habitats is one area of concern for its potential to harm breeding birds, due to accessing the area which often disturbs wildlife. The most targeted approach for managing invasive species with the lowest risk to wildlife is used whenever possible.

*Impacts from Public Uses*—Benefits associated with public use are the same as those described under “Impacts on Waterbirds Common to All Alternatives.” In addition, landbirds would benefit from improved habitat conditions associated with controlling the refuge’s deer population. Specific benefits associated with controlling the refuge’s deer population are discussed under each alternative below.

## **Adverse Impacts**

*Refuge Activities and Habitat Management*—Habitat management activities, such as mowing, using prescribed fire, and using silvicultural practices could result in the inadvertent take of a small number of breeding, wintering, or migrating birds. However, management activities would cause no major mortality or loss in local populations, because actions occur on a rotational basis, meaning no major habitat components would change completely in any one year. Management actions for early successional woody habitat and grasslands would be conducted after the breeding season for migratory birds, thereby avoiding direct impacts to nesting and recruitment. Although management actions may cause some immediate adverse impacts, the long-term effect is improved habitat, and therefore the overall impact is expected to be beneficial.

As discussed under “Impacts to Waterbirds Common to all Alternatives,” there would continue to be short-term disturbance associated with habitat management, restoration, and improvement projects and general maintenance including maintaining or repairing trails and dikes. Whenever possible, these activities are timed to avoid critical times of year for refuge species. In addition, these activities occur in localized areas. Landbirds would be able to avoid long-term effects by leaving the immediate vicinity of the project for other, quieter, areas of the refuge.

*Impacts from Public Uses*—All of the alternatives predict some increase in annual visitation. However, the impact varies with the types of habitat management and visitor use each alternative proposes. We can expect direct, adverse impacts on wildlife by disturbance wherever humans have access, and the degree of that disturbance may vary depending on the type of habitat. In general, human presence disturbs most wildlife, which often results in a temporary displacement without long-term effects on individuals or populations. Some species, such as wood thrush, will avoid areas people frequent, such as developed trails and buildings, while other species, particularly highly social species, such as purple martin, seem unaffected or even drawn to human presence.

Miller et al. (1998) found bird abundance and nesting activities (including nest success) increased as distance from recreational trails increased in both grassland and forested habitats. In this study, common species were found near trails and rare species were found farther from trails. In some cases there is a clear link between the extent of disturbance and either the survival or reproductive success of individuals (Schulz and Stock 1993), but in many cases disturbance acts in a more subtle way, by reducing access to resources such as food supplies or nesting sites (Gill et al. 1996). Bird flight in response to disturbance can lower reproductive success by exposing individuals and nests to predators. For recreation activities that occur simultaneously (e.g., hiking, biking) there could be compounding negative impacts to wildlife (Knight and Cole 1991).

When visitors approach nests too closely, they may cause the adult bird to flush, which exposes the eggs to weather conditions or predators (Miller et al. 2001). Limiting the presence of humans to trails would reduce any disturbance during the breeding season to the trail area. The extent of that disturbance on either side of the trail also depends on visibility and the density of vegetation through which the trail runs. Overall, direct effects should be minimal from visitor activities because current use of refuge lands is dispersed, the trail system is established, and large areas of the refuge are not accessible by trail.

For songbirds, Gutzwiller et al. (1994) found that low levels of human intrusion altered the singing behavior of some species. Disturbance may also affect the reproductive fitness of males by hampering territory defense, mate selection, and other reproductive functions of vocalizations (Arrese 1987). Disturbance, which leads to reduced singing activity, would make males rely more heavily on physical deterrents, which are time- and energy-consuming in defending territories (Ewald and Carpenter 1978).

Additionally, dogs frequently accompany recreationists and their presence can lead to short-term and long-term adverse impacts to wildlife populations. Some wildlife species are particularly sensitive to the presence of dogs and their response to disturbance is amplified above and beyond disturbance effects from recreationists traveling without dogs. Declines in bird diversity and abundance on trails where leashed dogs were permitted were in excess of declines observed from human disturbance alone (Banks and Bryant 2007). In all alternatives, the refuge permits dogs on leashes. This restricts dog activity to a narrower trail corridor and minimizes adverse effects to canine sensitive wildlife species. Additionally dogs would not be permitted off-trail except for hunting. In alternative B and C, dog walking, as allowed under alternative A, would no longer be permitted; it would be restricted to only the most frequently visited and disturbed part of the refuge, the headquarters and visitor contact station area, including the Seneca Trail.

We would take all necessary measures to mitigate adverse effects of public use, particularly where group educational activities are involved. We would evaluate the sites and programs periodically to assess whether they are meeting the objectives, and to prevent site degradation. Mitigation measures to prevent or limit the effects of public use are primarily tied to trail design and annual maintenance. We would post and enforce refuge regulations, and establish, post, and enforce closed areas.

## **Impacts on Landbirds of Alternative A (Current Management)**

### **Raptors**

#### ***Benefits***

Currently, the refuge supports five active bald eagle nests. Average productivity (combined for all nests) has been about 1.76 offspring since 1987 (USFWS, unpublished data). Long-term benefits would include the protection of nesting and roosting areas, while the availability of open water would directly benefit bald eagles by providing foraging habitat (for nesting adults and immature birds). Osprey would also continue to benefit under alternative A, having similar foraging requirements to bald eagles.

Although not a species of concern, maintaining a mixture of open and forested habitat would benefit red-tailed hawks by provide hunting and nesting areas (Bednarz and Dinsmore 1982, Speiser and Bosakowski 1988). Cooper's hawks have relatively broad nesting requirements, and can tolerate a higher degree of forest fragmentation than sharp-shinned hawks (Bildstein and Meyer 2000, Curtis et al. 2006), but we believe breeding and foraging habitat would remain relatively unchanged for both species. Under this alternative, we would continue to focus early successional habitat management on the requirements for wintering short-eared owls and provide

potential breeding habitat for northern harriers. Habitat would continue to be provided for the American kestrel, a species that favors grasslands with nearby trees.

### ***Adverse Impacts***

The northern goshawk requires relatively large tracts of intact forest (Squires and Reynolds 1997) and would likely continue to be rare on the refuge, as forest fragmentation would remain. Similarly, habitat conditions for barred owl and red-shouldered hawk would not significantly improve.

Under this alternative, lack of resources would continue to hamper early successional habitat management, making it difficult to provide for the needs of wintering short-eared owls and breeding northern harriers.

### **Migratory Songbirds**

#### ***Benefits***

Current management would restore some agricultural lands to forested habitats, eventually providing additional habitat for forest species such as cerulean warbler and wood thrush.

Current management would maintain approximately 400 acres of scrub-shrub habitat to meet the needs of a number of landbirds of conservation concern including blue-winged warbler, field sparrow, and brown thrasher.

Current management would gradually provide larger areas of contiguous grassland, supporting many birds of conservation concern, especially bobolink. In addition, there would be some reduction of predation on grassland birds by mammals and raptors that gain cover and perch sites from hedgerows which are being removed. At Iroquois NWR, grassland bird nest success was shown to be greater in larger fields, with shapes that minimized edges and maximized core grassland habitat (Norment and Windig 2006).

#### ***Adverse Impacts***

Under alternative A, negative impacts to landbirds due to continued reduction of the vegetation's physical structure and diversity due to overbrowsing by deer are expected to continue. Casey and Hein (1983) have found greatly reduced bird species diversity in areas with long-term, high-density populations of deer. These changes were mainly attributed to habitual landscape alteration with pronounced browse line and sparse cover caused by overbrowsing.

Refuge populations of bird species that depend on shrublands, such as blue-winged warbler, brown thrasher, and field sparrow, may decline as some shrublands would continue to revert to forests. Also, compared to alternative B, there would be fewer resources available to control invasive species in shrublands and to manage shrublands to maintain an optimal mix of herbaceous and woody vegetation, thus habitat quality would be poorer for landbirds of conservation concern. For example, most shrublands currently are managed by mowing or hydroaxing woody vegetation, which encourages vigorous resprouting of these species and leads to a homogeneous vertical structure rather than the more desirable 50:50 mix of herbaceous and woody vegetation with scattered trees throughout.

There would continue to be impacts from habitat fragmentation (and associated edge effects), which would disproportionately affect species of grassland birds, many of which prefer larger habitat patches.

## **Impacts on Landbirds of Alternative B (Service-preferred)**

### **Raptors**

#### ***Benefits***

Foraging opportunities for bald eagle and osprey would continue to be provided. More nesting habitat would be available as more trees are planted adjacent to the canal system.

Short-eared owls primarily forage in grasslands and other open areas, with voles and other small mammals being their main prey items (Dechant et al. 2003a). Northern harriers utilize open areas such as grasslands and marshes for foraging and breeding (Apfelbaum and Seelbach 1983). Both species would benefit from less fragmented, higher quality grassland habitats, especially with treelines removed from between grasslands and emergent marshes. Because of these improvements to habitat quality, American kestrel numbers would likely stay the same, even with a decline in grassland acreage.

Some raptors, such as the barred owl (Allen 1987), red-shouldered hawk (Johnsgard 1990), and northern goshawk (Squires and Reynolds 1997) require large tracts of intact forest and are expected to increase as a result of an increase in available habitat. The additional forested acreage would also provide more suitable habitat for turkeys on the refuge which may increase the current population

#### ***Adverse Impacts***

Adverse impacts to landbirds under alternative B are expected to be greater than those expected under “Impacts on Landbirds Common to All Alternatives” because of the expected increase in visitor numbers, opening the discovery areas, adding deer and turkey hunting opportunities, and our proposed construction of new trails and visitor use facilities. New trail and infrastructure construction (refer to table 4.1) could cause short-term, localized effects on raptor species associated with impacted habitats.

The presence of pedestrians and bicyclists on the Wildlife Drive could cause an increase in short-term disturbance to wildlife near the road. The impact is expected to be minor since these uses are not allowed on the Wildlife Drive during critical times of the year. The potential impacts of these uses are also discussed in appendix B. There would be increased human presence in the field and possible displacement of birds due to disturbance by deer and turkey hunters under this alternative. Turkey hunting would also result in long-term adverse impacts to individual turkeys (i.e., mortality from hunting). The State sets turkey hunting regulations and limits to ensure the State’s turkey hunting program provides sustainable harvest opportunities for turkeys. Therefore, mortality of individual turkeys as a result of the refuge’s turkey hunt program is not expected to adversely affect the turkey population as a whole. Any additional disturbance impacts are expected to be negligible because hunters tend to travel in dispersed patterns over wide areas and

the maximum number of daily hunt permits would be limited. This ensures that the number of hunters is kept at levels that have only negligible impacts on refuge resources. We would monitor the refuge for potential impacts and would limit access or close areas as needed to protect resources.

There could be a slight decline in habitat available for sharp-shinned and red-tailed hawks, and other forest edge species, as fragmentation is reduced.

## **Migratory Songbirds**

### ***Benefits***

As stated under alternative A, overbrowsing by deer can have negative impacts on nesting songbirds in upland areas. A study conducted in Pennsylvania showed that both species diversity and abundance declined in areas with high densities of deer as a result of reduced nesting habitat (deCalesta 1994). Alternative B includes an expanded deer hunt to better control the refuge's deer population. As described previously in this chapter, the quality of existing habitat and speed at which new areas can regenerate would improve as a result of efforts to minimize deer herbivory by increasing efforts to control the deer population. Species composition and understory complexity would also likely improve with a reduction in the refuge's deer population. Species associated with forested habitats such as the cerulean warbler, scarlet tanager, and wood thrush would likely increase as the age structure, block size, and diversity of forested habitats improve.

Although overall shrubland acreage would decrease under this alternative, improved management would have a beneficial impact on species that depend on this habitat type such as blue-winged warbler, brown thrasher, field sparrow, Baltimore oriole, and song sparrow. These species are associated with old, brushy fields with a well-developed shrub component. Managing for this diversity in vertical structure is more labor intensive than periodically mowing or hydroaxing, which tends to create dense shrub cover with little to no herbaceous cover. Under this alternative, we would fine tune shrubland management and maintain higher quality habitat.

Similarly, although the acreage of grassland would decline, the quality of remaining areas would improve by removing treelines separating grasslands from adjacent open habitats, such as emergent marshes. The reduction of hedgerows and increased distance to trees used by raptors and other predators would result in decreased predation on grassland bird species.

### ***Adverse Impacts***

Some grassland species, such as sedge wren, bobolink, and savannah sparrow would decline as less acreage of grassland (76 acres less compared to alternative A) would be available; however the grassland areas that would no longer be managed are of poor quality and have not had many grassland obligate species using them.

There would be increased displacement of birds due to disturbance by deer hunters because the deer hunt would start earlier in the season and Sunday hunting would be permitted. However, we believe these adverse impacts would be outweighed by the beneficial impacts resulting from improved habitat conditions as the deer herd is reduced. Under alternative B, there would be a

youth and fall turkey hunt. The maximum number of daily hunt permits that can be issued is based on a variety of factors, including areas open to hunting. This ensures that the number of hunters is kept at levels that have only negligible impacts on refuge resources. We would continue to monitor the refuge for potential impacts and would limit access or close areas as needed to protect resources. See appendix B and appendix E for additional information on the proposed deer and turkey hunts.

Additional adverse impacts under alternative B would be the same as those discussed in “Impacts on Landbirds Common to All Alternatives.”

## **Impacts on Landbirds of Alternative C (Less-active Habitat Management)**

### **Raptors**

#### ***Benefits***

Birds of prey that are found in forested areas would benefit from an increase in their habitat, and would include barred owl, red-shouldered hawk, and northern goshawk. Breeding opportunities would likely improve for Cooper’s and sharp-shinned hawk, which prefer relatively dense forests with closed canopies for nesting (Wiggers and Kritz 1991, Trexel et al. 1999). The additional forested acreage would also provide more suitable habitat for turkeys on the refuge which may increase the current population.

#### ***Adverse Impacts***

As the acreage of emergent marsh and associated open water decreases, less foraging habitat would be available for bald eagles (immature birds and nesting adults) and osprey. Although there may be short-term negative impacts to bald eagle and osprey foraging areas, these impacts would be localized. We expect these impacts to be minimal because the Seneca and Clyde Rivers are adjacent to the refuge and bald eagles (Elliott et al. 2006) and osprey tend to have large ranges and are highly mobile foragers.

Raptors that prefer grasslands, such as short-eared owl, northern harrier, and American kestrel would likely decline because the acreage of these foraging areas would decrease.

Proposed public uses under alternative C, and their potential adverse effects, are similar to alternative B except portions of the refuge would be open to the State spring turkey season as well. As with any public use, this activity could present temporary disturbances to nesting and foraging raptors. Additional impacts are expected to be negligible because hunters tend to travel in dispersed patterns over wide areas and the maximum number of daily hunt permits would be limited by requiring hunters to obtain a special use permit. This ensures that the number of hunters is kept at levels that have only negligible impacts on refuge resources. We would continue to monitor the refuge for potential impacts and would limit access or close areas as needed to protect resources.

## **Migratory Songbirds**

### ***Benefits***

Species that prefer dense understory and early successional forest vegetation would experience direct benefits in the short-term as grassland and agricultural fields develop shrub vegetation during succession. Breeding species such as the prairie warbler and song sparrow would gain additional acreage.

Cerulean warbler would benefit from decreased forest fragmentation and an increase in the acreage of forest habitat (Hamel et al. 2004). This alternative would also favor other migratory birds that are associated with forested habitats, such as wood thrush and scarlet tanager. Species associated with young regenerating forests such as rose-breasted grosbeak also would benefit under this alternative, but only in the short term (about 1 to 10 years).

Additionally, with a decrease in forest edge, nest parasitism by brown-headed cowbird would be expected to decline (Howell et al. 2007).

### ***Adverse Impacts***

Under this alternative, birds that depend on early successional habitats would experience significant habitat losses with the acreage of shrublands declining by 84 percent and the acreage of grasslands declining by 81 percent compared to alternative A. We expect to see dramatic declines in a number of species of conservation concern including blue-winged warbler, brown thrasher, and field sparrow (all high priority in BCR 13), as well as willow flycatcher, bobolink, northern flicker, horned lark, and song sparrow, under this alternative compared to alternatives A and B.

Grassland breeding songbirds, as an example, would seek suitable breeding sites elsewhere. Some grassland birds would likely set up breeding territories on active farmlands, particularly active hayfields in the region, to continue nesting. Haying operations on neighboring lands typically take place at the height of the grassland bird breeding season and would lead to increased loss of nests, nestlings, and fledglings. While species like Henslow's sparrows would benefit in the short term from active grasslands reverting to idle, old fields, Montezuma NWR would likely lose these grasslands and associated area-dependent species within 10 years.

Proposed public uses under alternative C, and their potential adverse effects, are similar to alternative B except portions of the refuge would be open to the State spring turkey season as well. As with any public use, this activity could temporarily disturb nesting and foraging birds. Additional impacts are expected to be negligible because hunters tend to travel in dispersed patterns over wide areas and the maximum number of daily hunt permits would be limited by requiring hunters to obtain a special use permit. This ensures that the number of hunters is kept at levels that have only negligible impacts on refuge resources. We would continue to monitor the refuge for potential impacts and would limit access or close areas as needed to protect resources

## Effects on Fish

We compared the management actions in the alternatives based on their potential to benefit or adversely impact the refuge's fish populations. We evaluated the management actions and public uses each of the alternatives proposed for their potential to beneficially or adversely impact fish species.

We evaluated the following proposed actions for their potential to cause beneficial impacts on fish:

- Acquiring and protecting land that would provide watershed benefits
- Protecting or restoring emergent wetlands
- Restoring or increasing the width of vegetated riparian buffers around wetlands
- Controlling invasive species

We evaluated the following proposed actions for their potential to cause adverse impacts on fish:

- Altering refuge hydrology or degrading water quality
- Applying herbicides to manage invasive species
- Accidental introductions of nonnative fish by anglers

## Impacts on Fish Common to All Alternatives

### **Benefits**

*Land Protection and Habitat Management*—Many of the same management actions for protecting wetlands, refuge impoundments, and open water, such as controlling nonnative invasive plants and providing or improving vegetated buffers around wetland-upland interfaces and riparian edges, are actions that would take place regardless of which alternative is selected, and would not only benefit wetlands, but also the fish that depend on good water quality and a well-functioning wetland ecosystem. When forested buffers lie next to open water, the debris from trees falling into the water provides cover and food. Vegetated buffers, whether grass or forest, serve to filter nutrients and other contaminants that may otherwise leach into wetlands or water bodies and affect fish directly or indirectly through their prey.

Because the hydrology on and around the refuge has been and remains altered, most if not all of the refuge's wetlands and open waters are artificial, managed impoundments. Despite efforts to exclude them, refuge waters provide habitat for common carp (a nonnative species). Refuge management efforts to exclude carp and decrease the carp population likely have ancillary benefits native fish species. The refuge provides habitat for several other common fish species, none of which are species of conservation concern.

### **Adverse Impacts**

*Habitat Management*—Under all alternatives, prescribed burning, mowing, brush hogging, and other management actions on lands adjacent to refuge waters may cause short-term, minimal,

localized increases in debris, turbidity, and agricultural runoff. Controlling invasive plants with herbicides is not expected to have negative effects on fisheries resources. As discussed under adverse effects in the section on soils at the beginning of this chapter, the formulations of herbicides we would use near waterways are approved for use around waters and are not toxic to fish. The glyphosate is the most commonly used herbicide around refuge wetlands and waters. It quickly absorbs to suspended and bottom sediments.

The purpose of the refuge and refuge management is to provide habitat for migratory birds. The refuge's impoundments are not intended to provide habitat for fish species. Refuge management would continue to include actively excluding carp from refuge impoundments. This would have short-term, localized adverse effects on the nonnative carp; however, native populations of fish would likely benefit from efforts to exclude carp because this would decrease competition for resources. Continued drawdowns would prevent a more diverse (both in terms of age classes and species) fish community from developing in impoundments. Currently, very few fish survive periodic drawdowns. Therefore, impoundment draw downs would also have short-term, localized adverse effects on fish species present. As discussed under benefits, these are all common species, some are nonnative, and no adverse effects on local populations of these species are expected.

*Impacts from Public Use*—We would not permit fishing in refuge impoundments or other waters because this activity can be a significant disturbance to wildlife and can conflict with other priority public uses (e.g., waterfowl hunting). Although fishing is not permitted directly in waters within the refuge boundary, recreational fishing and fishing access is allowed from designated areas along refuge shorelines in New York State waters. The State sets fishing regulations to maintain healthy fish populations, including harvest limits for certain species. These limits are set to ensure that harvest levels do not cumulatively impact native fish resources to the point they are no longer self-sustainable. The accidental or deliberate introduction of nonnative species used for bait by anglers is one potential impact of fishing. This would be addressed by partnering with the State to educate anglers about which baitfish are approved for use and potential adverse effects of using unauthorized bait when fishing. Adverse effects on fish populations associated with recreational fishing are not expected. Additional information is available in our compatibility determination for fishing in appendix B.

## **Impacts on Fish of Alternative A (Current Management)**

### ***Benefits***

Planting more trees adjacent to the canal system should improve habitat conditions for fish in these waters. Fish species would indirectly benefit from improved habitat and soil conditions that would result from planting native vegetation. Trees adjacent to bodies of water provide numerous benefits, including shade cover that contributes to cooler water temperatures and by providing woody plant tissue and debris that serves a vital role in supplying nutrients and maintaining a healthy ecosystem.

There would be benefits to water quality and fish species in the impoundments from continued efforts to control and eliminate phragmites. There would be continued benefits to wetland

habitats and fish species from protection of native plant communities on refuge uplands which filter runoff from operations on the refuge and adjacent lands and developed areas.

### ***Adverse Impacts***

In addition to impacts discussed under “Impacts on Fish Common to All Alternatives,” the refuge’s cooperative farming program may lead to small risks of agricultural runoff; however we anticipate these impacts to be negligible because we use best management practices to minimize adverse effects including using Service-approved herbicides.

## **Impacts on Fish of Alternative B (Service-preferred)**

### ***Benefits***

Compared to alternative A, there would be increased benefits to water quality, which directly benefits fish species, from an increase of 126 acres of wetland habitat, improved control of water levels in the impoundments, and additional restoration along the riparian zone offering greater benefits to the fish community. We expect that acquisition and conservation of additional lands would benefit aquatic biota, including fish, by reducing the potential for development and agricultural runoff that may adversely affect refuge water quality.

The addition of an observation area where visitors can view carp that are being excluded from the Main Pool would offer an opportunity for us to provide information about the impacts of nonnative species on refuge resources. Our continued outreach efforts to the fishing community and informing visitors about our management strategies can have direct and indirect benefits on native fish communities, such as reducing the introduction of nonnative species into refuge and adjacent waters and gaining support from the public.

### ***Adverse Impacts***

Construction of new trails and visitor use facilities, as well as increased environmental education and interpretation activities, would lead to a greater potential for sedimentation and turbidity in wetland areas and open waters from erosion of exposed soils. Because these activities would not be conducted immediately adjacent to refuge waters, the potential for these impacts to occur would be low. Proper site preparation and employing best management practices, such as silt fences, would further decrease any potential adverse effects. While some potential risks exist from the increased visitor activities and numbers that we are expecting, we believe they would be negligible when managed properly.

Under this alternative, cooperative farming would be phased out, so an adverse impacts associated with cooperative farming would decrease over time until the program ends.

## **Impacts on Fish of Alternative C (Less-active Habitat Management)**

### ***Benefits***

We would expect to see benefits to fish species from reconnecting refuge wetlands to the canal system and creating additional foraging and nursery habitat.

### **Adverse Impacts**

Because the NYS Canal Corporation manages water levels for flood control and navigation, timing of low and high water levels may not coincide with fish reproductive cycles or other resource needs. Currently, the canals are able to support naturally reproducing populations of many species of fish, so the impacts are expected to be minimal, at least on the species present.

Adverse impacts associated with refuge management, as listed under “Impacts on Fish Common to All Alternatives” and alternative B would continue in Tschache Pool, the Main Pool, and the Visitor Center Wetland.

### **Effects on Other Wildlife (Mammals, Amphibians and Reptiles, and Invertebrates)**

We evaluated the management actions and public uses each of the alternatives proposes for their potential to beneficially or adversely impact large and small aerial, terrestrial, or wetland mammals, amphibians and reptiles, and invertebrates.

We evaluated the following proposed actions for their potential to cause beneficial impacts on wildlife:

- Acquiring and conserving additional wetland and upland habitats
- Improving habitat quality in wetland and upland habitats, as in controlling invasive plant species or planting native species
- Controlling deer populations
- Providing early successional habitat
- Conducting public outreach and education on protection and stewardship practices

We evaluated the potential of the proposed actions to cause adverse effects on wildlife:

- Managing and maintaining early successional habitats, such as burning prescribed fires, mowing, or brush hogging
- Altering refuge hydrology or degrading water quality
- Managing deer hunts
- Creating trails and discovery areas, and disturbing wildlife by recreation activities

### **Impacts on Other Wildlife Common to All Alternatives**

#### **Benefits**

*Land Protection and Habitat Management*—Habitat management techniques, such as maintaining impoundments, prescribe burning, mowing, and controlling invasive species would be carried out to improve habitat conditions for a variety of wildlife species.

The programs that hold potential for impacts on wildlife, and that would continue regardless of alternative selected, are our strategies for protecting land (acquisition, easements, or habitat improvement measures) and controlling invasive or nuisance species. Each of these indirectly

benefits wildlife fauna over the long term by ensuring the continuation of quality natural habitats on the refuge.

Strategic land acquisition, conservation agreements, and outreach programs to the public on good stewardship practices are the most effective strategies for ensuring the increased or continued availability of quality forest, riparian, early successional, or wetland habitats. The carrying capacity of each of these habitat types varies with respect to different wildlife species, and depends on the size of each tract, vegetation composition, corridors, surrounding land uses, weather patterns, availability of food resources, and various other factors.

Controlling invasive species benefits wildlife species by maintaining the balance of food sources and vegetation structure types with which they evolved or adapted to for cover or nesting. Although thousands of nonnative plant species have become established throughout North America, those which pose the greatest threat to wildlife are those that quickly form dense, monocultural stands. For herbivores that depend on a variety of food sources throughout the year, this would be detrimental. For smaller, highly productive, insectivorous mammals, such degradation of the vegetation community could also affect the diversity of invertebrate food resources associated with the native plant groups.

Managed deer hunts would benefit the deer population as a whole by decreasing the deer population, decreasing risks of disease transmission, and improving deer herd health. While all alternatives include a managed deer hunt, the levels of hunting differ between the alternatives and therefore have different effects. Specific differences are addressed under each alternative.

### **Adverse Impacts**

*Habitat Management*—Habitat management activities that are aimed at setting back succession, such as prescribed burning, mowing, and hydroaxing would injure or kill some small to medium-sized mammals that are unable to find refuge or otherwise flee. Localized adverse effects from habitat management also include disturbance or displacement of breeding or foraging wildlife. However, we believe the risk to be low or the impact to be slight at the population level, and always of short duration. Mowing grassy access roads and public use trails also occasionally destroys turtles, snakes, and frogs if conducted during times of movement (the warm months). Mowing in the warm months, when insects are breeding, may destroy the eggs or pupae attached to leaves, consume adults, remove food sources, or unfavorably alter microhabitat. We work to minimize that type of direct, negative impact by keeping public use and access roads mowed short so that they do not become desirable habitat, and mowing in the heat of the day when amphibians have retreated to cool forest areas.

Applying herbicides to control invasive species and weeds on the refuge trails, roadsides, kiosks, and signs and buildings holds the potential for negative impacts on amphibians if we do not take certain precautions. If we properly follow the instructions regarding strength, weather conditions, and other factors for herbicide applications, they should not harm any sensitive amphibians.

Prescribed burning in grasslands typically generates fast-moving, surface fires which rarely burn down to the soil and many small mammals find shelter in the unburned duff. There could presumably be occasional snake mortality. The temporary loss of cover, lasting several days to

weeks, resulting from prescribed fires and mowing could make some species (especially small mammals and snakes) more vulnerable to predation. Displaced small mammals would move from treated areas into adjacent habitat, resulting in increased competition with established populations.

Hydroaxing would be conducted in the winter on frozen ground or on dry soils in the summer, resulting in cover loss. Overall, we expect all the management techniques discussed to have a minimal impact to wildlife.

Trapping furbearers as a management technique would continue under each alternative and is expected to have direct and indirect effects on wildlife. Benefits include the management of populations of furbearers at sustainable levels. Overcrowding can make populations more susceptible to disease outbreaks.

Direct impacts would include the removal of individual target and nontarget animals. Management of targeted species is regulated by the NYSDEC which has established seasons for New York's furbearers. These seasons are strictly regulated, with specific times when furbearer management is allowed and the harvest on the refuge is monitored to help understand population trends. No adverse impacts to furbearer populations are expected. Nontarget species may occasionally be killed, but the experience of the trappers and types of traps used limit these events.

The accidental harvest of nontarget furbearer species, such as river otter, is possible, but requirements for trap setting, refuge regulations on size of traps and location of trap placement, requirements for a state license, outreach and education, and requirements that adhere to Best Management Practices for Trapping in the United States (Association of Fish and Wildlife Agencies 2006) would help minimize impacts. Risk of taking species other than beaver would be reduced significantly as beaver trapping sets would occur specifically around areas of beaver activity. Selectivity for beaver can be achieved by carefully choosing trap locations, using specific beaver attractants, and employing trap types and trigger configurations that are unlikely to be sprung by other species. Trapper experience and the selection of the appropriate trap size would reduce nontarget furbearer captures (Organ et al. 1996, Boggess et al. 1990). The Service would continue to work with the State to help prevent the accidental take of furbearers on the refuge through trapper education.

*Impacts from Public Uses*—An important component of refuge management includes maintaining a careful balance between wildlife conservation and public use. A 1987 study of refuges in the Northeast found that 16 refuges reported various impacts to wildlife resulting from public use and identified various mitigation measures to minimize these effects (USFWS 1987).

The primary impacts to wildlife populations from public use on the refuge would be those associated with disturbance and the taking of wildlife. An overview of the impacts of these uses on wildlife is provided below. For additional information on the potential effects of these uses, especially in relation to alternative B, refer to the compatibility determinations detailed in appendix B, as well as the “Montezuma NWR Hunt Program EA” provided in appendix E.

We would expect short-term and long-term adverse effects, i.e., disturbance or mortality, on wildlife populations resulting from public use of trails, the Wildlife Drive, and deer hunting. Visitors and dogs cause temporary disturbance impacts on resting and foraging wildlife. Disturbances would vary by wildlife species involved and the type, level, frequency, duration and the time of year activities occur. Even when people stay on trails, they would have some effect on the behavior of many wildlife species. Furthermore, adverse effects to wildlife have been shown to be directly proportional to increases in the number of users (Beale and Monaghan 2004). According to the study, groups of visitors using trails were more likely to cause behavioral changes in the animals studied when compared to individual visitors. Similarly, use of the Wildlife Drive would have some disturbance effects on wildlife found in adjacent areas.

Disturbance can cause shifts in habitat use, abandonment of habitat, and increased energy demands on affected wildlife (Knight and Cole 1991). There is evidence to suggest that species most likely to be adversely affected are those where available habitat is limited, constraining them to stay in disturbed areas and suffer the costs of reduced survival or reproductive success (Gill et al. 2001).

Lenth et al. (2006) found, in areas that prohibited dogs, mule deer were less active up to 50 meters from recreational trails. In areas that allowed dogs, mule deer showed reduced activity within at least 100 meters of trails. The same study found similar adverse effects for small mammals including squirrels, rabbits, chipmunks, and mice. This means that there is a certain area around recreational trails that becomes unsuitable habitat for certain wildlife species, even though the habitat would otherwise be suitable (Lenth et al. 2006).

Wildlife disturbance may be compounded by seasonal needs. For example, causing mammals to flee during winter months would consume stored fat reserves that are necessary to get through the winter. Hammitt and Cole (1998) found white-tailed deer females with young are more likely to flee from disturbance than those without young.

We plan some administrative activities under each alternative, such as rehabilitating existing buildings, maintaining roads, and maintaining dikes and associated water control structures. These activities could cause some disturbance to wildlife. Breeding amphibians would not be affected as the small ponds in which they breed are not located near these areas. Therefore, most of the impacts from these actions would be minor and temporary.

We minimize potential adverse effects by requiring dogs to be on 6-foot leashes and controlling the daily number hunters allowed on the refuge. Regulating the number of hunters allowed on the refuge should result in a relatively low density of hunters per acre. Therefore, these effects are expected to be of low intensity and short duration so they would have minor consequences. Under all alternatives, we would continue to monitor the refuge for potential impacts and would limit access or close areas as needed to protect resources.

All alternatives include some type of deer hunt program. Deer hunting is a consumptive use that has long-term adverse effects on individual animals. However, as discussed under benefits above, it would have long-term benefits to the deer population, as well as other species on the refuge, as a whole.

## Impacts on Other Wildlife of Alternative A (Current Management)

### **Benefits**

Under alternative A, we would continue to manage refuge impoundments, to provide a diversity of habitats and to mimic natural hydrologic periods. This management is intended to provide emergent marsh plant communities dominated by native plants, which would benefit river otters, spotted turtles, and other native species that use these habitats.

Current management would restore some agricultural lands to forested habitats, eventually providing additional habitat for forest species such as Indiana bat<sup>1</sup>, silver-haired bat, spotted turtle, blue-spotted salamander, Jefferson salamander, and river otter. More wood turtle habitat would be available as more trees are planted adjacent to the canal system.

We would continue to maintain more than 700 acres of early successional habitat (including shrubland and grassland) for species of conservation concern, including spotted turtle and western chorus frog. Bats also need open habitats for their nighttime aerial foraging. Grasslands have high abundances of insects beneficial to bats. Grasslands, wet meadows, and marshes that lie close to forested areas where bats roost are essential, as some species do not forage in the forest.

An indirect benefit would derive from the long-term persistence of large patches of grasslands in multiple locations, as that pattern contributes to the enhanced survival and population growth of small mammals with limited home ranges. A continuous supply of palatable herbaceous plants also contributes to the overall health of the deer herd. The carnivores or omnivores, such as fox, skunk, coyote, and raccoon that feed on small mammals best succeed at the interface between field and forest, serving to maintain the balance of mammal populations.

The maintenance of grasslands provides an enormous direct benefit for reptiles and some amphibians due to the abundant food resources, particularly in older fields that provide a diversity of plant and invertebrate life, and complex soils. A number of snake species use grasslands for foraging, particularly if they are near woodlands with ample cover. Well-established grasslands provide a diverse array of nectaries and plant structures for pollinating, herbivorous, and predatory insects.

### **Adverse Impacts**

Drawdowns of each impoundment occur every 3 to 7 years (up to 2,000 total acres annually). These drawdowns likely would cause pools to dry up prior to most aquatic amphibian larvae metamorphosing into terrestrial adults. However, more than 2,000 acres of emergent marsh habitat would still be provided annually for these species. We would continue to avoid summer drawdowns (June through July), as much as possible, in impoundments with nesting black terns so nests are not stranded on dry ground, leading to nest desertion and possible increased predation (USFWS 2008b).

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<sup>1</sup> Indian bats are a federally listed, endangered species. Impacts to this species are covered in more detail under "Effects on Threatened or Endangered Species."

Refuge partnerships would not improve upstream land use practices and deicing operations on nearby county roads would continue to contribute salt to refuge waterways. As a result, amphibians (including Jefferson salamanders) would continue to be affected by low or declining water quality.

## **Impacts on Other Wildlife of Alternative B (Service-preferred)**

### ***Benefits***

Under alternative B, most benefits to wildlife would be similar to benefits described in “Impacts Common to All Alternatives” and under alternative A.

In addition, proposed changes to the deer hunt program under this alternative are designed to better manage the refuge’s deer population by keeping population density at or below the carrying capacity of the environment. This ensures continued recruitment and maturation of a diversity of palatable herbaceous and woody plants, as well as fruit or nut-producing tree species on which deer and other herbivores depend throughout the year. Deer herd health also is expected to improve as densities are managed at more sustainable levels (at high densities, deer become more susceptible to parasites and disease).

River otter populations would likely increase with more emergent marsh habitat. Tree bats may increase as some shrublands convert to forest and as trees mature, offering more roosting opportunities. Bats would further benefit from bat boxes. Salamanders would benefit as described under alternative A. Amphibians and turtles would benefit from highway underpasses by providing a corridor for travel.

### ***Adverse Impacts***

Adverse impacts to amphibians in refuge impoundments would be similar to those described under alternative A, but there would be more alternate emergent marsh habitat available to mitigate these negative effects. Early successional species such as western chorus frog would have reduced habitat available to them.

The addition of new trails would displace wildlife inhabiting the selected sites. Sites would be selected carefully to minimize adverse impacts to species of conservation concern. Wildlife is expected to move to higher quality habitat surrounding the project area during the construction of trails, kiosks, and outdoor facilities. Wildlife habitat may suffer short-term degradation due to loss of vegetation that may provide forage and cover. No major or long-term effects on wildlife are anticipated. Incidental mortality or displacement among small animals may occur on the site during clearing and preparation of the site.

In general, adverse effects associated with habitat management would be similar to those already described above under alternative A. Localized adverse effects from mowing include soil compaction and rutting where wet soils are encountered, damage and loss of vegetation, displacement of foraging wildlife, and inadvertent take of small mammals, reptiles, amphibians, insects, and young birds. The refuge would minimize these potential adverse effects by performing management actions after the bird breeding season, when plants are dormant, and when small mammals, reptiles, and amphibians are least active.

Under alternative B, we expect increased visitation. We would open one to two areas (discovery areas) of the refuge to off-trail use, and would open the refuge to youth and fall turkey hunting. Visitors and dogs cause temporary disturbance impacts on resting and foraging wildlife. By limiting dog walking to 6-foot leashes, restricting dog walking to high-traffic areas of the refuge, and controlling the number hunters allowed on the refuge, we expect these impacts to be minor. We would continue to monitor the refuge for potential impacts and would limit access or close areas as needed to protect resources.

## **Impacts on Other Wildlife of Alternative C (Less-active Habitat Management)**

### ***Benefits***

Under alternative C, most early successional habitats would be allowed to revert to forest. Compared to alternative A, there would be a net gain of 2,401 acres of forested habitat. Similarly, there would be a net gain of 2,076 acres of forested habitat compared to alternative B.

In the uplands, woodland-dependent species would benefit over the long term from increasing forest cover, particularly when the stands have reached maturity. Deer herd health would improve as described under alternative B. Deer would derive short-term benefits from the increased cover and some palatable saplings during the interim period as the fields undergo natural succession. Bats would also gain increased roosting habitat when the trees are mature enough to form cavities and crevices in their bark. Summer populations of tree bats would increase as forests expand. Along riparian habitats, increased forest cover would benefit river otter and wood turtle, but that would only apply to easements or new tracts where grassland habitat exists directly on the edge. Beaver populations would likely increase as a result of less managed water levels and increased hydrological connectivity. Since all of the remaining shrublands would be on forest edges, species that require early successional habitat adjacent to forests for raising their young would benefit.

Reptile and amphibian species including wood turtle, blue-spotted salamander, and Jefferson salamander that use forested wetlands could increase as more riparian corridors become available. Wood turtles would benefit from improved riparian habitat and a potential increase in beaver ponds. Highway underpasses would benefit these species as well by providing a corridor for travel.

Invertebrate species that depend on the bark, cambium, leaves, flowers, sap, or decomposing litter of woody vegetation (beetles, slugs, earthworms, certain wasps and bees, ants, termites, caterpillars, and forest butterflies and moths) would directly benefit from increases in forest habitats (bottomland floodplain, riparian, and upland forest).

### ***Adverse Impacts***

Compared to alternatives A and B, the adverse impact to amphibians caused by periodically draining refuge impoundments would be exacerbated by the decrease in this habitat type overall. River otters would likely decline as the proportion of hemi-marsh decreases. Species that depend on early successional habitats, such as western chorus frog, would be negatively impacted

through loss of habitat in direct proportion to the benefits to the population gained in alternatives A and B.

For invertebrate species that depend on nectar from forbs and grasses, the loss of grassland habitat could result in the gradual, localized, extirpation of their populations. That change could affect many species of bees, beetles, butterflies, dragonflies, damselflies, flies, gnats, moths, and spiders. Indirectly, their loss could set in motion a reduction in the pollination of grassland vegetation, which may have broader consequences on the landscape scale.

Effects associated with the refuge's hunt programs would be the same as those described under alternative B except, under alternative C we would open the refuge to spring turkey hunting. As with any public use, this activity could present temporary disturbances to refuge wildlife. As previously discussed, additional impacts are expected to be negligible because hunters tend to travel in dispersed patterns over wide areas and the maximum number of daily hunt permits would be limited by requiring hunters to obtain a special use permit. This ensures that the number of hunters is kept at levels that have only negligible impacts on refuge resources. We would continue to monitor the refuge for potential impacts and would limit access or close areas as needed to protect resources.

## **Effects on Threatened or Endangered Species**

Currently, the Indiana bat is the only federally listed species likely to be present on the refuge. Consequences to State-listed species are evaluated under the taxonomic sections above.

The Indiana Bat Draft Recovery Plan (USFWS 2007b) identifies several actions to help recover this species including conserving and managing summer habitat to maximize survival and fecundity. The plan also identifies the loss and degradation of forested habitat as a threat to summer habitat as well as migration pathways and swarming sites. Regardless of the alternative selected, we would consult with the Service's NYES office as needed to protect this species and meet our obligations under the ESA.

### **Impacts on Threatened or Endangered Species of Alternative A (Current Management)**

#### ***Benefits***

An increase in forested areas and improvements in the quality of this habitat would continue to benefit the Indiana bat.

#### ***Adverse Impacts***

The potential for disturbance to Indiana bats under alternative A is expected to be minimal, and would not exceed existing baseline levels. The bat is not known to occur on the refuge, though habitat on the refuge could support summer foraging and roosting. Public use of the refuge is confined to daylight hours, so it is unlikely to interfere with the bat's nocturnal foraging. Most public use is confined to established roads and trails, further limiting the potential for disturbance. Hunting occurs off-trail, but it is an established use on the refuge. If Indiana bats are

documented on the refuge, we would consult with the Service's NYES office as needed to ensure that the Indiana bat is protected.

### **Impacts on Threatened or Endangered Species of Alternative B (Service-preferred)**

#### ***Benefits***

An increase in the amount of forested habitat could benefit the Indiana bat by providing additional foraging and roosting habitat. Increased wetlands also provide additional foraging habitat for this species. The Indiana bat may benefit from the installation of bat boxes.

#### ***Adverse Impacts***

Adverse impacts on threatened or endangered species are the same as those discussed for alternative A.

### **Impacts on Threatened or Endangered Species of Alternative C (Less-active Habitat Management)**

#### ***Benefits***

Benefits would be similar as described under alternative B. Additional forest acreage could offer more roosting habitat for the Indiana bat compared to alternatives A and B.

#### ***Adverse Impacts***

Adverse impacts on threatened or endangered species are the same as those discussed for alternative A.

## **Effects on Cultural and Historic Resources**

Chapter 2, "Cultural and Historic Resources," describes the known Native American sites within the refuge's approved acquisition boundary, as well as historical research which suggest the possibility of more than 100 archaeological sites within the approved acquisition boundary. The likelihood of locating additional prehistoric or historic sites is high. Potential impacts to cultural resources would be primarily associated with construction or impoundment projects, as discussed under each of the alternatives.

### **Impacts on Cultural and Historic Resources Common to All Alternatives**

#### ***Benefits***

Regardless of which alternative we select, we would protect known cultural and historic resources. We would continue our outreach and education and use law enforcement, if necessary, to protect against the loss of or damage to those resources. A cultural resource overview was conducted for the refuge by GAI Consultants (GAI 2010). This information will help us further protect these resources.

Under each of the alternatives, the refuge would continue to protect known and unrecorded archaeological sites from unauthorized disturbance and looting. Further, the refuge would communicate the importance of understanding and appreciating the area's rich cultural history and how it relates to our natural history under all scenarios. In doing so, we would potentially provide long-term benefits to regional cultural and historic resources. As we acquire more lands with the refuge's approved acquisition boundary, opportunities to protect these resources would increase.

### **Adverse Impacts**

The Service recognizes the importance of continued compliance with the NHPA and other Federal laws and mandates protecting these resources to ensure that known sites are protected and any sites that are found in the course of refuge management and public use are properly addressed. While no adverse impacts to cultural or historic resources are anticipated, we will send this draft CCP/EA to the SHPO for review in compliance with section 106 of the NHPA. In all of the alternatives, we will consult with our regional archaeologist(s) and the SHPO as needed to ensure compliance with NHPA and other applicable laws and regulations. In particular, we would continue to consult with the SHPO and regional archaeologist(s) prior to conducting any ground-disturbing activities.

Refuge lands are vulnerable to looting, despite our best efforts at outreach, education and law enforcement. In addition, refuge visitors may inadvertently or even intentionally damage or disturb known or undiscovered cultural artifacts or historic properties. We would continue our vigilance in looking for this problem, and use law enforcement where necessary. However, we also recognize we may not discover every incident.

### **Impacts on Cultural and Historic Resources of Alternative A (Current Management)**

Impacts on cultural and historic resources of alternative A are the same as those under "Impacts on Cultural and Historic Resources Common to All Alternatives."

### **Impacts on Cultural and Historic Resources of Alternative B (Service-preferred)**

#### **Benefits**

In addition to the benefits under alternative A and benefits under "Impacts on Cultural and Historic Resources Common to All Alternatives," alternative B would have increased benefits from our efforts to expand our environmental education and interpretation programs and projected increase in visitation. The expected increase in visitation provides us with a greater opportunity to inform the public about the value of our cultural and historic resources. We would include that information in the appropriate environmental education and interpretive programs and materials. The potential for further protection of cultural resources is likely without the management of croplands.

#### **Adverse Impacts**

The risk of impacts as described in alternative A would increase slightly in alternative B, because of our proposed visitor use projects and facility construction. Possible risks to unrecorded cultural resources on the refuge could be associated with expanding public use opportunities

(e.g., building trails, etc.). However, we would continue to assess all projects for their potential to impact cultural resources and, as described in “Impacts on Cultural and Historic Resources Common to All Alternatives,” we would comply with Section 106 of the NHPA and other appropriate laws and regulations prior to any ground disturbing activity.

### **Impacts on Cultural and Historic Resources of Alternative C (Less-active Habitat Management)**

Impacts under this alternative are intermediate between alternatives A and B. There would be additional facilities and more visitors compared to alternative, but fewer facilities and visitors compared to alternative B.

## **Effects on Public Use and Access**

Since refuge lands are held in the public trust by the Service, access is generally allowed for compatible, priority wildlife-dependent public uses. Uses are limited when Federal trust resources would be impacted; the activity would detract from achieving refuge purposes or the Refuge System mission; or when administrative resources are not available to ensure a safe, quality experience. Montezuma refuge is currently open to the following priority wildlife-dependent public uses: hunting, wildlife observation, photography, environmental education and interpretation. Under all of the alternatives, we prohibit fishing in refuge pools and impoundments, however, we maintain a fishing pier and access to various fishing sites. Other uses which facilitate the priority public uses mentioned above include: bicycling, dog walking, snowshoeing, cross-country skiing, and nonmotorized boating.

The following section discusses the beneficial and adverse impacts to the six priority public uses (hunting, fishing, wildlife observation and photography, interpretation, and environmental education) as well as other facilitative recreational opportunities. For more specific information on the potential beneficial and adverse impacts of these uses, refer to the attached compatibility determinations (appendix B).

We evaluated the following management actions for their potential benefit or adverse impacts on public use and access that would result from implementing each alternative:

- Acquiring land in fee simple, providing permanent access for approved public activities
- Improvement and/or new construction of visitor infrastructure, and the increased distribution of refuge information, would improve visitor experiences
- Increased partnerships with local, regional, and state recreational interests would encourage a diversity of sustainable opportunities
- Increased outreach and Service visibility would promote resource stewardship and outdoor ethics

We considered the following potential short- and long-term direct, indirect, and cumulative impacts on public use and access that could result from the actions above:

- Conflicts among users—both actual (e.g., consumptive vs. nonconsumptive) and perceived (e.g., outreach for one activity may deter the interest of other users)
- Conflicts among uses (e.g., conflicts about safety and access)
- Confusion over changes in land ownership and management
- More informed public (e.g., about species, their habitats, and their conservation)
- More supportive public (e.g., of the refuge, the Refuge System, and the Service)
- Increases in visitation and its associated effects on the quality of the experiences and our ability to meet the demand

### **Impacts on Public Use and Access Common to All Alternatives**

Regardless of alternative, we would continue to allow compatible, wildlife-oriented public uses including hunting, fishing, observing, photographing wildlife, hiking, biking, and vehicle driving. We would also continue to allow cross-country skiing and snowshoeing to facilitate wildlife observation and photography in the winter, when access on foot is difficult. We would continue to provide the public with wildlife interpretation and environmental education opportunities. To support public use, we would continue to maintain refuge facilities including the refuge headquarters, visitor contact station, parking lots, observation platforms, photography blinds, kiosks, and trails.

Of the management activities that would not vary by alternative, the following would benefit or adversely impact public use and access on the refuge: protecting land, maintaining facilities, and implementing existing priority public use opportunities. We discuss the general impacts below.

### **Benefits**

*Operating Hours*—Under each alternative, the refuge headquarters would remain open to the public 7:30 a.m. to 4 p.m. Monday through Friday, excluding Federal holidays. The visitor contact station would remain open to the public 10 a.m. to 3 p.m. weekdays, and 10 a.m. to 4 p.m. weekends from mid-March through November (closing for the winter on Dec. 1). Under alternatives B and C, the visitor contact station may remain open until 6 p.m., depending on volunteer availability. Refuge grounds would remain open year-round from one-half hour before sunrise to one-half hour after sunset. The Wildlife Drive would remain open to automobiles from April 1 (weather-dependent) until December 1 (weather-dependent). During the winter months, December 1 until April 1, the Wildlife Drive would remain open for walking, cross-country skiing, and snowshoeing.

*Land Protection*—As we acquire lands for the refuge, we plan to evaluate its suitability to offer opportunities for wildlife-dependent public use. At this time, we do not know whether the owners of future acquisitions allow public access, or what types of activities they permit. Our observations and interactions with the public indicate that the following activities occur in the surrounding areas: allowing dogs to roam off leash, using off-road vehicles, hiking off trail, camping, picnicking, collecting plants or artifacts, making campfires, and swimming. Those activities have been determined inappropriate uses of the refuge, or have been prohibited by the general access regulations in the Title 50 of the Code of Federal Regulations. In addition, all of the priority public uses the Refuge System promotes most likely occur on surrounding private lands. Although those activities prevail in the area as private uses, it is likely that most of the

land we plan to acquire in fee title or in conservation easement is effectively closed to public access.

After acquisition, and restoration if needed, we envision opening these areas to priority public uses (e.g., deer, waterfowl, and turkey hunting, wildlife observation and photography) similar to nearby refuge land. Impacts on refuge visitors would be addressed through the Compatibility Determination process and additional opportunities for public comments.

*Demand and Access*—If we opened newly acquired tracts to any of the six priority uses, having additional locations to enjoy these pastimes would benefit those who engage in them. We would plan the locations of facilities and activities to minimize conflicts among users and treat different users fairly when conflicts are unavoidable (e.g., hunting and photographing wildlife in the same area).

*Maintaining Visitor Facilities*—Having well-maintained visitor facilities is important for encouraging and welcoming visitors to public lands. It reflects on the Service’s responsibility to spend taxpayer dollars effectively and efficiently. It is also important to protect public safety and refuge resources, both of which can be directly impacted or compromised when facilities deteriorate. Under all alternatives, we would continue to take this responsibility seriously and insure all facilities are up to Service standards and safe conditions.

*Existing Priority Public Use Opportunities*—The beneficial impacts of providing the existing level of wildlife-dependent activities, with some modest increases, include helping meet the existing and future demands for outdoor recreation and education. Hunters, anglers, birders, and photographers would find high quality opportunities to engage their preferred pastimes. Visitor use is increasing over time as local residents and visitors become more aware of refuge opportunities, and as we progress in creating new facilities and programs. The economic benefits of increased tourism would also likely benefit local communities.

*Hunting White-tailed Deer*—Annual refuge deer hunts would continue in designated areas. These areas would be open for hunting from November 1 until the end of November or early December. See appendix B, “Big Game Hunting CD.”

*Fishing*—We would continue to maintain and provide fishing access to the Seneca-Cayuga Canal and Clyde River Oxbow at the following sites: (1) the boat launch site south of U.S. Highway 20; (2) May’s Point (which offers a universally accessible fishing platform); (3) along the banks of the Seneca Trail and from the floating dock in the refuge headquarters area; and (4) along the banks of the proposed Oxbow Trail on the Wildlife Drive. Refer to appendix B, “Fishing CD,” for more information.

*Wildlife Observation and Photography*—Current opportunities to observe and photograph wildlife exist daily at four established observation areas, two of which are along the Wildlife Drive. We would continue to support the Friends’ photography contest and develop a Family Nature Club at the refuge.

## **Adverse Impacts**

*Demand and Access*—Over time, it is reasonable to expect that public awareness of the refuge would increase, and, in turn, visitation would increase on the tracts open for public use. The refuge may or may not be capable of meeting the demand as it increases: providing programs, maintaining facilities, and providing adequate facilities for increased numbers of visitors (such as parking areas). Whether the refuge would be capable of meeting the increasing demand depends on our coinciding levels of staffing, the proximity of new tracts to staff (for ease of management capability), or the availability of partners and volunteers to assist.

Because the protection of wetland habitats is a priority, we expect to acquire lands that would support our protection efforts. Because riparian habitats support a variety of migratory waterfowl, shorebirds, and marshbirds, we may close some types of public use or restrict certain uses (such as biking along the Wildlife Drive) during critical periods.

When we open new tracts to public uses, neighboring land owners could experience a change in the level of disturbance and an increase in the potential for trespass by refuge visitors. We should note that, to offset those issues, we would post boundary signs along the property line and deploy a State or FWS law enforcement presence to regulate the activities of visitors.

*Existing Priority Public Use Opportunities*—The increase in visitation and level of use at the refuge could eventually change the quality of experience for many visitors. Some may opt to either forgo certain recreation activities due to issues like overcrowding, or choose other locations. The refuge currently provides opportunities for only a small portion of the area's visitors, and if the expected increase exceeds the projected 15-year estimate, it could put additional strains on other public lands, or diminish the refuge contribution to the mission of the Refuge System. We would work to avoid that by continuing to distribute our programs and facilities to minimize conflict among users.

*Hunting White-tailed Deer*—We may close the refuge to other public uses during hunt days, unless we can safely sequester the locations of those uses from the locations of hunting activity. Currently, Esker Brook and South Spring Pool Trails are closed to other users during the white-tailed deer season, beginning each year on November 1 and into December. Impact on other visitors is minimal since there are other refuge trails that remain open and the main attraction to the refuge at that time is viewing the waterfowl migration along the Wildlife Drive.

*Fishing*—Declining or unhealthy populations of fish should not adversely affect the quality of the experience for anglers. Should those populations demonstrate unhealthy conditions, we could close or otherwise restrict the program until we studied the problem further or corrected it. That would disrupt regular use; however, we would make every effort to prevent confusion by explaining the situation to the public through the refuge Web site, signs, and news releases.

*Wildlife Observation and Photography*—The area of user conflicts offers the primary potential for adverse impacts, which we discuss in the impacts of hunting. There is also the potential that increased visitation could diminish the quality of experience for wildlife observation and photography opportunities.

## Impacts on Public Use and Access of Alternative A (Current Management)

### **Benefits**

*Demand and Access*—Under this alternative, the following areas would remain open year-round: the immediate area around the refuge office and visitor contact station, Seneca Trail and observation areas, Wildlife Drive (open to automobiles April 1 through December 1, weather-dependent and open to pedestrians December 1 through April 1), Tschache Pool observation area, May's Point observation area, North Spring Pool Observation area, observation parking area on Route 89 northbound, Knox-Marsellus observation area, and Crane Unit observation via Van Dyne Spoor Road (four wheel drive may be necessary, depending on weather). Esker Brook and South Spring Pool Trails would remain open except during white-tailed deer hunting season (approximately November 1 through mid-December).

We would maintain the current level of programs and types of public use opportunities on the refuge. We would not expand permitted uses or programs. We would continue to allow public access for the current public use programs. Refuge staff would continue to maintain the trails, fishing pier, observation towers, photography blinds, Wildlife Drive, and informational signs. Refuge law enforcement would continue to enforce current refuge regulations to provide a safe environment for refuge visitors.

*Hunting*—The refuge would continue to provide a range of high quality hunting opportunities for hunters of all skill levels. The current annual refuge white-tailed deer hunts would continue in all areas of the refuge except safety zones and areas specifically closed to hunting. Currently, “no hunting” zones include but are not limited to: the immediate areas around the refuge office headquarters area, refuge impoundments, along the Wildlife Drive, and adjacent to Wood Marsh Road. We would promote waterfowl hunting opportunities and cooperate with the Friends group to administer the waterfowl hunting program. Goose hunting would be allowed in the early season during the waterfowl hunt.

*Fishing*—Access to fishing sites would be the same as in “Impacts on Public Use and Access Common to All Alternatives.”

*Wildlife Observation and Photography*—Adequate opportunities for wildlife observation (overlooks, trails, observation tower) would continue to be provided.

*Environmental Education, Interpretation, and Outreach*—Approximately 800 to 1,000 students per year would continue learning about basic biology, as well as wetlands and migratory birds. A growing percentage of the local and regional community would continue to become aware of the refuge through its outreach program. Partnerships with other conservation organizations, as well as tourism entities, have increased over the past 10 years, thereby increasing public awareness and support of the refuge.

We would continue the activities we describe in chapter 2: information kiosks, interpretive talks, etc. Under alternative A, we would continue to provide at least the current level of interpretation. Other beneficial impacts of the current level of onsite interpretative activities are incorporated in providing general access and opportunities above.

## **Adverse Impacts**

*Demand and Access*—We assume an increase in visitation under alternative A, but not to the same extent as under alternative B. That can be attributed to the increasing trend in regional visitation (Carver and Caudill 2007). Eventually, the level of use could change the nature of the experience for many visitors. Should that occur, some visitors could choose to give up certain recreation due to issues of crowding or behavior, or to visit alternate locations. We do not anticipate that projected increases would adversely affect resources or their use or enjoyment by visitors because projected increases are relatively small, and are expected to be spread out over time (i.e., time of day and time of year) and space (refuge lands).

*Hunting*—Hunters are generally limited to areas otherwise closed to public use, and waterfowl hunting is limited to the morning hours, 3 days per week. Esker Brook and South Spring Pool Trails are closed to other users during the white-tailed deer season, beginning each year on November 1 and into December. Impact on other visitors is minimal since there are other refuge trails that remain open and the main attraction to the refuge at that time is viewing the waterfowl migration along the Wildlife Drive.

The Seneca and Clyde Rivers are adjacent to the refuge, but are not within the refuge boundary. While the Service does not have jurisdiction over these areas, we would continue to request that they remain closed to waterfowl hunting to provide for a buffer zone surrounding the refuge and to preclude trespass of waterfowl hunters on the portions of the river where the refuge owns land.

*Environmental Education, Interpretation, and Outreach*—Environmental education programs would be unable to accommodate more students and the programs would not be fully developed. With regard to interpretation, the refuge would not be able to meet demand. Quantitative data regarding the number of people reached through refuge outreach efforts would continue to be unavailable. In addition, the latest technological tools to reach a wider audience would not be utilized. Some other users could change their planned activities due to crowds associated with school groups, but this would be expected to have a minimal effect as they could utilize other trails on the refuge. The visitor contact station would not be expanded and would continue to be inadequate to meet the needs of the environmental education and interpretation programs on the refuge. Environmental education and interpretive activities could conflict with other priority public uses. We would continue to implement these activities to minimize potential conflicts with other priority public uses.

## **Impacts on Public Use and Access of Alternative B (Service-preferred)**

Adding new lands to the refuge would result in additional visitor use opportunities and costs to the refuge. In the expansion area, we plan to extend the Wildlife Drive to connect to the Montezuma Audubon Center located in Savannah, possibly add some parking areas, provide fishing access points, build some trails, and several observation areas. We also intend to open at least some of this land for hunting. The exact number and location of these public use improvements and opportunities is currently unknown. These details would be further defined and announced to the public as new lands are acquired.

## **Benefits**

*Demand and Access*—We assume an increase in visitation of 5 to 10 percent over 15 years, for a total of 157,500 to 165,000 visits after 15 years. That can be attributed to the increasing trend in regional visitation (Carver and Caudill 2007). Eventually, the level of use could change the nature of the experience for many visitors. We do not anticipate that this increase would adversely affect resources or their use or enjoyment by visitors, because the increases we project for the refuge would be well distributed. Alternative B would increase opportunities to wildlife-dependent public use and access by enhancing those programs and facilities at the refuge. The areas that would remain open year round are the same as the “Demand and Access” for alternative A.

The visitor contact station hours would extend to 10 a.m. to 6 p.m., 7 days a week, from mid-March through November. As a byproduct of this new interaction, increased public awareness, improved community relations, and enhanced support of the refuge mission would result. We would help meet demands from the communities where we are located, and from tourists, for outdoor recreation and education. By attracting visitors from outside the area, local communities should experience economic benefits from sales of food, lodging, and supplies.

The refuge would expand authorized public uses by allowing bicycling, cross-country skiing, and snowshoeing.

The proposed land expansion would further benefit visitors by providing more areas for hunting and recreation opportunities.

*Hunting*—Alternative B would expand the hunt program by expanding opportunities for deer and waterfowl hunting, and opening portions of the refuge to the State’s youth and fall turkey hunts.

*Fishing*—The refuge does not have jurisdiction over canal waters, but can provide access to the canals for the purpose of fishing. Under this alternative, access to fishing areas along the canal would be increased by adding at least two fishing access sites. An annual Family Fishing Day and other outreach tools would further promote the refuge’s fishing program and increase opportunities for visitors to experience the refuge via a long-standing American tradition.

*Wildlife Observation and Photography*—Under this alternative, there would be increased and higher quality opportunities for observing and photographing wildlife. Alternative B proposes that we work toward meeting the increased demand for opportunities to observe wildlife by constructing additional trails, observation areas, and photography blinds, as well as extending the Wildlife Drive. We would allow limited pedestrian use of the Wildlife Drive. We would also work to better orient, inform, and guide the visiting public, and help create a more fulfilling wildlife observation and photography experience through a variety of means, including additional roving naturalists and trailhead kiosks, and working with the established Friends photography club to increase use by photographers.

*Environmental Education, Interpretation, and Outreach*—This alternative would result in increased and higher quality environmental education and interpretive programs. Indirect benefits would include a greater understanding by the public of the importance of the refuge and

its management. There would be increased and more focused outreach resulting in a greater awareness of the refuge, the refuge System, and the Service. The construction of a new visitor contact station would create better opportunities for environmental education and interpretation. The outdoor pavilion/amphitheater would further benefit environmental education and interpretive programs. Partnerships would continue to offer increased outreach and programming opportunities, facilitating public awareness and understanding of the refuge.

### **Adverse Impacts**

*Demand and Access*—As above, the level and means of use resulting from the expected increase in visitation would change the overall experience for some visitors. That could result in them changing their patterns of activity or site preferences due to issues of crowding or behavior. The addition of new lands acquired within the approved acquisition boundary may lead to increased use by visitors and further impact the quality of experience for some visitors.

Newly created observation areas or photography blinds may be closed to the public during white-tailed deer hunting season and would be evaluated on a case-by-case basis. Esker Brook and South Spring Pool Trails would remain closed during the white-tailed deer hunting season (approximately November 1 through mid-December). This would limit some public use opportunities for other visitors. However, fall migration is best observed at other areas within the refuge and minimal adverse impacts are expected. The area around headquarters, the Seneca Trail, and the visitor contact station would be closed to all other uses during the late archery deer season.

The construction of a new visitor use and administrative facility may place a burden on visitors due to the noise and increased use of mechanized equipment.

*Hunting*—Hunting would continue to be prohibited along the Wildlife Drive, including the proposed Oxbow Trail, in October and November when the waterfowl migration is at its peak and use by wildlife observers and photographers is high. To accommodate fall birders who desire upland walking trail experiences, Esker Brook and South Spring Pool Trails would continue to remain open for wildlife observation, photography, environmental interpretation and education and closed to hunting until November 1 each year. From November 1 through the rest of the white-tailed deer hunting seasons, the Esker Brook and South Spring Pool Trails would be closed to visitors, except to hunters with a valid refuge deer hunting permit, as has been the case historically on the refuge. The fall turkey hunt would occur simultaneously with the deer hunt program, which could result in conflicts between deer and turkey hunters. We would control the number of hunters by issuing limited numbers of special use permits. Numbers of permits would be based on refuge area and are intended to minimize conflicts between users. If we receive comments or complaints about user conflicts, we would investigate and adjust refuge programs as needed.

*Fishing*—Impacts would be similar to those discussed in “Impacts on Public Use and Access Common to All Alternatives.”

*Wildlife Observation and Photography*—We may enact seasonal closures to ensure the safety of nonconsumptive users, as well as the quality of both programs. There may be unavoidable

adverse effects on the site and its existing visitation as well, primarily during the actual construction of the facilities. Our practices and precautions to safeguard visitors, such as prior notification of construction activities, would mitigate those effects somewhat. Adverse effects generally would be short-term and more than offset by the long-term gains in public awareness and support of refuge resource programs.

*Environmental Education, Interpretation, and Outreach*—Our increased education and interpretation programs may adversely impact some users who prefer our existing level of visitor use activities. These programs would most likely lead to increased visitation and larger groups of visitors at the refuge at any given time, which may reduce the quality of experience for other users.

## **Impacts on Public Use and Access of Alternative C (Less-active Habitat Management)**

### ***Benefits***

*Demand and Access*—Under alternative C, the refuge would increase opportunities in our public use programs compared with alternative A, but not to the same extent as detailed in alternative B.

*Hunting*—Under this alternative, the expanded hunts proposed in alternative B would be implemented. This alternative proposes to implement alternative B and further expand the hunt program by administering a spring turkey hunt.

*Fishing*—There would be increased access to fishing areas as described in alternative B.

*Wildlife Observation and Photography*—Opportunities for wildlife observation and photography would increase compared to alternative A, but could change compared to alternative B as a result of changes in habitat management proposed under alternative C.

*Environmental Education, Interpretation, and Outreach*—Environmental education and interpretation programs would benefit from an expanded visitor services facility and the outdoor environmental education and interpretation facility.

### ***Adverse Impacts***

*Demand and Access*—The area around headquarters, the Seneca Trail, and the visitor contact station would be closed to all other uses during the late archery deer season. The impacts would be similar to those discussed in the previous sections.

*Hunting*—Impacts to hunting under alternative C would be similar to those stated above for alternative B. However, waterfowl hunting would likely decrease due to lack of emergent marsh habitat.

*Fishing*—Impacts are the same as those described in alternative B.

*Wildlife Observation and Photography*—Impacts would be similar to those discussed in alternative B. Expansion of the refuge’s hunt program to include turkey hunting may conflict with these user groups.

*Environmental Education, Interpretation, and Outreach*—Impacts would be similar to those discussed in alternative B. Expansion of the refuge’s hunt program to include turkey hunting may require redistribution of funds that support these programs and diminish their quality.

## **Effects on the Socioeconomic Environment**

We evaluated the socioeconomic effects in terms of the degree to which the proposed alternatives might affect the local economy, social structures, or quality of life of the local communities. To do this, we considered changes in

- jobs and income to the local community from changes in refuge staffing;
- jobs and income from temporary construction work on the refuge;
- expenditures in the local economy from changes in public uses of the refuge; and
- availability of opportunities for recreation that are in demand by the public.

### **Impacts on Socioeconomic Environment Common to All Alternatives**

#### ***Benefits***

Under each alternative, the refuge would provide socioeconomic benefits by providing wildlife-dependent recreational opportunities and through the contribution of money to local economies through the following processes:

- Purchasing of goods and services within the local community for refuge operations
- Spending of salaries by refuge personnel
- Spending in the local area by refuge visitors
- Purchasing additional refuge land

#### ***Adverse Impacts***

In our current approved acquisition boundary of 19,510 acres, approximately 244 parcels remain in private or other ownership and would potentially be available for purchase (fee title or conservation easement) from willing sellers. Acquisition of property by the Federal Government would effectively remove these properties from the local tax base. As long as the Refuge Revenue Sharing Act (16 U.S.C. 715s, as amended) is in effect, the Service would continue to somewhat offset the tax losses by making an annual payment in lieu of taxes to the local governments. The amount of this payment is determined by Congress each year; however, recent payments to local governments have not equaled losses in tax revenue and we expect these payments to have negligible effect on the local governments’ budgets.

## **Impacts on Socioeconomic Environment of Alternative A (Current Management)**

### ***Benefits***

Currently, more than 149,000 visitors annually come to the refuge. Over the 15-year plan, this could increase to approximately 224,000 per year, based on an average 4.4 percent annual rate of increase. They would continue to contribute to the local economy through consumption of goods and services, equipment rentals, and other expenditures associated with recreational opportunities made available on the refuge. In addition, refuge staff (eight full-time employees) and work-related expenditures would continue to contribute to the local economy. Under this alternative, these recurring costs associated with salaries and annually completed refuge projects would total approximately \$1.2 million per year, and some percentage of this would be spent in the surrounding area. A detailed analysis and discussion of how money associated with national wildlife refuges makes its way through local economies can be found in “Banking on Nature 2006: The Economic Benefits to Local Communities of National Wildlife refuge Visitation” (Carver and Caudill 2007). They estimated that, on average, approximately four dollars were generated in the local economy for every dollar spent by the Service.

### ***Adverse Impacts***

Adverse impacts of alternative A are the same as those discussed under “Impacts on the Socioeconomic Environment Common to All Alternatives.”

## **Impacts on Socioeconomic Environment of Alternative B (Service-preferred)**

### ***Benefits***

Increase in refuge visitation to nearly 224,000 visits over the course of the plan would increase expenditures in the local economy. Furthermore, an additional six full time staff would make a small contribution to employment and income in the local community. If fully funded, recurring salary and project costs would approximate \$1.8 million annually. The construction of a new administrative and visitor services facility would temporarily provide several construction jobs to the local area, although it is expected to have a minimal effect compared to the region’s overall economy.

We would increase the refuge’s approved acquisition boundary by about 1400 acres. Individual willing sellers within the expansion area would benefit from our purchase of their lands, and there would be one-time benefits to local governments from taxes and real estate fees associated with these sales.

Refuges provide many benefits to local economies in addition to tourism dollars. Property values and associated property taxes often increase near open spaces, benefitting local communities (Gies 2009). In addition, land in public ownership requires little in the way of services from municipalities yet it provides valuable recreation opportunities for local residents.

Alternative B of the draft CCP plans to increase current staffing to 12 positions, by proposing six additional full-time refuge employees (including two refuge law enforcement officers) to meet the refuge’s proposed management requirements. If the refuge acquires all the new lands identified in the Land Protection Plan, these new lands would comprise approximately 13 percent

of the refuge lands. We estimate that staff time needed to manage refuge lands would be divided roughly proportionally among refuge lands, in other words about 13 percent of refuge staff time would be used to manage these lands.

### ***Adverse Impacts***

The potential adverse impacts include the loss of tax revenue related to the expansion of the acquisition boundary.

## **Impacts on Socioeconomic Environment of Alternative C (Less-active Habitat Management)**

### ***Benefits***

Under this alternative, there would be four full time staff positions added to current levels. Benefits would be similar to those under alternative B, with an annual recurring cost estimated at \$1.5 million and four full time staff positions added to current levels. The expansion of the visitor contact station by 25 percent would temporarily provide some construction jobs to the local area, although it is expected to have a minimal effect compared to the region's overall economy. Benefits of the proposed expansion of the acquisition boundary would be the same as described in alternative B.

### ***Adverse Impacts***

As with alternative B, potential adverse impacts include the loss of tax revenue related to the expansion of the acquisition boundary.

## **Cumulative Impacts**

According to the CEQ regulations on implementing NEPA (40 CFR 1508.7), a cumulative impact is the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes the other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over time. This cumulative impacts assessment includes the actions of other agencies or organizations, if they are interrelated and influence the same environment. Therefore, this analysis considers the interaction of activities at the refuge with other actions occurring over a larger spatial and temporal frame of reference.

### **Air Quality**

We expect there to be cumulative positive effects on air quality through the restoration of habitats. Although the refuge would continue to use prescribed fires for maintaining certain habitats, we anticipate that air quality impacts associated with those actions would be temporary and localized.

With respect to climate change, we believe that the refuge would be a net carbon sink over the 15-year planning period, with alternative C likely having the greatest sequestration capacity due to the conversion of impounded wetlands and grasslands to forest. The amount of carbon that

would potentially be released by the refuge as a result of associated energy use was not estimated for this EA. However, under each alternative, the refuge would continue to lower its carbon emissions. As we work to implement many of the strategies for achieving Service-wide carbon neutrality by 2020 (USFWS 2010b), refuge energy use is expected to decline. These actions would include conversion to hybrid vehicles, upgrading energy efficiencies in facilities, video-conferencing, and green purchasing. These actions, combined with those of other Service offices and the Federal government in general, would likely result in a beneficial reduction in the rate of greenhouse gas emissions nationally.

In terms of preparing for the predicted impacts of climate change, each management alternative, but especially alternatives B and C, would contribute to increasing resiliency and redundancy in the landscape. They incorporate strategies that improve the ability of an area to adapt to more extreme weather events and shifting climate zones which are important components of the response to this crisis, as recommended in various regional, national, and international reports:

- *Confronting Climate Change in the Great Lakes region: Impacts on our Communities and Ecosystems* (Kling et al. 2003)
- *Draft Strategic Plan for Climate Change* (USFWS 2009b)
- *Preliminary review of adaptation options for climate-sensitive ecosystems and resources.* (U.S. Climate Change Science Program 2008)
- *Climate Change 2007: Impacts, Adaptation and Vulnerability* (International Panel on Climate Change 2007)

Some of these strategies (which are proposed under various alternatives in this draft) include increasing connections between wetlands and waterways to improve their ability to withstand frequent floods and droughts; minimizing or reversing habitat fragmentation (on the scale of the refuge and regionally, such as through offsite habitat improvements in conjunction with partners); and improving water quality.

### **Hydrology and Water Quality**

We anticipate that there would be positive cumulative impacts on water quality as a result of acquiring new lands. By converting agricultural lands and other areas to conservation use, we diminish the likelihood that these sites would contribute to water degradation. Under alternative C, where possible, we intend to reestablish natural hydrology by breaching/removing farm dikes.

We predict no major, adverse, cumulative impacts on water quality under any of the alternatives. We would use best management practices on any roads, trails, or other infrastructure construction sites to ensure potential impacts are avoided or minimized.

### **Soils**

The greatest past adverse impacts on refuge soils occurred from agriculture and construction of the canal system, while the most significant impact at the present time is largely due to recreational activities. We would improve watershed soil conditions and minimize site-level soil impacts by restoring the vegetation of developed sites, roads and trails; limiting recreational use to designated trails; employing best management practices on restoration and construction sites;

collaborating in protecting land with important habitats; and exchanging technical information with landowners throughout the watershed and region.

We would accomplish this to some degree under alternative A. Under alternatives B and C, we propose a wide range of restoration and mitigation practices to improve soil conditions, such as reforestation of several tracts of land. Any forest management that would take place would be done so that all BMPs are followed and monitored closely. All projects are few, and dispersed on the refuge, so their local effects would not be additive.

## **Biological Environment**

Each of the alternatives would maintain or improve biological resources on the refuge and in the MWC. The combination of our management actions with our State, Federal, nongovernmental organizations, and university partners would likely result in significant, beneficial cumulative effects by: increasing protection and management for federally and State-listed, threatened or endangered species and other species of conservation concern; protecting sensitive wetland habitats; reducing invasive species; and improving water quality.

Habitat improvements under the alternatives should benefit rare or declining species and species listed as threatened or endangered. In particular, we target migrating waterfowl, migrating shorebirds, breeding marshbirds, bald eagles, and songbirds. Invasive species monitoring and control efforts would limit the spread of these exotics.

Under each alternative, we would continue to allow activities (hunting, fishing, furbearer management) that result in the direct loss of individual wildlife. While hunting and fishing fall under the priority public use category, we authorize trapping as a management tool. We describe the site-specific impacts of these programs earlier in this chapter and in “Appendix B, Findings of Appropriateness and Compatibility Determinations” and “Appendix E, Montezuma NWR Hunt Program EA.” In our professional judgment and experience, we do not think those programs would cause a significant cumulative effect on the respective populations of the wildlife species harvested, for reasons discussed below.

Under the Migratory Bird Treaty Act, the Service regulates the take of migratory birds through Migratory Bird Hunting Frameworks. These guidelines provide season dates, bag limits, and other options for the states to select that should result in the level of harvest determined to be appropriate based upon Service-prepared annual biological assessments detailing the status of migratory game bird populations. More details on the current population status of migratory waterfowl and other game species is provided in annual monitoring reports made available by the USFWS Migratory Bird Program (USFWS 2010d). The refuge adopts State bag limits, although it has the option to be more restrictive, if deemed necessary. Because seasonal bag limits are set at what are believed to be sustainable levels based on annual national and regional population data, as well as other factors, hunting of waterfowl on the refuge would not be expected to have a significant cumulative impact on the populations of those species.

In much of the Northeast, deer populations continue to increase and have reached densities in some areas that are above the carrying capacity of the habitat. A deer harvest is essential in helping to maintain the herd at or below the carrying capacity of its habitat. When deer

overpopulate, they overbrowse their habitat, and can completely change the species composition of a forest, in addition to reducing its overall biodiversity (Côté et al. 2004). Tree seedlings can be killed by over browsing, limiting recruitment. The failure of forests to regenerate due to overbrowsing by deer would have negative impacts on future resident and migratory populations of native wildlife, including deer. Overbrowsing by deer can also affect nesting songbirds in upland areas. A study conducted in Pennsylvania showed that both species diversity and abundance declined in areas with high densities of deer as a result of reduced nesting habitat (deCalesta 1994). Additionally, deer overpopulation can lead to outbreaks of devastating diseases such as hemorrhagic disease, bluetongue, and chronic wasting disease. Furthermore, overpopulation leads to starvation, more numerous car-deer collisions, and poorer herd health overall (Northeast Deer Technical Committee 2009). Regulated hunting has proven to be an effective deer population management tool and has been shown to be the most efficient and least expensive technique for removing deer and maintaining deer at desired levels (Northeast Deer Technical Committee 2009).

Deer have restricted home ranges and local hunting efforts would not affect regional populations. The refuge is in WMUs 8J, 8F, and 7F. State deer density estimates for this region are approximately 20 per square mile and have been increasing across New York State in the last few years, based on harvest data (<http://www.dec.ny.gov/>). Based on the refuge's total acreage, there are approximately 300 deer inhabiting refuge lands. However, the refuge's population is likely higher due to the amount of dense cover available to deer. Furthermore, the deer population in the vicinity of the refuge is still considered higher than optimal, indicating that current hunting levels are not affecting the population substantially (NYSDEC 2009). This information confirms that decades of deer hunting on the refuge and surrounding private lands has not had a local cumulative adverse effect on the deer population. Therefore, continuing to allow hunting or increasing the deer harvest on the refuge should not have negative cumulative impacts on the deer herd; but instead, should support better overall herd health and maintain or increase habitat biodiversity.

Furbearers would continue to be trapped with the aim of managing habitat and protecting impoundment infrastructure. NYSDEC monitors furbearer populations and regulates trapping seasons to ensure the continued health of these populations. As a result, their regulated take is not anticipated to affect regional or national levels. No cumulative impacts are expected. Some positive effects include maintenance of hemi-marsh conditions, which benefits waterfowl and breeding marshbirds. Furthermore, damage to dikes and other refuge infrastructure caused by muskrat and beaver would be minimized.

Fishing would not have a significant cumulative impact on the species taken. The refuge does not have jurisdiction over canal waters, only access to them. Fished species consist of locally reproducing populations and their take would not comprise a regional impact.

Priority public use opportunities that do not include the direct take of fish and wildlife (wildlife observation and photography and environmental education) would continue under each alternative. Each of these activities has some level of disturbance to wildlife associated with them, even though they occur on a relatively limited area of the refuge (trails, overlooks, Wildlife Drive, etc.). Breeding and nesting birds can be affected, affecting productivity.

Likewise, resting or foraging birds that are using the refuge during their migration could also be disturbed, negatively affecting their energetics. During migration, birds have limited energy (fat) reserves and a reduction in resting or foraging opportunities due to human disturbance can increase their risk of mortality due to exhaustion or starvation. However, cumulatively, these impacts are not expected to be significant as levels of disturbance are expected to be of low intensity and limited in area, time, and scope. No more than 40 percent of the refuge can be open to waterfowl hunting.

There would be no significant cumulative adverse effects to biological resources under any of the alternatives because the changes in habitat components that we would manage for directly or expect to realize through natural succession would provide beneficial effects. Biological resources that we would manage to prevent their introduction, limit, or eliminate, such as invasive plants, are not natural components of the Montezuma Refuge ecosystem. Losses of those biotic components where they occur would not be considered adverse.

### **Socioeconomic Environment**

Cumulative impacts on the socioeconomic environment are not expected to be significant under any of the alternatives. Potential benefits may include revenue sharing payments, refuge spending, and promoting ecotourism, in addition to increased hunting that may bring additional visitors.

Implementing any of the alternatives would result in several minor beneficial impacts on the social communities near the refuge and in the region as a whole. We would expect public use of the refuge to increase, thereby increasing the number of days visitors spend in the area and, correspondingly, the level of visitor spending in the local community. There would be minor benefits affiliated with revenue sharing payments, refuge spending, and promoting ecotourism opportunities under alternative B. Fully funding the additional staff in alternatives B and C would also make a small, incremental contribution to the employment and income in the local community.

We expect none of the three proposed alternatives to have a significant adverse cumulative impact on the economy of the towns or counties in which the refuge lies. We would expect none of the alternatives to alter the demographic or economic characteristics of the local community. The actions we propose would neither disproportionately affect any communities nor damage or undermine any businesses or community organizations. The land acquisition we propose would involve only willing sellers, and would spread among three counties and approximately 1,421 acres. All of the alternatives would maintain the rural landscape. Consequently, no adverse impacts would be associated with changes in the community character or demographic composition.

The current approved acquisition boundary of 19,510 acres is the result of the executive order that created the refuge, a major expansion of the boundary as detailed in an environmental impact statement conducted by the Service with NYDEC acting as a co-lead agency (USFWS and NYSDEC 1991), and several minor expansions which were conducted via NEPA Categorical Exclusions. The 1991 EIS was prepared for the expansion of existing lands managed by the Service and the NYSDEC. The EIS provided a preferred alternative, of five that were

presented for public review, which proposed a joint USFWS and NYSDEC 50,000-acre acquisition area and a division line between the Federal area of interest and the State area of interest. The USFWS acquisition boundary was formalized through a Land Protection Plan which was approved in 1994 (USFWS 1994). The proposed expansion area is an adjustment of this designation. The PEA is located within the area originally identified for NYSDEC acquisition.

We believe there would be an overall positive effect on the socioeconomic environment as a result of the action outlined in the LPP (appendix F). Were the Service to buy most of the lands in the PEA, positive benefits for communities in New York would include: towns benefiting from increased property values, increased watershed protection, maintenance of scenic values, and increased revenues for local businesses from refuge visitors who participate in bird watching, hunting, fishing, and wildlife observation.

Various objectives in alternatives B and C would have varying degrees of impact on the recreational use of the refuge. Earlier sections detailed specific impacts on individual uses, such as hunting, fishing, and observing or photographing wildlife. Increased hunting opportunities under alternatives B and C may also draw additional visitors. Cumulatively, each alternative has a different economic impact since it affects the level of public use. The table at the end of this chapter summarizes those cumulative impacts by alternative. Each alternative takes a different approach to managing the variety of recreational uses on the refuge, ranging from the status quo (alternative A) to an integrated approach (alternative B) that seeks to conserve wildlife and habitat while providing diverse recreational opportunities for visitors.

These varying alternatives would have cumulative impacts, because we expect the demand for nearly all recreation to grow while the amount of refuge space and natural resources stays relatively constant. In alternative A, current uses would continue without much change. Alternatives B and C strive to maintain a reasonable balance to ensure that the refuge remains a popular destination of choice for both wildlife and people. If successful, that integrated approach may prove more sustainable, with more positive, long-term impacts on natural resources on the refuge, and social and economic impacts on the communities in the area. Although budgets are impossible to predict, if an increase came from existing allocations, it could affect operating funding at other refuges and wetland management districts in the region. That would delay or forego habitat and facility improvements and other work in the region.

Our working relationships with the NYSDEC, area colleges and universities, and private landowners and others should improve in terms of the responsiveness to inquiries and joint projects under all alternatives. That improvement mainly would result from the increased staffing under alternatives B and C in key areas, such as biology, public use, and maintenance. The overall coordination and communication with the public should improve under alternatives B and C, because the addition of two park rangers would deal with public use and disseminating public information. Although some may oppose changes in one or more of the alternatives, or support them, the cumulative impact on the public perception of the refuge and the Service could be negative or positive.

More emphasis on public education and information in alternatives B and C should foster more understanding and appreciation of resource issues and needs, and could lead to increased political support and funding, which could positively affect fish and wildlife resources in the refuge and the MWC. The increased outreach of these alternatives could also positively affect land use decisions outside the refuge by local governments and private landowners, and thus, lead to increased fish and wildlife populations over a broader area.

### **Cultural and Historic Resources**

As stated previously in this chapter, we will comply with all applicable State and Federal laws and mandates protecting cultural and historic resources on the refuge. All of the activities proposed in this document will comply with Section 106 of the National Historic Preservation Act and other applicable regulations in order to avoid impacts to significant cultural resources. For these reasons, no cumulative impacts are expected.

## **Relationship between Short-term Uses of the Human Environment and the Enhancement of Long-term Productivity**

NEPA Section 102(C)(iv) (CEQ regulations Part 1502.16) requires Federal agencies to disclose the relationship between local short-term uses of the human environment and the maintenance and enhancement of long-term productivity. The Service expects that the proposed alternatives would lead to long-term productivity through the life of the CCP (15 years). This discussion focuses on the tradeoffs between short-term environmental costs and long-term environmental benefits.

In this section, we consider the relationship between local, short-term uses of the human environment and maintaining the long-term productivity of the environment. By long-term, we mean that the impact would extend beyond the 15-year period of this plan.

Under all of the alternatives, our primary aim is to maintain or enhance the long-term productivity and sustainability of natural resources on the refuge, in the MWC, and migratory birds and other far-ranging species, across the whole range of each of the species.

Habitat protection and restoration actions across all alternatives often entail short-term negative impacts to ensure the long-term productivity of the refuge. Many of the cyclic management actions in the alternatives, namely impoundment drawdowns, prescribed burning, controlling invasive plants and animals, and managing grasslands, can have dramatic short-term impacts. Those include the direct mortality of some plants and animals, the displacement of species, and the temporary displacement or cessation of certain types of public use. However, the near-term and long-term benefits of those actions offset their short-term impacts, practices that often mimic the natural and thus sustainable processes necessary for long-term habitat health. We describe many of them in more detail earlier in this chapter, under their applicable issues or concerns.

As we discussed in previous sections, the short-term disruption that habitat management causes in the current means, locations, and timing of public uses, should, in the long term, help sustain the greatest diversity of opportunity for the greatest number of people. In addition, diverse

opportunities for public use should provide the best long-term positive economic impact on local communities. That mirrors the widely accepted premise that maintaining diversity in natural systems helps ensure their long-term resiliency. We would design our proposed programs in outreach and environmental education to explain our actions and what some may perceive as inconveniences to visitors may encourage visitors to be better stewards of our environment.

The dedication of refuge lands for new visitor facilities, Wildlife Drive, trail and fishing access facilities represents a small loss of long-term productivity in a few localized areas, but we do not consider it significant, given the comparative size of the refuge and the expected net gain of these additions.

In summary, we predict that the alternatives would contribute positively in maintaining or enhancing the long-term productivity of the environment with minimal inconvenience or loss of opportunity for the American public.

## **Unavoidable Adverse Effects**

Unavoidable adverse effects are the effects of those actions that could cause harm to the human environment and that cannot be avoided, even with mitigation measures. All of the alternatives would result in some minor, localized, unavoidable adverse effects. For example, constructing a new administrative facility and visitor contact station and burning prescribed fires to maintain grasslands would produce minor, short-term, localized, adverse effects. The loss of property tax by local taxing authorities and increased visitation could have unavoidable adverse effects. However, we do not believe that any of these effects would rise to a significant level.

Many of the habitat management and facility construction projects in the alternatives have a certain level of unavoidable adverse effects, especially during the actual construction. Those effects are mitigated to some degree by the use of best management practices and precautions that safeguard water quality, avoid sensitive or irreplaceable habitats, or time the actions or include features to avoid or minimize impacts on fish and wildlife. The adverse effects generally are short-term and more than offset by the long-term gains in habitat quality and fish, wildlife, and plant productivity.

All of these unavoidable adverse effects on the physical and biological environment would be relatively local and more than offset by the long-term benefits for the diversity and ecological health of the broader landscape.

We do not anticipate significant adverse socioeconomic impacts from refuge management. Refuge land acquisition entails unavoidable impacts on local units of government, most noticeably due to the loss of tax revenue as ownership changes from private to public. Without knowing the specific appraised values of land to be acquired, the associated loss in local property tax revenue for each of the potentially affected counties cannot be determined. There would likely be some adverse impacts as a result of the proposed land expansion under alternatives B and C, namely a decline of tax revenue to local towns (as lands come under Service ownership). This would be the case under NYSDEC ownership as well; therefore, potential impacts would be the same as those identified in the 1991 EIS (USFWS and NYSDEC 1991). Land is acquired

from willing sellers, usually over the course of several years, so abrupt changes in tax revenue associated with Service land acquisition are not anticipated. In addition, the refuge Revenue Sharing Act of June 15, 1935 (16 U.S.C. §715s) partially offsets the loss of local tax revenues from Federal land ownership through payments to local taxing authorities. The actual refuge revenue sharing payment does vary from year to year, because Congress may or may not appropriate sufficient funds to make full payment. With respect to Montezuma NWR, recent revenue sharing payments to local towns have been less than what property taxes would have yielded. However, after considering potential benefits to the local economy associated with refuge visitation discussed under “Cumulative Impacts on the Socioeconomic Environment” above, we believe there would be a net positive effect to the region.

All of the alternatives, in varying degrees, would have adverse impacts on a segment of the public that does not desire any change in our current public use programs and regulations or may have differing views on the course of action. Some people may be concerned about increased visitation to the refuge. Others may become concerned as we open new tracts for public use adjacent to their property.

Some impacts on certain individuals or neighbors are unavoidable, but our responsibility is to provide equal opportunities to the American public, not a select few. We believe we have sought a fair balance in minimizing and mitigating adverse impacts while providing quality recreational opportunities to the public. All of what we propose in the arena of public use results from public involvement and input during the planning process.

## **Potential Irreversible and Irretrievable Commitments of Resources**

NEPA Section 102(C)(v) (CEQ regulations Part 1502.16) requires Federal agencies to consider any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

Irreversible commitments of resources are those that cannot be undone, except perhaps in the extreme long term. One example is an action that contributes to a species’ extinction. Once extinct, it can never be replaced and is an irreversible loss. By comparison, irretrievable commitments of resources are those that are lost for an extended period of time, but could be undone given sufficient time and resources, although there may be a loss in productivity or use for a time. An example of an irretrievable commitment is converting what was once a mature forest and actively managing and maintaining it in an early successional forest habitat condition. If, for some reason, that early successional forest habitat was no longer an objective, those acres could progress gradually to mature forest again over a period of 70 or more years, or we could determine it best to expedite that reversion by planting shrubs and trees and controlling invasive plants.

We do not believe there are any actions proposed under any alternative that are irreversible. With regards to irretrievable actions, only a few examples fall into this category and primarily relate to the construction of administrative and visitor facilities, such as buildings, roads and trails. They are considered irretrievable because in the future, any facility we construct could potentially be dismantled and the site restored; however, while standing, they represent a loss in habitat

productivity. For example, alternatives B and C include plans to construct or expand existing structures, as well as construct additional trails, observation towers, fishing docks, pulloffs, and photography blinds. We describe the site-specific impacts of those actions earlier in this chapter. Based on the impact footprints of those facilities, in comparison to other developments in this rural landscape, and coupled with the benefits we believe would result from engaging the community and visitors in natural resources, we do not believe significant cumulative impacts would occur.

## **Environmental Justice**

President Clinton signed Executive Order No. 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations” on February 11, 1994, to focus Federal attention on the environmental and human health conditions of minority and low-income populations, with the goal of achieving environmental protection for all communities. The order directs Federal agencies to develop environmental justice strategies to aid in identifying and addressing disproportionately high, adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. The order is also intended to promote nondiscrimination in Federal programs substantially affecting human health and the environment, and to provide minority and low-income communities access to public information and participation in matters relating to human health or the environment.

Overall, we expect none of the alternatives would place disproportionately high, adverse environmental, economic, social, or health effects on minority or low-income persons. Our programs and facilities are open to all who are willing to adhere to the established refuge rules and regulations, and we do not discriminate in our responses for technical assistance in managing private lands. Lastly, additional facilities proposed under alternatives B and C would be located on existing refuge lands, or newly acquired refuge lands, and are not expected to be located in a way that would disproportionately affect minority or low-income persons.

Table 4.3. Summary of Impacts Under Each of the Three Management Alternatives for Montezuma NWR.

Alternative A: Current Management	Alternative B: Service-preferred	Alternative C: Less-active Habitat Management
<b>Effects on Land Use</b>		
<p>Land use would gradually change within the current acquisition boundary as agricultural lands are converted to conservation land.</p>	<p>Similar to alternative A except that more lands would be available.</p> <p>Lands currently used for cooperative farming would be restored to native plant habitat.</p>	<p>Same as alternative B.</p>
<b>Effects on Air Quality</b>		
<p>Current management activities neither substantially benefit nor adversely affect local and regional air quality.</p> <p>Minor long-term benefits in air filtration and carbon sequestration from protecting 9,184 acres of vegetated upland, riparian, and wetlands habitats.</p> <p>Continue energy efficient practices and adopt additional practices, such as hybrid vehicles.</p> <p>Limited ground disturbance activities and new emission sources would minimize impacts.</p> <p>Negligible adverse effects from prescribed burning on up to 363 acre/year to maintain grassland and control invasive species.</p> <p>Anticipated increase in annual refuge visits by motor vehicles would cause a minor increase in air emissions in the long term.</p>	<p>Long-term benefits for air filtering and carbon sequestration could increase under alternative B by acquiring up to 1,461 additional acres.</p> <p>Same energy efficient practices as in alternative A, which would extend to the new proposed visitor contact station and administrative facility.</p> <p>New trail, infrastructure, and other proposed projects would contribute to an increase in short-term adverse effects from emissions and dust during construction.</p> <p>A 50 percent increase in annual visitation over the next 15 years would result in more motor vehicles and higher emission levels than in alternative A.</p>	<p>Long-term benefits to improved air quality would be similar to alternative B, with a small increase as a result of allowing approximately 368 acres to succeed to forest.</p> <p>Same energy efficient practices as in alternative A, and with less adverse effects compared with alternative B from proposed facility expansion of 25 percent.</p>
<b>Effects on Hydrology and Water Quality</b>		
Impacts Common to All Alternatives		
<p>Acquisition of additional lands within the acquisition boundary and conservation of the existing 9,184 acres of upland forest, wetlands, and other lands within the refuge would further benefit water resources.</p>		

<b>Alternative A: Current Management</b>	<b>Alternative B: Service-preferred</b>	<b>Alternative C: Less-active Habitat Management</b>
<p>Impoundment management aims to reverse the adverse impacts on hydrology caused by the construction and maintenance of the canal system.</p> <p>We would continue to work with partners to complete our goal of protecting 19,510 acres within the approved acquisition boundary. In doing so, we would prevent their conversion to uses that may negatively affect water quality and hydrology.</p> <p>In managing the refuge, we would closely monitor and mitigate all of our routine activities that may result in the chemical contamination of water.</p>		
<p>Continued monitoring of water levels would allow the refuge to continually improve management of its impoundments. By comparing proposed water levels with actual recorded levels, the refuge can adapt its wetland management based on water availability.</p> <p>Continue to restore about 44 acres of refuge land to riparian forest.</p>	<p>Maintain and restore an additional 120 acres of riparian habitat. Benefits would be similar to those described under alternative A, but would be greater because more area would be restored.</p> <p>Removing or breaching the dikes at North and South Spring Pools would further restore the area's natural hydrology.</p> <p>Propose to work more closely with the NYS Canal Corporation to allow for more efficient management of the refuge's impoundments.</p> <p>There are higher risks of short-term adverse effects on water quality associated with new construction of trails, kiosks, observation areas, and expanding the Wildlife Drive, when compared to alternative A.</p>	<p>Hydrologic processes would be restored by breaching or removing farm dikes, thereby reducing the acreage of emergent marsh and increasing the acreage of forested wetlands.</p> <p>Offer additional flood plain forest to restore connectivity to existing hydrology. This could offer additional flood protection and could potentially improve water quality by increasing natural filtration, and reducing sediment loads in flood waters.</p> <p>Hydrological conditions on the refuge would be controlled by the NYS Canal Corporation for navigational and property protection purposes rather than for wildlife or to mimic natural hydrologic conditions.</p>
<b>Effects on Soils</b>		
Impacts Common to All Alternatives		
<p>We would continue to maintain native vegetation cover on the refuge that stabilizes and minimizes soils losses through erosion. Land protection efforts would continue to pursue acquisition of mucklands from willing sellers, which would greatly benefit soils. Construction and maintenance of dikes would continue in order to manage impounded wetlands, causing some soil disturbance.</p> <p>We would reserve the option to use prescribed fire, continue the use of herbicides, and allow hiking and walking on trails, all of which have potential to cause negligible direct or indirect impacts on soils. Regardless of the alternative selected, we would continue to use the best management practices.</p>		
<p>Short-term localized adverse impacts to soils would be expected where the refuge would plant native tree species in efforts to reforest agricultural lands</p>	<p>Increase long-term benefits to soils through reconnecting the hydrology in some areas, as well as from the acquisition of additional lands.</p>	<p>Impacts to soils would be similar to alternative A, however more acres would benefit from unimpounded wetlands.</p>

<b>Alternative A: Current Management</b>	<b>Alternative B: Service-preferred</b>	<b>Alternative C: Less-active Habitat Management</b>
and maintain continuity in forested tracts.	Minor short-term, localized soil compaction and long-term loss of productive soils where soils are removed or surfaced for visitor infrastructure and construction of visitor facilities.	Visitation and construction impacts to soils would be similar to alternative B, albeit on a smaller scale.
<b>Effects on Wetlands</b>		
Impacts Common to All Alternatives		
<p>We would implement our Habitat Management Plan for wetland habitats, and mitigate any potential for major unplanned changes in vegetation. We would continue to eradicate or control invasive species to protect wetland habitats on the refuge.</p> <p>A hunt and trapping program would maintain waterfowl, deer, and furbearer populations at levels compatible with the habitat and with refuge objectives. Continue to manage water levels in the refuge’s impounded wetlands to mimic natural hydrologic conditions and maintain an invasive species control program. Direct impacts affiliated with increased visitation would include minor damage or loss of vegetation due to opening areas to off-trail use (i.e., discovery areas, pulloffs, etc.). Indirect impacts could result from the activity of visitors trampling wetland vegetation, as well as potential impacts associated with habitat restoration or general Service activities.</p>		
<p><u>Emergent Marsh, Open Water, Shallow Water/Mudflats</u></p> <p>Continued management and protection of 4,275 acres of emergent marsh, open water, and mudflats.</p> <p>Continue using system of diked impoundments in order to restore this habitat type and promote the growth of annual or perennial wetland vegetation.</p> <p>Drawdowns and water level manipulations would continue to promote the growth of wetland plants.</p> <p><u>Bottomland Floodplain Forest</u></p> <p>Forested wetlands would to be maintained at 1,792 acres and the dike separating Unit 17 East and Unit 17 West would succeed to forest.</p> <p>Improve the quality of habitat through reforestation efforts and by no longer flooding the interiors of</p>	<p><u>Emergent Marsh, Open Water, Shallow Water/Mudflats</u></p> <p>Management of emergent marsh would continue to be the highest priority.</p> <p>Benefits are expected due to increased habitat restoration and invasive species control. About 126 additional acres would be restored.</p> <p>Emergent marshes would be maintained in a series of successional stages and increased data on water levels and bathymetry would allow for more informed decisionmaking.</p> <p>Improve communication efforts with NYS Canal Corporation regarding water level changes in the canal.</p> <p>There would be short-term, adverse effects due to increased restoration activities.</p>	<p><u>Emergent Marsh, Open Water, Shallow Water/Mudflats</u></p> <p>Refuge’s wetlands would be connected to the canal system and managed by the NYS Canal Corporation, resulting in lower water levels on the refuge and succession of emergent marsh to forested wetland.</p> <p>Compared to alternative A, about 1,428 acres of emergent marsh and open water would transition to forested habitat, which would result in 1,554 fewer acres of these habitat types.</p> <p><u>Bottomland Floodplain Forest</u></p> <p>The area of bottomland floodplain forest is expected to double to about 3,651 acres.</p> <p>The increased acreage of deer habitat and an expanded deer hunt would provide more habitat for</p>

<b>Alternative A: Current Management</b>	<b>Alternative B: Service-preferred</b>	<b>Alternative C: Less-active Habitat Management</b>
<p>Unit 17 East and West.</p> <p>Adverse impacts include the continued threat of invasive plants and overbrowsing by deer, as the current deer hunt does not maintain optimal deer population densities.</p> <p><u>Riparian Forest Corridor</u></p> <p>Riparian forests are expected to be maintained at 1,077 acres following continued reforestation of about 40 acres along the Seneca Trail area.</p> <p>Riparian forest corridors would gradually expand and become less fragmented as small areas are replanted.</p> <p>Negative impacts due to deer overbrowsing would likely continue.</p>	<p>Proposed construction projects (e.g., pulloffs, kiosks) would result in short-term, localized adverse effects.</p> <p>Minimal, adverse short-term impacts as a result of increased visitation and expanded hunting opportunities would be greatest under this alternative.</p> <p><u>Bottomland Floodplain Forest</u></p> <p>There would be additional benefits to forested wetlands as a result of 223 additional acres.</p> <p>The quality of habitat would benefit from reforestation efforts, an expanded deer hunt program, and additional biological staff.</p> <p>There would be short-term adverse effects from our efforts to control the emerald ash borer through planting native tree species.</p> <p>Short-term, adverse effects would be likely from breaching or removing dikes in Unit 17.</p> <p>The addition of a turkey hunt may increase the potential for adverse effects due to increased off-trail use during the hunting season.</p> <p><u>Riparian Forest Corridor</u></p> <p>Increase the acreage of the riparian forests by 120 acres, compared to alternative A.</p> <p>The quality of this habitat is expected to improve through a reduction in the deer herd.</p>	<p>deer and help decrease population densities.</p> <p>The addition of a turkey hunt may increase the potential for adverse effects due to increased off-trail use during the hunting season.</p> <p><u>Riparian Forest Corridor</u></p> <p>This alternative would result in the greatest acreage of riparian forest, with 1,251 acres.</p> <p>Adverse effects would be similar to those described above under bottomland floodplain forest.</p>
<b>Effects on Upland Habitats</b>		
Impacts Common to All Alternatives		
<p>We would use standard and effective habitat management techniques to conduct forest, shrubland, and grassland management activities in the refuge uplands.</p>		

<b>Alternative A: Current Management</b>	<b>Alternative B: Service-preferred</b>	<b>Alternative C: Less-active Habitat Management</b>
<p>Whenever feasible, we would replace nonnative plant species with native species to restore the ecological integrity of the refuge and our management actions would cause no major mortality or loss in local populations.</p> <p>We would continue a hunt program under all alternatives that includes the harvesting of white-tailed deer, in an effort to control the deer population on the refuge and minimize the negative impacts of overbrowsing.</p> <p>Visitors who participate in authorized uses on the refuge indirectly benefit upland habitats by improving their understanding and appreciation of these ecological communities and further supporting the mission and purpose of the refuge. Direct impacts of increased visitation would include minor damage or loss of vegetation. Indirect impacts could result from the activity of visitors trampling vegetation, as well as potential impacts associated with habitat restoration or general service activities.</p>		
<p><u>Forests</u></p> <p>Maintain upland forest acreage at about 563 acres by allowing artificial openings to succeed to forest and continuing reforestation efforts.</p> <p>Upland forest structure would benefit from increased heterogeneity and reduced fragmentation.</p> <p>There would continue to be adverse effects from invasive species and the current deer hunt program, which may not be sufficient to control the deer population and could lead to overbrowsing.</p> <p>Reforestation efforts may cause short-term impacts such as trampling vegetation and soil disturbance.</p> <p><u>Shrublands</u></p> <p>Continue to maintain about 401 acres of shrubland habitat by brush hogging or hydroaxing every 15 years.</p> <p>We do not have the resources to manage or monitor shrubland units as needed in order to provide the best possible habitat.</p> <p>Succession would be set back by infrequent mowing or hydroaxing entire units, resulting in a more homogenous vertical structure that would be considered less desirable habitat for many species.</p>	<p><u>Forests</u></p> <p>Beneficial impacts to forests would be greater due to increased restoration, invasive plant control, and increased white-tailed deer harvest.</p> <p>Work with NYSDEC to implement DMAP and improve the quality of forest habitats by reducing the impacts caused by deer overbrowsing.</p> <p>Additional biological staff would allow for more control of invasive species.</p> <p>Strategically focus reforestation activities to decrease edge and increase connectivity of forested tracts on the refuge.</p> <p>Adverse effects could increase as a result of constructing visitor and administrative facilities and expanding hunting opportunities.</p> <p>There would be 28 fewer forested acres that would be maintained as early succession habitat.</p> <p><u>Shrublands</u></p> <p>Units that would be maintained as shrublands are more suited to this habitat and would therefore provide high quality scrub-shrub species.</p> <p>We would focus more scrub-shrub habitat management on units where it does not increase</p>	<p><u>Forests</u></p> <p>Benefits to forest habitat would be greatest by allowing shrublands and grasslands to convert to forest, increasing the acres of forested habitat by nearly 70 percent compared to alternative A.</p> <p>This approach would benefit oak-hickory and beech-maple-basswood stands, but adversely impact early successional habitats.</p> <p>The use of heavy equipment would be reduced and there would be more opportunities to increase the recruitment of forest species and improve stand health.</p> <p>Potential adverse impacts to upland forests from increased visitor opportunities and expanded hunting opportunities which would be spread out over a larger area.</p> <p><u>Shrublands</u></p> <p>Natural succession would be allowed on 335 acres currently managed as shrubland, therefore the refuge would have 66 remaining acres to actively manage.</p> <p>The loss of potential rare plant communities and plant species would likely be an adverse effect.</p>

<b>Alternative A: Current Management</b>	<b>Alternative B: Service-preferred</b>	<b>Alternative C: Less-active Habitat Management</b>
<p>Direct adverse impacts would include the temporary loss of vegetation due to brush hogging, prescribed fires, or applying herbicides.</p> <p><u>Grasslands</u></p> <p>Maintain about 363 acres of grasslands in patches of 50 acres or more. The removal of hedgerows and small patches of shrubs and trees would create larger areas of contiguous grassland habitat.</p> <p>Direct benefits to grassland habitat include the reintroduction of native herbaceous and grass species in fields maintained in early succession.</p> <p>Prescribed burns would benefit grasslands by maintaining open areas, decreasing presence of trees and other woody vegetation, and encouraging growth of fire-adapted vegetation.</p> <p>Adverse impacts associated with habitat management activities include loss of nonfire adapted vegetation and loss of nontarget vegetation during herbicide application.</p> <p>Continued maintenance and restoration efforts would aim to increase native plants to levels where they become self-sustaining population sources.</p> <p>Adverse effects to grasslands include continued fragmentation due to the presence of hedgerows and treelines.</p>	<p>fragmentation.</p> <p>This alternative would result in a loss of 110 acres of shrubland compared to alternative A.</p> <p>Localized adverse effects from mowing include soil compaction, damage and loss of vegetation.</p> <p>There would be short-term adverse impacts from a new discovery area, such as loss of vegetation; however the location would be determined based on already disturbed areas.</p> <p><u>Grasslands</u></p> <p>Maintain about 287 acres of grassland habitat on the refuge, whose quality would improve from our efforts to remove hedgerows, decrease fragmentation, and increase species diversity.</p> <p>There would be a loss of about 76 acres of grassland habitat compared to alternative A. This loss would be negligible in the context of providing higher quality grassland units with less fragmentation.</p>	<p><u>Grasslands</u></p> <p>Only 68 acres would be maintained as grassland habitat; however, the two tracts would provide high quality habitat in locations ideally suited for obligate grassland breeding birds.</p> <p>The loss of grassland habitat would adversely impact grassland dependent wildlife, and the refuge would significantly reduce its part in sustaining this habitat type in the region.</p>
<b>Effects on Waterbirds</b>		
Impacts Common to All Alternatives		
<p>Waterbirds would benefit from our control of nonnative invasive species and the maintenance of native plant communities.</p> <p>The refuge would continue to offer a waterfowl hunt program which has negative effects on individual birds; however, bag limits and seasons are set to protect overall populations.</p>		

<b>Alternative A: Current Management</b>	<b>Alternative B: Service-preferred</b>	<b>Alternative C: Less-active Habitat Management</b>
<p>The use of herbicides may adversely impact waterfowl; however, we would spray when waterfowl have completed their breeding cycle and implement best management practices to reduce this possibility.</p> <p>An increase in visitation is likely to occur under any alternative. The impacts of recreation on waterbirds are well-documented and disturbance to these species include displacement, higher occurrences of flushing, and general avoidance.</p>		
<p><u>Waterfowl and Marshbirds</u></p> <p>Numerous bird species would benefit from the restoration of 182 acres of emergent marsh, open water, and mudflat habitat.</p> <p>We would continue to manage water levels in refuge wetlands within diked impoundments to mimic natural hydrologic periods or to provide optimal habitat for focal waterbird species.</p> <p>Plan accordingly for maintenance and construction projects of the impoundments when use by waterfowl is relatively low.</p> <p>Drawdowns of each impoundment would occur every 3 to 7 years and would potentially displace some waterfowl.</p> <p><u>Shorebirds</u></p> <p>Continue to benefit interior migrating shorebirds by providing about 100 acres of resting and foraging habitat.</p>	<p><u>Waterfowl and Marshbirds</u></p> <p>Work to improve the control and flow of water so it directly benefits the quality of emergent marsh and the waterfowl and marshbirds dependent on it.</p> <p>Birds would benefit from an increase of 126 acres more of emergent marsh, 233 additional acres of bottomland floodplain forest, and 120 acres more of riparian forest in which to breed, forage, and rest.</p> <p>Birds would be adversely impacted by an increase in visitor use opportunities. Bicycle and pedestrian use of the Wildlife Drive would only be allowed during low wildlife use periods.</p> <p><u>Shorebirds</u></p> <p>Additional habitat restoration efforts would benefit shorebirds.</p> <p>Work closely with the NYS Canal Corporation to improve the quality of emergent marsh habitat by not flooding impoundments more than 4 continuous months prior to shorebird migration.</p> <p>There would be some minimal adverse impacts on American woodcock populations.</p>	<p><u>Waterfowl and Marshbirds</u></p> <p>The continued management of the Main Pool and Tschache Pool as emergent marsh would provide habitat for migrating waterfowl and breeding marshbirds.</p> <p>Emergent marsh acreage would decline by 1,391 acres compared to alternative A, and 1,523 acres compared to alternative B. This would adversely impact migrating waterfowl by reducing the preferred habitat.</p> <p><u>Shorebirds</u></p> <p>Continued management of the Visitor Center Wetland would benefit shorebirds.</p> <p>Adverse impacts would be similar to those under alternative B; however we expect a greater displacement of bird species as a result of the loss of emergent marsh habitat.</p>
<b>Effects on Landbirds</b>		
Impacts Common to All Alternatives		
<p>We would continue implementing our habitat management objectives which would directly benefit landbird species by improving the quality of habitat, areas in which to nest and forage, and further protection from loss of habitat to development.</p>		

<b>Alternative A: Current Management</b>	<b>Alternative B: Service-preferred</b>	<b>Alternative C: Less-active Habitat Management</b>
<p>The addition of new visitor infrastructure would be strategically located to minimize any adverse effects on landbirds. The expected increase in visitation could have additional adverse impacts on landbirds; however, we would take all measures necessary to mitigate potential negative impacts.</p>		
<p><u>Raptors</u></p> <p>Protection of nesting and roosting areas, and the availability of open water would further benefit bald eagles by providing foraging habitat.</p> <p>Management efforts to maintain a mixture of open and forested habitat benefit raptors by providing both hunting and nesting areas.</p> <p>Continue to focus on early successional habitat to provide quality habitat for short-eared owl and northern harriers.</p> <p>Due to continued forest fragmentation, the northern goshawk would likely continue to be rare on the refuge.</p> <p>A lack of resources would continue to limit efforts to improve early successional habitat, and therefore the needs of short-eared owls and breeding northern harriers.</p> <p><u>Migratory Songbirds</u></p> <p>Current management would restore some agricultural lands to forested habitats, providing benefits to forest species.</p> <p>Maintaining 400 acres of shrubland would meet the needs of landbirds of conservation concern.</p> <p>Providing larger areas of contiguous grassland would support many birds of conservation concern. There would be some reduction of predation on grassland birds by mammals and raptors from the removal of hedgerows.</p> <p>Negative impacts to landbirds due to continued reduction of the vegetation's physical structure and</p>	<p><u>Raptors</u></p> <p>Foraging opportunities for bald eagle and osprey would continue to be provided, as well as increased nesting sites as more trees are planted adjacent to the canal system.</p> <p>Short-eared owls and northern harriers would benefit from reduced fragmentation of grasslands and the higher quality of more focused management of these habitats.</p> <p>Raptor species would benefit as bottomland floodplain forest habitat increases by about 227 acres.</p> <p>Adverse impacts are expected to be somewhat greater as a result of increased visitation, proposed construction of new trails and infrastructure, and more visitor use recreation opportunities.</p> <p><u>Migratory Songbirds</u></p> <p>The expanded hunt program would benefit nesting songbirds through the beneficial impacts to vegetation from reduced deer densities.</p> <p>Species associated with forested habitats would likely increase as the age structure, block size, and diversity of forested habitats improve.</p> <p>Although overall shrubland acreage would decrease, improved management would have a beneficial impact on species that depend on this habitat type.</p> <p>Some grassland species would decline on the refuge (but not regionally) as less acreage of grassland (76 acres less compared to alternative A) would be</p>	<p><u>Raptors</u></p> <p>Birds of prey that are found in forested areas would benefit from an increase in their habitat.</p> <p>Breeding opportunities would likely improve for Cooper's and sharp-shinned hawk, which prefer relatively dense forests with closed canopies.</p> <p>As the acreage of emergent marsh and associated open water decreases, less foraging habitat would be available for bald eagles.</p> <p>Proposed public uses could present temporary disturbances to nesting and foraging raptors.</p> <p><u>Migratory Songbirds</u></p> <p>Species that prefer dense understory and early successional forest would experience benefits in the short-term as grassland and agricultural fields develop shrub vegetation during succession.</p> <p>This alternative would favor migratory birds associated with forested habitats.</p> <p>Birds that depend on early successional habitats would experience significant habitat losses with the acreage of shrublands declining by 84 percent and the acreage of grasslands declining by 81 percent compared to alternative A.</p> <p>The benefits to priority migratory species of concern that utilize shrubland plant communities far outweigh the impacts on grassland dependent species.</p> <p>Potential adverse impacts from public uses are similar to alternative B.</p>

<b>Alternative A: Current Management</b>	<b>Alternative B: Service-preferred</b>	<b>Alternative C: Less-active Habitat Management</b>
<p>diversity due to deer overbrowsing would continue.</p> <p>Bird species that depend on shrublands would likely decline on the refuge as shrublands convert to forests.</p>	<p>available.</p> <p>There could be some increased displacement of birds due to disturbance by deer hunters.</p>	
<b>Effects on Fish</b>		
Impacts Common to All Alternatives		
<p>We would take management actions to protect wetlands, refuge impoundments, and open water, such as controlling nonnative invasive species and providing and improving riparian buffers around wetland-upland interfaces.</p> <p>The adverse effects of actions like prescribed burning and cooperative farming, whereby the introduction of debris, increased turbidity, and runoff can negatively impact fish resources, would continue under all alternatives. We would continue to follow best management practices to minimize potential negative effects.</p> <p>Although fishing is not allowed in waters within the refuge boundary, we provide fishing access to State waters in designated areas. The State sets harvest limits for certain species to ensure fish resources can continue to remain self-sustainable and anglers on refuge lands are required to follow applicable State regulations.</p>		
<p>Planting trees adjacent to the canal system should directly benefit fish resources as shade cover contributes to cooler water temperatures.</p> <p>Continued drawdowns would prevent a more diverse (in age classes and species) fish community from developing in impoundments.</p>	<p>Impacts to fish would be similar to alternative A, in addition to restoration efforts along the riparian zone that would offer greater benefits to the fish population.</p> <p>Fish communities would continue to be dominated by species that tolerate periodic drawdowns.</p>	<p>The removal of dikes along the canal system would benefit fish species that prefer a more free-flowing system.</p> <p>Adverse effects associated with impoundments would continue in Tschache Pool, Main Pool, and the Visitor Center Wetland.</p>
<b>Effects on Other Wildlife</b>		
Impacts Common to All Alternatives		
<p>We would continue to use habitat management techniques, such as maintaining impoundments, prescribed burning, mowing, and controlling invasive species, all of which provide benefits to the habitats wildlife reside in, as well as adverse effects previously described under Wetlands and Uplands.</p> <p>Strategic land acquisition, conservation, and outreach to the public on good stewardship practices are the most effective measures for ensuring increased and improved availability of forest, riparian, early successional, and wetland habitats to support and benefit wildlife species.</p> <p>We would continue our (deer and waterfowl) hunt programs. Hunting has a direct negative impact on individuals for affected wildlife species; however, hunts are managed to protect the overall health of the populations.</p>		

<b>Alternative A: Current Management</b>	<b>Alternative B: Service-preferred</b>	<b>Alternative C: Less-active Habitat Management</b>
<p>Continue to manage water levels in the refuge impoundments to mimic natural hydrologic periods, which would benefit wetland species.</p> <p>Shrubland and grassland areas would continue to provide nesting habitat for species of conservation concern, as well as foraging areas.</p> <p>Small mammals would benefit from the long-term management of large patches of grassland in multiple locations as it would increase survival and population growth.</p> <p>Impoundment drawdowns could negatively affect amphibian larvae development.</p>	<p>Most benefits to wildlife species would be similar to those described under alternative A.</p> <p>The health of the deer herd is expected to improve as densities are managed at more sustainable levels. River otter populations would likely increase as more emergent marsh becomes available. Tree bats may increase as some shrublands convert to forested areas.</p> <p>Additional minimal adverse effects are expected to impact wildlife in areas where new visitor infrastructure is constructed.</p>	<p>Woodland-dependent wildlife species would benefit from additional forested areas.</p> <p>Summer populations of tree bats would increase as forested areas expand; the river otter and wood turtle would benefit from increased forest cover; beaver populations would likely increase from less managed water levels.</p> <p>There would be adverse impacts to amphibians caused by periodically draining refuge impoundments.</p> <p>The significant loss of grassland habitat would negatively impact populations of invertebrate species.</p>
<b>Effects on Threatened or Endangered Species</b>		
<p>Existing habitat would continue to benefit Indiana bats, if documented on the refuge.</p>	<p>Indiana bats could benefit from increased and higher quality forest habitat and the construction of bat houses.</p>	<p>Similar to alternative B, with additional forest acreage offering more potential habitat for the Indiana bat.</p>
<b>Effects on Cultural and Historical Resources</b>		
Impacts Common to All Alternatives		
<p>Protect known cultural and historic resources and communicate the importance of understanding and appreciating the area's rich cultural history.</p> <p>Habitat management activities have the potential risk of disturbing unknown sites, as well as visitors inadvertently or intentionally damaging undiscovered sites.</p>		
<p>Long-term benefits for cultural and historic resources come from protecting up to 19,510 acres within the approved acquisition boundary. Refuge status ensures that protection would be afforded for known and yet undiscovered cultural and historic resources.</p>	<p>In addition to alternative A, our planned increase in interpretive and educational programs would include cultural resources, increasing awareness.</p> <p>There is some increased risk from our proposed visitor use projects and facility construction. We would comply with Section 106 of the NHPA.</p>	<p>There would be additional facilities and more visitors compared to alternative A, but fewer than alternative B.</p>

Alternative A: Current Management	Alternative B: Service-preferred	Alternative C: Less-active Habitat Management
<b>Effects on Public Use and Access</b>		
Impacts Common to All Alternatives		
<p>We would continue to provide compatible wildlife-dependent activities that can be supported with respective staff and budget projections. We would maintain our infrastructure and continue to conduct outreach to visitors and the local communities.</p>		
<p>Long-term benefits for public use and access from pursuing refuge acquisition of up to 19,510 acres.</p> <p>Maintain the existing programs for all six priority public uses and adequate opportunities for wildlife observation and photography.</p> <p>The refuge would continue to provide a range of high quality hunting opportunities and maintain access to designated fishing sites.</p> <p>An expected increase in visitation may change the quality of experience for some visitors, but this is not anticipated to have a significant adverse impact on visitors who engage in refuge activities.</p> <p>The visitor contact station would continue to be inadequate to meet the needs of the environmental education and interpretation programs, and these programs would not be fully developed.</p>	<p>The addition of new lands would likely result in increased visitor use opportunities and further support our ability to meet new demand for recreational opportunities.</p> <p>Our proposed projects would benefit visitors and help meet the demand of an expected increase in refuge visitation.</p> <p>The expanded hunt program would provide additional opportunities for deer and waterfowl hunting, and access to fishing would be increased.</p> <p>Increase and improve our environmental education and interpretation programs, which would provide a greater understanding by the public of the importance of the refuge and its management. Due to these increased opportunities, there would be some related adverse impacts.</p> <p>Visitors may experience short-term adverse impacts during the construction of our new facility, which may alter their experience on the refuge.</p> <p>The expanded hunt program may cause trail closures that would be short-term and during periods of the year when visitor use is low.</p> <p>Seasonal area closures to protect wildlife and short-term closures during construction would continue to inconvenience some visitors.</p>	<p>Impacts on public use and access would be similar to alternative B, except:</p> <p>The hunt program would expand with the addition of a spring turkey hunt.</p> <p>Environmental education and interpretation programs would benefit from a 25 percent visitor contact station expansion.</p> <p>Fewer public use facilities would be constructed (e.g., pulloffs).</p>
<b>Effects on the Socioeconomic Environment</b>		

Alternative A: Current Management	Alternative B: Service-preferred	Alternative C: Less-active Habitat Management
Impacts Common to All Alternatives		
<p>We would continue to make refuge revenue sharing payments, as authorized by Congress, to the counties within which refuge lands lie. Refuge management jobs, income, and expenditures would have negligible benefits to the local economy, but the expenditures of refuge visitors would continue to add some minor benefits for the local economy.</p> <p>The acquisition of additional properties would remove them from the local property tax base and result in a loss in tax revenue for local municipalities.</p>		
<p>The expected increase in visitation over the next 15 years would continue to contribute to the local economy.</p> <p>The recurring costs associated with salaries and refuge projects would total approximately \$1.2 M per year, some of which would be spent in the surrounding area.</p>	<p>The addition of six full time staff would minimally increase benefits for the local economy in jobs, income, and expenditures. If fully funded, recurring salary and project costs would approximate \$1.8 M annually.</p> <p>Construction of a new visitor services and administrative facility would temporarily provide several construction jobs to the local area.</p> <p>An increase in public use each year would increase visitor expenditures in the local economy.</p> <p>The potential adverse impacts include the loss of tax revenue related to the expansion of the acquisition boundary.</p>	<p>The addition of four full time staff would minimally increase benefits for the local economy in jobs, income, and expenditures.</p> <p>Benefits would be similar to those under alternative B, with an annual recurring cost estimated at \$1.5 M.</p> <p>The expansion of the visitor contact station by 25 percent would temporarily provide some construction jobs to the local area.</p>

