

Chapter 4



Green-winged teal
USFWS

Environmental Consequences

- Introduction
- Consequences of Alternative A. Current Management
- Consequences of Alternative B. The Service-Proposed Action
- Consequences of Alternative C
- Consequences Comparison Matrix

Introduction

This chapter predicts the foreseeable impacts of implementing the management strategies in each of the alternatives in chapter 2. When detailed information is available, we present scientific, analytical comparisons among the alternatives. When detailed information is unavailable, we base our comparisons on professional judgment and experience. We identify both direct and indirect impacts within our 15-year planning time frame; beyond that time frame they become more speculative.

Please keep in mind the relatively small total land mass of the Complex: less than 1 percent of the region in which it is located. The Complex covers about 6,400 acres of the 768,000 acres in Nassau and Suffolk counties. Oyster Bay and Wertheim, its largest refuges, comprise 5,700 acres: almost 89 percent of the Complex. Each of its seven smaller refuges is less than 200 acres. The total acreage of the Complex is also incredibly small in comparison with the entire Atlantic Flyway or the breeding ranges of the many birds that use it.

We recognize that the Complex refuges are not isolated ecologically from the land around them. However, because our analysis of impacts focuses mainly on the refuges, it may not fully discuss the influence of the surrounding landscape on their duration and extent. We may have overstated positive or negative impacts in that larger geographic context. Nevertheless, many of the actions we propose conform with other plans identified in chapter 1, and provide positive, incremental contributions to those larger landscape goals. A matrix at the end of this chapter summarizes the consequences of each alternative by topic.

Categorical exclusions are classes of actions which do not individually or cumulatively have a significant effect on the human environment. The following actions are designated categorical exclusions and thus do not require additional NEPA analysis or further discussion in this chapter.

1. Providing environmental education and interpretation programs, unless they involve new construction or major additions to existing facilities;
2. Conducting research, resource inventories, and collecting other resource information;
3. Operating or maintaining existing infrastructure and facilities, unless that involves major renovation;
4. Improving routine, recurring management activities;
5. Building small construction projects (e.g., fences, berms, small water control structures, interpretative kiosks) or developing access for routine management purposes;

6. Planting vegetation;
7. Reintroducing native plants and animals;
8. Making minor changes in the amount or types of public use; and,
9. Issuing new or revised management plans with only minor changes.

Consequences of Alternative A. Current Management

Although this No Action alternative does not represent a complete status quo, neither does it propose major changes in our present public use or wildlife management programs or facilities. Our analysis will focus on expected changes in specific refuge management actions and their impact on the physical, biological and socioeconomic environment. We also remind our readers that much of the rationale supporting our conclusions throughout this chapter may appear once, in discussing the consequences of alternative A, and may be incorporated by reference in discussing the other alternatives.

Effects on Physical Environment

Water Quality and Soils

We do not expect impacts on water quality or soils from the deer hunt. The number of hunters allowed in each hunt zone minimizes any potential impacts on water and soils.

The nitrogen from heavy concentrations of goose droppings can result in eutrophication of ponds and lakes, resulting in excessive algal growth (Kear 1963, Manny et al. 1994) and reduced water quality. Additionally, the nitrogen in the droppings may be in a form that is more available to plants and thus overfertilize an area (Smith et al. 1999). Geese will also trample grass in medium-heavy soils, which creates a surface “hard pan” that prevents vegetative growth (Traill-Stevenson 1988). This causes erosion and loss of habitat for other species (Wall 1984). According to Conover (1991), geese in high concentrations or even a smaller flock that remains in the same place for an extended period of time may overgraze grass, creating large dead spots on lawns. Likewise, the overabundant populations of resident Canada geese on refuge property may cause similar damage to vegetation. Although some of these consequences described have not yet occurred, it is possible that these impacts may occur if populations are left unchecked and continue to proliferate.

Controlling invasive plants in uplands and wetlands will often require the use of such herbicides as Garlon® and Rodeo®. Those have been tested extensively and labeled for application in specific settings. For example, the EPA licensed Rodeo® for aquatic use because of its low toxicity for aquatic animals. Therefore, we prefer it in controlling common reed (*Phragmites australis*). Garlon® is

registered only for upland use, because of its much greater toxicity for aquatic life. It is effective in controlling invasive woody plants, but is not used within 100 feet of a waterway. Our regional environmental contaminants coordinator annually reviews such compounds, and approves or disapproves their applications.

Although treating such wetland invasives as *Phragmites* will often involve the broadcast application of herbicide, upland invasive plants are more often sprayed individually on either their foliage or their cut stumps, thereby minimizing any overspray. When used as directed by each compound's label, vegetation-specific herbicides have low potential impact on animal life. They are also non-persistent; therefore, we expect no effects on soils.

We may also pull invasive plants by hand, or by mechanized equipment, or burn them in prescribed fires. Pulling them by hand works well on such herbaceous species as garlic mustard and individual woody plants like Japanese barberry and multiflora rose, which have few stems and are less than 4 feet tall. That technique removes only the targeted plant and disturbs the soil very little, so new invasions become less likely.

Mechanized treatments include uprooting invasive plants with a small excavator, cutting them with a chainsaw, discing them with a tractor or, in extensive infestations, grading them with a bulldozer. Such species as black locust, Norway maple, and Russian olive are best treated by cutting or uprooting during the non-breeding season to avoid impacts on shrub-nesting birds. Although generally less than 5 feet in diameter, the greatest threat for the area of soil disturbed is that it serves as a host site for future invasions. We can mitigate that threat by ensuring that no other seed-borne invasive plants grow nearby, and by uprooting the targeted trees when they do not carry viable seeds. Other than the somewhat larger areas of soil disturbance that result, we foresee no environmental or social effects from mechanized treatments.

Clearing plants with a bulldozer is an extreme method, and will only be used in areas of *Phragmites* infestation where its base elevation has increased beyond that of the pre-existing high marsh. If we do not lower that elevation, it is unlikely that desirable plants will ever re-colonize the site. That technique will probably be limited to the brackish marsh areas of Wertheim, and could adversely affect wildlife and water quality. Non-target vegetation may be affected, but only in the unlikely event it grows intermixed with *Phragmites*. All of those will be short-term effects, which we can minimize by timing each activity in the dormant season. Restoring the site to its former condition will tremendously improve its habitat values.

The aerial application of larvicides for mosquito control will have minimal impact on water quality and soils because larvacide treatments



Creating tidal ponds
Suffolk County Vector Control

are more target-specific and less persistent in the environment than most chemical insecticides. Furthermore, potential impacts are mitigated by only allowing treatment of the marsh when the criteria for spraying (described in the Mosquito Surveillance/Control compatibility determination, appendix C) have been met and by requiring approval of our refuge manager.

Filling ditches and creating tidal channels is intended to restore hydrologic integrity to the marsh areas adjacent to the Carmans River and Big Fish Creek. It focuses on internal areas of the marsh and wetland areas dominated by *Phragmites*. These manage-

ment techniques are intended to partially restore water levels to pre-ditching variability (Wolfe 1996). We do not expect either significant positive or negative impacts on water quality.

The open marsh water management (OMWM) demonstration project might result in landscape alterations, hydrologic changes, and soil compaction. Specialized, low ground pressure equipment is used during construction to mitigate soil compaction. Measures are in place to avoid and contain discharges of pollutants into the project areas during construction. We expect an improvement of hydrologic integrity in marsh areas near Wertheim's Carmans River and Big Fish Creek. We also expect an improvement of water movement onto and off the marsh.

We do not expect that creating tidal creeks, channels, and ponds will cause changes in surface water quality. They are intended to improve water movement onto and off the marsh and provide access and habitat for fish, birds, and other wildlife. All physical changes in the project site will not exceed depths that may penetrate the permeable barrier separating the peat layer and marsh sediment from groundwater; therefore, we do not expect groundwater quality to change.

Changes in the existing ditch network are intended to increase tidal influence in the project area and divert the abundant freshwater inputs, the result of past alterations, off the marsh.

Although we strive to minimize the degradation of resources in all prescribed fires, they can impact water quality and soils in small areas. Prescribed fire elevates surface temperatures; mineralizes detritus, litter and standing dead material; volatilizes some nutrients and organic matter; alters the water-holding capacity of soils; and, alters their populations of micro- and macro-fauna (Barbour et al. 1999).

The effects on organic matter depend on the intensity and duration of the burn. Intense fires of long duration consume more organic matter than brief, low-intensity fires. At temperatures between 100° and 200°C, nitrogen compounds volatilize and are lost; by contrast, calcium, sodium, and magnesium are usually deposited on the soil surface and recycled. At temperatures between 200° and 300°C, large amounts of organic substances are lost, which can reduce the capacity of soils to exchange cations and hold moisture.

Fire usually elevates soil pH by releasing cations; that effect is particularly evident in acidic soils. In coastal plains, an increase in soil potassium and phosphorous levels often follows fires. Soil microbial nitrogen fixation may be enhanced after fire, due to the mineralization of nutrients and elevated pH levels in soils (Barbour et al. 1999).

The removal of litter and duff may initially facilitate water infiltration; nevertheless, evaporation is also mediated by the loss of litter and the blackened soils. This results in an overall reduction in the water-holding capacity of soils. Water repellency changes little with cool fires, i.e., below 176°C; moderately hot fires, i.e. those between 176° and 204°C, increase water repellency. After moderately intense fires, lowered infiltration may increase runoff, and erosion may result. Extremely hot fires, those above 204°C, volatilize hydrophobic substances and destroy the water repellency of soils (Debano et al. 1998).

Fires usually reduce fungi, increase soil bacteria, often destroy nitrifying bacteria, and may remove soil and litter pathogens. Legumes and other nitrogen-fixing plants often must recover nitrogen losses due to volatilization, as the recovery of nitrifying bacteria is slow (Barbour et al. 1999).

We burn prescribed fires of short duration on a small scale in confined areas, and keep them within low-to-moderate complexity. Many of the Long Island native habitats consist of pitch pine barrens, in which fire has played a major role (Wacker 1979). Within those habitats, both surface and stand replacement fires occur at short intervals (Olsvig et al. 1979). Terrestrial habitats on Long Island have both frequent light surface fires as well as short return intervals (25–50 years) of crown fires and severe surface fires in combination. They also consume only part of the duff/litter layer, and rarely transfer significant amounts of heat into the soils. We would use prescribed fires to remove litter and light fuels, and avoid the significant adverse effects of severe, hot wildfires on soils.

We expect negligible direct or indirect impacts on upland soils from all of the potential treatment methods; their effects are limited due to the short duration, low to moderate intensity, and confinement to the project area. We expect none of the proposed actions of alternative A to adversely impact soil or water quality.

The presence of docks can have several adverse effects on the aquatic environment, including both chemical (i.e., water quality) and biological (i.e., aquatic dependent organisms) features. Chemically treated wood, such as pilings used in dock construction, contain metals such as chromium, copper, and arsenic. When placed in the aquatic environment, these chemicals are released through leaching and are incorporated into algae and the tissues of shellfish which is harmful to aquatic life (Degroot et al. 1979). Docks and the boats that they are designed to access also impair the physical environment. Boats have been demonstrated to directly affect sea grasses (Zieman 1976) while dredging to access deeper water is known to impact marine life. Such impacts include the direct loss of the benthic community, smothering aquatic plants and invertebrates in nearby areas with suspended sediments, changes in water chemistry, and the problems associated with placement of dredge spoil (Brown and Clark 1968, Slotta and Williamson 1974).

More recent studies continue to affirm the environmental consequences of docks. Releases of metals associated with treated wood are compounded as these materials move up the food chain (Weis and Weis 1994), and accumulate in other organisms. In a Long Island investigation, Ludwig, et al. (1997) reported that a single private dock degraded benthic habitats across an area one acre in size. One of the most recognizable impacts involved the shrinking on an eel grass (*Zostera marina*) bed. The authors hypothesized that much of the reduction in eel grass was due to settling of sediments suspended by propeller action. Others (Short and Wyllie-Echeverria 1996, Shafer 1999) reference the importance of sunlight in maintaining sea grass beds and that docks adversely affect photosynthesis among these extremely light sensitive plants by shading underwater areas. A review article by Mulvihill et al. (1980) notes short and long term effects. The turbidity and sedimentation created during construction can reduce primary productivity, interfere with fish respiration, alter the suitability of spawning areas, reduce habitat diversity of bay bottoms, and smother benthic organisms. Cumulatively, Mulvihill et al. (1980) project that impacts grow commensurate with an increase in the number of docks. They mention that changes in water temperature and a reduction in primary productivity associated with docks could adversely affect the food chain.

Air Quality

There are no anticipated impacts on air quality from the deer hunt. Although the odor of herbicides and their surfactants will persist for roughly one day after treatment, no long-term effects on air quality or the quality of life of neighbors will result.

Prescribed fire and visitor vehicle exhaust can impact air quality. Our management-ignited prescribed fire program directly impacts air quality in three principal ways: decreased visibility, increased particulates, and increased pollutants. Although visitor vehicle exhaust may directly contribute air pollutants, it is not a principle cause of poor conditions. Most visitors are local residents or summer vacationers who travel less than 100 miles to the Complex from their permanent or vacation residences; refuges are usually a secondary destination for them. Their contribution to poor air quality is negligible compared with that of the urban and industrial centers within a 200-mile radius.

In December 2000, we completed an environmental assessment and fire management plan for wildfire suppression and prescribed fire. All of the alternatives incorporate the decision of that plan. Our objective is to take aggressive action to manage smoke from wildland and prescribed fires to minimize negative impacts on visibility and, at the same time, maintain air quality.

Visibility and clean air are primary natural resource values, and our fire management planning and operation gives full consideration to protecting them. The Complex will comply with all applicable federal, state, interstate and local air pollution control requirements, as specified in section 118 of the Clean Air Act, as amended (42 U.S.C. 7418). Additional smoke management guidelines can be found in the Fire Management Handbook (USFWS 2001).

Our plan stipulates the conditions required for prescribed fires to control their size, minimize or eliminate their impacts on visibility, and reduce their potential for adding the particulates and pollutants they create to the air. All of the required conditions are geared toward minimizing smoke emissions, and follow the Best Available Control Technology. These measures will minimize the impacts of prescribed fires on air quality.

- Burning will only be permitted provided that the existing wind speed, wind direction, and atmospheric conditions do not create nuisance smoke conditions.
- Smoke-sensitive areas will be identified and addressed within the Annual Prescribed Fire Plan. The direction of wind vector selected will be such that smoke and other particulate emissions are transported away from sensitive areas.
- Burning will be conducted only when the visibility exceeds 2 miles and the fire weather forecast indicates the presence of an unstable airmass, mixing heights are greater than 1,500 feet, and ventilation rates (mixing height x transport wind speed) are 7,500 or greater. A minimum transport wind speed of 5 mph is

recommended. A daily spot forecast is required and is obtained from the National Weather Service.

- Burning will not be conducted if any government agency has issued an air pollution health advisory, alert, warning, or emergency for the area surrounding the refuge.
- Backing and flanking fires will be used when possible to minimize particulate emissions.
- Media sources will be kept informed of fire and smoke dispersal conditions throughout any fire.

Unlike the short-term adverse effects on air quality from our prescribed fire program, the pollution-filtering benefits derived from maintaining natural vegetation conditions will last in perpetuity. The Complex primarily impacts air quality positively by protecting natural lands. Natural vegetation and wetlands help offset pollution levels by acting as filters in the environment. Unfortunately, we have never quantified that benefit from Complex lands.

Effects on Biological Environment

Vegetation, Habitats and Wildlife

Limited deer hunting at Wertheim will not occur outside the seasonal framework established by the NYSDEC. Archery hunting could occur only from October through December, and firearm hunting could only occur on January weekdays. As noted in the EA for deer management at Wertheim, reduction of deer population densities will allow forest vegetation to recover more quickly from the effects of overbrowsing and allow development of a herbaceous layer and woody understory representative of a balanced ecosystem. Such effects are recorded in deer exclosures throughout Wertheim. Overall, the stem densities of woody vegetation are greater inside the exclosures than outside. In addition to increasing plant density and species diversity, that added vegetative growth will provide the structure necessary to benefit ground-nesting birds, as well as reptiles, amphibians and small mammals.

See “Effects on Physical Environment” for the impact of overabundant resident Canada goose populations on vegetation.

Waterfowl hunters will not use refuge lands under alternative A. However, hunters harvest waterfowl adjacent to and offshore from Conscience Point and Wertheim, potentially disturbing some migratory and resident birds. Occasional poachers or trespassers cause some disturbance of migratory and resident birds, but the level of that disturbance would likely be lower than that associated with any hunt alternative.

As with the effects of herbicide applications discussed in “Water Quality and Soils,” adverse affects on non-target plants can be

mitigated by altering the type of treatment or the method of application in areas where desirable plants and invasive plants commingle. In those situations, the contact application of herbicide with a saturated wick may be preferred, or hand-pulling may be more appropriate.

We will continue mowing to control the encroachment of invasive woody species and enhance habitats for endangered and priority species. Our primary objective is to continue enhancing habitat for migratory birds. Mowing reduces plant height without altering species composition or reducing accumulating thatch. Fields will require repeated mowing within 3–5 years to maintain desired habitat conditions. Mowing will promote the growth of various species of grasses and forbs, and provide suitable habitat conditions for the spread of sandplain gerardia.

The features created as part of the Complex open marsh water management program—such as tidal creeks, channels, and ponds—are intended to enhance habitat for fish that consume mosquito larvae and increase fish access to potential mosquito breeding sites. The project will eliminate mosquito breeding depressions on the marsh using spoil produced by the construction of ponds and channels. That spoil will be spread thinly across the marsh surface to fill in depressions, mostly in areas of *Spartina alterniflora*.

After construction, vegetation may appear to have been impacted. However, most vegetation begins to rebound immediately after construction. In as little as one year in some cases, normal plant succession on the marsh can be seen. Construction in areas of little vegetation will disperse fewer rhizomes, so regrowth will take longer. We are now monitoring our OMWM program to identify changes in vegetation, invertebrate, fish, and bird communities that may result.

Changes in water movement as a result of tidal creek and channel construction may influence the spread and vigor of invasive *Phragmites*. We expect the creation of tidal creeks to improve salt-water movement onto the marsh and freshwater movement off the marsh. Spreading the material produced by tidal creek, channel, and pond construction will level the marsh surface. Those factors promote conditions that are unfavorable to *Phragmites*, which often grows in freshwater on higher marsh elevation.

Restoration will create a healthier aquatic ecosystem by decreasing the negative impacts of nutrients, contaminants and sediments and increasing native emergent vegetation.

Prescribed fire will be used to help maintain historic vegetation communities and reduce accumulations of fuels that contribute to larger, more catastrophic fires. The natural ignition pattern of fire on the landscape will be replaced by a more systematic pattern. Prescribed fire can be gradually introduced in vegetation types

influenced by fire suppression activities. In vegetation around developments or sensitive resource areas, prescribed fire or mechanical treatments can be used to simulate the effects of historical fire frequency.

Pedestrian travel (walking, cross-country skiing, and snowshoeing) has the potential of impacting shorebird, waterfowl, marsh birds and other migratory bird populations feeding and resting near the trails and on the beaches at certain times of the year. The use of upland trails is more likely to impact songbirds than other migratory birds. Many studies in different locations have documented the effects of human disturbance on migratory birds. Since skiing and snowshoeing are winter activities that require snow, there are fewer adverse impacts to the Complex's species of concern compared to activities like jogging, bicycling, and horseback riding.

Conflicts arise when migratory birds and humans are present in the same areas. The responses of wildlife to human activities include departing from the site, using suboptimal habitat, altering behavior and increasing energy expenditure. Many waterfowl species avoid disturbance by feeding at night instead of during the day.

The location of recreational activities affects species in different ways. Miller et al. (1998) found that nesting success was lower near recreational trails, where human activity was common, than at greater distances from the trails. A number of species have shown greater reactions when pedestrian use occurred off-trail (Miller 1998). In addition, Burger (1981) found that wading birds in the northeastern United States were extremely sensitive to disturbance. Regarding waterfowl, Klein (1989) found migratory dabbling ducks to be the most sensitive to disturbance, and migrant ducks to be more sensitive when they first arrived in the late fall than later in winter. She also found gulls and sandpipers to be apparently insensitive to human disturbance. Burger (1981) found the same to be true for various gull species.

As for songbirds, Gutzwiller et al. (1997) found that low levels of human intrusion altered the singing behavior of some species. Pedestrian travel can influence normal behavior, including feeding, reproducing, and socializing. Studies have shown that ducks and shorebirds are sensitive to pedestrian activity (Burger 1981, 1986). Resident water birds tend to be less sensitive to human disturbance than migrants, and migrant ducks particularly sensitive when they first arrive (Klein 1993). In areas where human activity is common, birds tolerated closer approaches than in areas that receive less activity.

Maintenance dredging at Morton and Seatuck will affect wildlife habitats and resources which may affect population of some fish,

invertebrate, and bird species. See the “Maintenance Dredging” compatibility determination in appendix C for details.

Sunbathing on Amagansett and Morton may cause various levels of wildlife disturbance and displacement. Refer to the “Sunbathing on refuge beaches” compatibility determination in appendix C for details.

Fish stocking may potentially have both short and long-term impacts on the existing fish community. The hatchery-raised rainbow and brown trout stocked by the DEC in the Carmans River several times each year are part of a “put-and-take” fishery, whereby the fish are of “legal” size. Stocked fish of such size may adversely affect native populations by competing for food resources, preying on juvenile native fishes, introducing diseases, and interbreeding with other species (Poff 1997). Refer to the “Fish Stocking” compatibility determination in appendix C for details.

Non-motorized boating can affect refuge resources in a number of ways. Studies show that canoes and rowboats disturb wildlife (Bouffard 1982; Kaiser and Fritzell 1984; Knight 1984; Kahl 1991). They may affect waterfowl broods, wintering waterfowl, shorebirds, raptors, and long-legged waders, but their low speed and their use primarily during the warmer months would mitigate those impacts, especially on wintering waterfowl and raptors. Boaters also may try to access closed portions of the refuge, causing additional disturbance of wildlife. We do not expect cumulative negative impacts.

Threatened and Endangered Species

The federally listed species most likely to be impacted by our management actions are endangered piping plovers, endangered roseate terns, endangered sandplain gerardia, and threatened bald eagles.

The timing and location of deer hunting (page 4-9) precludes disturbance of any federal- or state-listed endangered or threatened species; hence, the action will not affect any threatened or endangered species.

Herbicide treatments will not impact any known threatened or endangered species. The applications will be highly localized and plant-specific, with the ultimate goal of improving habitats. Mechanical treatment in the form of mowing and tree removal is necessary to keep habitat suitable for sandplain gerardia. Because the other federally listed species are avian, mowing treatments will not negatively impact them. Also, mowing will take place in open fields or shrubby areas, not in beach communities near piping plovers and roseate terns.

Improving marsh conditions for waterfowl, a food source for eagles, can be seen as either neutral or minimally benefiting eagles. State-listed species known to inhabit the project area include northern harrier, least bittern, and king rail. Both the least bittern and king rail inhabit the fresh water zones of marshes, an area where the project is not concentrated. We expect all three species to benefit from the opportunities for foraging added by the more diverse habitats created as a result of the alternative. Short-term, direct adverse effects on those species are unlikely, as we will implement the restoration during a 4-week period in the middle of winter.

None of the other management actions in alternative A will negatively impact any federally listed species.

Effects on Socioeconomic Environment

Local and Regional Economy

The economic benefits of deer hunting include a reduction in damage to gardens and ornamental plantings on private lands around Wertheim, as well as a reduction in costs borne by landowners to protect their landscaping. Although measuring the cost savings of a reduction in deer-vehicle collisions is difficult, information from *www.erieinsurance.com* reveals that the 16 vehicle-deer collisions recorded in 2003 cost an estimated \$29,760 (16×\$1,860 average per incident).

Local businesses may see a slight increase in revenue from hunters purchasing food and hunting supplies, meat-processing, fuel, and lodging. Closing Wertheim to other visitors during hunt days might offset that increase in economic activity somewhat. In any event, we expect insignificant economic gains or losses. The costs to the Complex for implementing a hunt include approximately \$3,000 to establish and post hunting zones and \$800 in salary for each day of the hunt.

Prescribed fires prevent fuel loads from building up, decreasing the likelihood of catastrophic wildfires and the potential loss of property on or near the refuges. Losses can also be mitigated by using wildland urban interface methods at the refuges that border residential or commercial areas.

Wildlife-dependent recreational uses such as fishing, wildlife observation, and environmental education and interpretation will either continue or be initiated in the vicinity of Wertheim, with some beneficial effects on the local economy. Conscience Point, Seatuck, and Sayville will remain closed to public use, and will offer no beneficial economic or social impacts.

Public Use, Access and Recreational Opportunities

At the local level, public sport hunting opportunities are limited on Long Island, especially during the shotgun season. The New York Department of Environmental Conservation maintains 111 parking spaces at its Long Island Management Areas with the capacity for 2,109 hunting parties during the January season. In 2002, those areas were at 92 percent capacity (D. Little, pers. comm.). The Wertheim deer hunt can provide opportunities for up to 40 hunters each day, for a potential total of 920 hunter-use days for the shotgun season (i.e., 40 hunters×23 days) and 3,680 hunter-use days for the bow season (i.e., 40 hunters×92 days) from October through January. Because both of the refuge nature trails are closed when hunting occurs in their vicinity, visitors interested in viewing or photographing wildlife or hiking on the trails are excluded from those activities during hunt days. Approximately 42 visitors to the trail system will be excluded during each day hunting is permitted on weekdays, while as many as 80 visitors could be excluded during those weekend days when bow hunting is permitted. Although excluded at Wertheim during hunt days, the general public also has the opportunity to visit the nature trails at the Morton and Target Rock refuges.

Hunters could contribute up to 40 vehicles to the overall traffic on Montauk Highway and Smith Road during the early morning and evening hours on hunt days. That increase is immeasurable when compared to the thousands of daily vehicle trips on these roads. The sound of firearms discharging is minimally noticeable to surrounding homeowners given the distance between homes and hunt areas (more than 500 feet) and the noise attenuation provided by forest vegetation. The effects of those sounds will also be minimized, as shotgun hunting will occur only during daylight hours on weekdays, when most residents are at work or away from home.

Reducing the refuge deer density over a period of several years will have localized effects within the adjacent community. The overall decrease of deer on residential properties will result in less damage to landscaping. Fewer deer will be available to transport Lyme-disease-bearing ticks. Although deer will undoubtedly continue to move off-refuge, especially during the breeding season, their smaller population could likewise reduce the number of vehicle-deer collisions.

Most areas in the Complex where herbicidal and mechanical treatments will be used are not open to public use. If we use them in a public use area, we will notify the public and restrict access during the treatments.

The Complex offers a prevention and public education program about fire on wildlands, and uses a large, portable display, "Wildfire and Prescribed Fire on Long Island," at many annual public events. We are also working with partners, the Long Island Pine Barrens Commission and the New York Forest Rangers, to develop additional public education materials on fire, including brochures and fact sheets. Public education is necessary to gain public support and understanding of the fire management program.

Most fire management areas in the Complex are not open to public use. If a wildfire or prescribed fire occurs in a public use area, we will notify the public and restrict access to those areas during the fire.

Closing nesting sites to public access during the breeding season should improve the nesting success of piping plovers and roseate terns. We will restrict public access or limit public use at times when such uses as sunbathing may negatively impact species at risk. The human disturbance of nest sites reduces the energy reserves the birds need to defend them, increases their susceptibility to predation by other seabirds, and keeps the adult birds away from them longer.

We will continue to maintain and manage open water, aquatic bed, salt marsh, grassland, and upland forest habitats for fish and wildlife.

Cultural Resources

The L-shaped barn at Seatuck is the only structure identified on the National Register of Historic Structures. No other structures on any of the refuges have been identified or proposed for listing. Several small cemeteries at Wertheim are protected from disturbance.

Although the Long Island region was inhabited by Native Americans and settled early in the Colonial Period, this alternative will not impact any resources that may be present on the refuges.

No known cultural resources will be impacted by our removal of invasive plants. Herbicides are intended to affect those plants, and will not come in contact with identified cultural resources.

Scheduling the ignition and control of prescribed burns provides the ability to plan, locate, and consequently avoid the disturbance of cultural resources. The use of prescribed fire to reduce fuel accumulation will protect unrecorded cultural resources from the effects of high-intensity wildfires. Wildfire suppression will be implemented, which may help preserve the historic structures and buildings on the Complex.

Consequences of Alternative B. The Service-Proposed Action

Effects on Physical Environment

Water Quality and Soils

Like alternative A, we do not expect impacts on water quality or soils from the deer hunt. The number of hunters allowed in each hunt zone minimizes any potential impacts on water and soils.

In “Consequences of Alternative A” we described the impacts that overabundant populations of resident Canada geese can have on water quality, soils, and vegetation. The proposed hunt will reduce the populations of resident Canada geese, and thus decrease their impacts.

Hunting dogs at Wertheim used as part of the resident Canada goose hunt may impact water quality and soils via increased turbidity from disturbing sediment or organic matter, or via added nutrients from their excrement. However, this will have minimal impacts because the activity occurs only during the month of September, and because dogs must be under the control of their owners at all times.

The impacts of controlling invasive species, mosquito control, and OMWM are described in “Consequences of Alternative A.” The impacts of prescribed fire will be very similar to those described in “Consequences of Alternative A,” but since we will place more emphasis on mapping vegetation and researching historic fire regimes, our treatment areas will be more focused and efficient.

Although short-term negative impacts may be associated with shoreline restoration, the overall goal is to restore the natural hydrology and habitats associated with tidal rivers and creeks. In the long term, that restoration will improve water quality and soil function.

The proposed action for the future management of Oyster Bay will identify and remove illegal private structures and moorings. In addition, shell fishing and dredging will be more closely regulated to ensure compliance with policy. That could result in a slight increase in water quality. Because many of those activities occur along the shoreline, they impact intertidal vegetation and fauna. Stopping the illegal activities will allow the intertidal and subtidal areas to recover and re-vegetate. Added vegetation will provide additional filtering of the water, especially the water entering the refuge from upland areas.

Building a visitor center may produce localized, short-term impacts on water quality and soils. Although its footprint will be located entirely on upland soils, construction activities may result in soil compaction and erosion, and produce runoff into the Carmans River nearby. Careful planning and proper building design, site selection and construction techniques will minimize those impacts.

Air Quality

There are no anticipated impacts to air quality from either of the hunts. The impacts of invasive species treatments, mosquito control, and prescribed fire on air quality are described in “Consequences of Alternative A.”

The potential negative impacts on air quality will be localized and short-term during the construction phase of the visitor center. Impacts will most likely come from the exhaust emissions of construction equipment and the particulates raised in clearing ground.

Increased visitation and vehicle emissions from all new and existing programs may have long-term negative impacts on air quality. However, that increase in emissions is unlikely to have a significant effect on the surrounding residential areas, compared with the urban areas and already high vehicle use nearby. Providing limited visitor parking spaces and restricting visiting hours will alleviate any potential negative impacts.

Effects on Biological Environment

Vegetation, Habitats and Wildlife

The impacts of the deer hunt, controlling invasive species, mosquito control, open marsh water management, prescribed burns, pedestrian access (walking, cross-country skiing, and snowshoeing), maintenance dredging, sunbathing on refuge beaches, fish stocking, and non-motorized boating on vegetation, habitats, and wildlife are described in “Consequences of Alternative A.”

In “Consequences of Alternative A” we described the impacts that overabundant populations of resident Canada geese can have on water quality, soils, and vegetation. The proposed hunt will reduce the populations of resident Canada geese, and thus decrease their impacts. Removal of some geese will help us restore habitat for fall and spring migrants and wintering waterfowl and waterbirds like coots and grebes.

Hunting dogs at Wertheim, used as part of the resident Canada goose hunt, may impact vegetation, habitats, and wildlife—mainly through trampling. However, this will have minimal impacts because the activity occurs only during the month of September, and because dogs must be under the control of their owners at all times. Hunting dogs will also reduce the loss of downed birds.

The resident Canada goose hunt at Wertheim could also lead to some displacement of birds in the area occupied by hunting parties. Hunting could also flush other migratory and resident birds and lead to the inadvertent or intentional take of non-target species. However, the proposed hunting program would be limited to only two



Osprey
John Mosesso, Jr./NBII

days per week; from one-half hour before sunrise until 12:00 noon, and would be limited to two blinds to ensure the presence of adequate non-hunted areas to maintain and even allow for the expansion of waterfowl populations as refuge habitats are enhanced in the future. Therefore, we predict that the potential detrimental effects on waterfowl populations, such as displacing birds, would be minimal.

State-listed species that may be present on the refuges during the resident Canada goose hunt include the pied-billed grebe, least bittern, northern harrier, least tern,

common tern, and short-eared owl, and eastern mud turtle. The proposed waterfowl hunt may affect those species through accidental take or disturbance. The refuge will consult with the New York State Department of Environmental Conservation to ensure that the proposed waterfowl hunt does not adversely affect these species.

Under federal law and international treaties with Canada, Mexico and other countries with whom we share responsibility for migratory birds, the Service is ultimately responsible for regulating migratory bird hunting nationwide. Through a regulatory process that begins each year in January and includes public participation, we establish the frameworks that govern all migratory bird hunting in the United States. Within the boundaries established by those frameworks, state wildlife commissions have the flexibility to determine season length, bag limits, and areas for migratory game bird hunting. The refuge adopts harvest regulations set by federal and state resource agencies that derive from the concepts of density-dependent compensatory mortality and adaptive harvest management to ensure sustainable populations of game species. As a result, the limited harvest of waterfowl (i.e., resident geese) in a public hunting program will have a negligible impact on the overall refuge populations of the various species.

The actions proposed for Oyster Bay will enhance vegetation and habitats by eradicating illegal activities. For example, the shifting anchors of illegal docks and moorings can remove shoreline vegetation and scour the bay bottom. Removing them will enhance vegetation and habitats, thus benefiting waterfowl and the whole resource.

The proposed visitor center site at Wertheim consists of a maritime oak forest, as defined by Reschke (1990), grading into a red maple swamp at its westernmost part next to the river. The construction of the visitor center and its road will have two principal impacts: the loss of habitat and the reduction of habitat quality.

Clearing the site for facilities and a parking area will result in a net loss of 9 acres of forested habitat. A small section of road (<0.2 miles) will also be extended to join the present entrance to Wertheim. Because that extension will be located on an existing fire road, it will cause no additional forest fragmentation. The greater vehicle use of the new spur of the entrance road, and the possible increased use of the existing White Oak Nature Trail will increase disturbances of wildlife (Edington and Edington 1986, Eltringham 1984).

One concern about the presence of roads is their possible impact on migratory birds, particularly forest interior species on the refuge. However, narrow roads (26 feet or less), such as the proposed entrance road, have been shown to have little impact on forest interior birds (Rich et al. 1994). An additional concern is the impact of vehicle traffic on the entrance road disturbing wildlife (Edington and Edington 1986, Eltringham 1984, Wolff 1999). The operating hours of the facility and entrance road will partly offset that. They will operate from 8:00 a.m. to 4:30 p.m. during daylight, when most species of mammals and salamanders are not active (Whitaker and Hamilton 1998).

The proposed action will also have a new, half-mile nature trail that will make use of an existing fire road, but will likely require some additional trail-building. The disturbance of wildlife by public use of the trail will reduce the habitat quality of the area for some species, but limiting public use to daylight hours will partially offset that reduction (Edington and Edington 1986, Eltringham 1984).

The principal impacts of this action on wildlife would be their displacement during construction and the elimination of 9 acres of forest habitat. Wildlife such as nesting birds, ungulates, and small mammals may avoid the construction site and an adjacent area during periods of active work. That avoidance would vary by species, and be temporary. Although a permanent avoidance zone may remain once the facility is open to staff and visitors, the disturbed area is minimal compared with the size of Wertheim. The effect on wildlife would be insignificant, and would not impact wildlife populations.

Threatened and Endangered Species

The federally listed species most likely to be impacted by our management actions are endangered piping plovers, endangered roseate terns, endangered sandplain gerardia, and threatened bald eagles. Management activities include increasing total available breeding area by removing beach grass and known predators including red foxes, raccoons, and black-backed gulls.

See “Consequences of Alternative A” for the impacts of deer hunting, invasive species control, and open marsh water management on threatened and endangered species.

We initiated a section 7 intra-Service consultation regarding resident Canada goose hunting under alternative B to address possible impacts to bald eagles and migrating peregrine falcons at Wertheim. Depending on its results, we may modify the hunting program. Since the proposed action would take place before bald eagles or peregrine falcons generally use the refuge we have determined that the proposed action is not likely to adversely affect bald eagles or peregrine falcons. Other than the bald eagle, peregrine falcon, and occasional transients, we know of no federally listed species at Wertheim. The Intra-Service Section 7 Biological Evaluation Form is included in appendix H and will be completed before the release of the final CCP/EA.

Removing vegetation, redistributing sand and managing predators at Morton will benefit piping plovers, roseate terns, and least terns. Removing or killing vegetation increases the amount of their suitable nesting habitat. We will remove vegetation, primarily beach grass, by grading several areas of roughly one-quarter acre each with an excavator blade. We will limit that grading to the root zone within 6 inches of the surface, and grade only in winter.

No bald eagles have established nests within the Complex, and sightings are recorded intermittently throughout the year. At this time, mechanical treatments will not negatively impact bald eagles, given their current use of refuge habitats.

By reducing the use of mosquito larvicides, we expect higher trophic levels to benefit from a fuller assemblage of invertebrates over the long term. Likewise, marsh-nesting birds will not be subject to the disturbance caused by low-flying helicopters applying the larvicides.

The ability to plan and localize prescribed fires will alleviate the disturbance of threatened and endangered species during fire operations. The use of prescribed fire is needed to aid in the recovery of the endangered sandplain gerardia at Sayville and Conscience Point and to expand its population to other refuges, such as Seatuck. Prescribed fire will allow the Complex to create and enhance more habitats conducive to the propagation of this species.

The proposed actions for Oyster Bay will remove illegal activities, thereby enhancing vegetation and habitats. As the habitat is enhanced and human disturbance is lessened, we expect a positive result for threatened and endangered species.

No known threatened or endangered species will be impacted by the development, design, and construction of the office headquarters

and visitors facility. The bald eagle is the only federally listed threatened species near the proposed site. We will also partially alleviate the disturbance of wildlife from the use of the new nature trail and entrance road by limiting visitor numbers and restricting organized group use of the facility (one group per day from Tuesday through Saturday), limiting special events to one per month, limiting operating hours, and limiting the size of the parking lot.

**Effects on
Socioeconomic
Environment**

Local and Regional Economy

See “Consequences of Alternative A” for a description of the impacts of a deer hunt on the local and regional economy.

The resident Canada goose hunt could increase visitation by approximately 12 visitors per week at Wertheim. That will generate minimal additional revenues for businesses in local towns. Administering the proposed waterfowl hunting program may exceed the existing management budget of the Complex. However, the program could also lead to the Complex receiving budget increases to expand station management capability and staffing. Additional funding and staff proposals related to this project would be entered into the Service internal budget systems, including the Refuge Operating Needs System and the Maintenance Management System.

We expect no impacts on neighboring landowners, because any increases in traffic would be minor, and the blinds are located at sufficient distances from adjacent residences. Refuge law enforcement would also patrol the area regularly to ensure the safety of visitors and hunter compliance, and discourage illegal activities (e.g., trespassing, vandalism, littering, poaching). Future waterfowl hunt programs at Wertheim and Conscience Point could provide hunting opportunities for a growing population and contribute directly to refuge goals and expanded public recreational opportunities.

Restoring shorelines and improving water quality will benefit commercial and sport fisheries by providing emergent vegetation to filter nutrients and contaminants, creating better conditions for healthy shellfish beds and a healthier environment for aquatic biota.

The removal of illegal private structures, including docks, and moorings, may result in some individuals seeking legal methods for access to the bay. Those legal methods will require individuals to pay fees to their respective local entities. The proposed action may boost the economy, and will certainly increase the demand for legal methods of access to the bay.

The visitor center and administrative headquarters could provide a facility that contributes to community pride. The attraction of such a facility on a state-designated Wild and Scenic River close to a

National Seashore would provide a unique opportunity for local communities to promote and benefit from ecotourism.

The proposed visitor center has the potential to increase public visitation at Wertheim. The refuge is a popular destination for bird watchers, wildlife and nature enthusiasts, environmental education classes, photographers, fishermen, hikers and canoeists. Refuge users have long recognized its importance as a resting stop for migratory songbirds and waterfowl in their spring and fall migrations. That function, coupled with its location, bolsters the public use of the refuge to 30,000 or 40,000 visits per year.

According to studies at similar sites, a visitor center would generate an estimated \$6 million in expenditures in the local community. Routing visitors along the William Floyd Parkway and Montauk Highway will attract them to local restaurants, service stations and other businesses. Activities at the refuge are based on natural resources, and offer opportunities for viewing wildlife, hiking, fishing, and canoeing. Therefore, sporting goods dealers may see an increase in sales of gear and clothing.

The development of a headquarters and visitor center at Wertheim creates other potential effects on the community.

Aesthetics. We expect the construction of the facility to take one year. It will cause noise; however, that will be temporary, and will occur during regular business hours on weekdays. Typical noise levels from construction equipment range between 85 and 90 decibels at a distance of 50 feet. The sensitive receptors nearest to the construction site are community residents approximately 0.1 miles away on Smith Road. Construction noise could be detected at that distance. The forest vegetation will act as a sound and sight barrier between the entrance road and residents on Smith Road. The long-term operation of the visitor center/headquarters building would produce no substantial noise for its neighbors. The facility producing no change in the visual aesthetics of the local community, because it would not be visible from any public road. It would be no more than two stories high, and its design would fit into the local architecture.

Utilities. No utilities are present at the site; however, it is less than 0.1 miles from Smith Road, which contains adequate water, electric, telephone and sewage services for the proposed facility. Solid waste will be handled in the same manner as it has been for years at the refuge office: staff will periodically haul sealed bags of waste by pickup truck to the local landfill. The proposed facility will increase the annual utility costs for the refuge, but will not burden the use of the local community. The annually recurring utility costs for a visitor center will increase the present refuge utility costs without a center, but will not cause an impact on the community.

Safety/Emergency/Law Enforcement Response. Access for emergency responses by fire, medical and law enforcement agencies will still be available on all existing refuge entrances and fire roads. Under this action, the public will have access to the improved grounds, which will include the visitor center/parking area and the 3 mile nature trail. The entrance road will be gated and locked after hours.

Traffic. The site of the proposed visitor center/office building is south of Sunrise Highway (New York State Route 27), off of Smith Road just south of the Long Island Railroad. Smith Road is a two-lane, north-south, town road that begins on the south side of Montauk Highway and continues south with a posted speed limit of 30 miles per hour. Access will be gained from Montauk Highway (Suffolk County Road 80), which is a major east-west highway of three travel lanes (one in each direction and a center lane for traffic turning left). Its posted speed limit is 50 miles per hour (Dunn Engineering Associates, 1999).

The visitor center entrance will be located on the west side of Smith Road, approximately 0.25 miles south of Montauk Highway, where the present entrance road leads to the refuge office and maintenance facility. That portion of Smith Road is flat and straight, with no sight-distance restrictions.

Montauk Highway receives a daily average of approximately 15,500 vehicles traveling in both directions (Suffolk County Department of Public Works). The increase in traffic on Montauk Highway due to the proposed visitor center would be insignificant compared to its present volume. We estimate the traffic for the proposed visitor center would average 50 vehicles a day, or a 0.7 percent increase in the present volume of traffic on Montauk Highway. Smith Road receives a daily average of 5,830 vehicles traveling in both directions (Dunn Engineering Associates 1999). The increase in traffic on Smith Road due to the proposed visitor center would be insignificant compared with its present volume: an increase of about 1.7 percent.

Public Use, Access and Recreational Opportunities

See “Consequences of Alternative A” for a description of the impacts of a deer hunt on public use, access and recreational opportunities. The impacts of the resident Canada goose hunt are described under “Local and Regional Economy.”

Restoration on the Carmans River and Oyster Bay will not adversely impact public access, education, or recreation opportunities. On the contrary, it will provide an outlet to educate visitors about the importance of healthy ecosystems and the positive effects restoration will have on the river and bay flora and fauna.

The proposed actions for Oyster Bay will limit public access to the bay by removing illegal private docks and moorings. That will effectively increase the demand for, and possibly, revenue from legal methods of access. Public recreational opportunities for boating will be limited to those methods. Removing illegal activities will also benefit refuge habitats, enhance their use by waterfowl and other wildlife, increase opportunities for viewing and photographing them, and increase public education and public understanding of the refuge and its resources.

Building a visitor center will increase opportunities for environmental education and interpretation by providing year round interpretive exhibits and programs, space for natural-resource-related events, and a classroom for school groups. That space will minimize distractions for office staff and provide a more enjoyable experience for refuge visitors.

Outreach

Through our outreach proposals, we hope to garner additional support for our land protection and management. In addition, the volunteer program could grow and the Friends of Wertheim could see enhanced membership and support. The proposed headquarters/visitor center will serve as an important resource for the Long Island conservation community, providing meeting and exhibit space for local conservation organizations, as well as educational and recreational opportunities.

Cultural Resources

The actions proposed for Oyster Bay will help protect cultural resources by limiting the disturbance of the shoreline and subtidal activities.

We expect no significant impacts on cultural resources from the construction of a headquarters and visitor center at Wertheim. Our regional archeologist has visited the Complex several times. The L-shaped barn at Seatuck has been placed on the National Register of Historic Structures. No other structures have been proposed, identified or listed. We protect several small cemeteries from disturbances at Wertheim and Morton refuges. Native Americans did inhabit the Long Island region, but no sites have been discovered. The area also was settled early during the Colonial Period, but no historic or cultural resources have been identified. As for the hunting opportunities alternative B proposes, all historic sites at Wertheim and Conscience Point would continue to be protected.

Consequences of Alternative C

Many of the consequences of this alternative are similar to those of Alternatives A and B, as the actions and strategies are often the same.

Effects on Physical Environment

Water Quality and Soils

Eliminating mute swans will impact water quality and soils positively, by providing an opportunity for the re-establishment of submerged aquatic vegetation that act as natural filters of pollutants.

The impacts of aerial application of larvacides and OMWM for mosquito control are described in “Consequences of Alternative A.” This alternative, however, places less emphasis on spraying, and therefore those impacts will be less.

All other impacts from actions are described in other alternatives.

Air Quality

Additional mosquito control measures and the modification of Little Neck Run may impact air quality. Both will have the minimal, short-term impacts described in “Consequences of Alternative B.” In the long term, however, using control measures that do not rely as heavily on aerial spraying to control mosquito populations will improve air quality.

All other impacts from actions are described in other alternatives.

Effects on Biological Environment

Vegetation, Habitats and Wildlife

Eliminating mute swans will positively impact native vegetation and wildlife species. Non-native mute swans are aggressive, and destroy the eggs and chicks of native waterbirds. They also out-compete other waterbirds for food resources, and destroy submerged aquatic vegetation.

All other impacts from actions are described in other alternatives.

Threatened and Endangered Species

Because alternative C increases our emphasis on protecting refuge biological resources, any of its management actions, such as increasing law enforcement patrols or preventing beach access, will positively impact these federally listed species: the endangered piping plover, endangered roseate tern, endangered sandplain gerardia, and threatened bald eagle.

Conserving or acquiring unprotected lands (e.g., Lloyd Harbor, private beach at Target Rock, sandplain gerardia sites) could help in reducing possible habitat degradation resulting from development. Protection of these sites would ensure that valuable habitat would be available long-term for Federal trust species (i.e., piping plover and/or sandplain gerardia).

All other impacts from actions are described in other alternatives.

**Effects on
Socioeconomic
Environment**

Local and Regional Economy

All impacts from actions are described in other alternatives.

**Public Use, Access,
and Recreational
Opportunities**

Restoration will not adversely impact public use, access, or recreational opportunities. It will provide opportunities for public outreach, reduce visitor harassment by aggressive mute swans, and make outdoor recreation more comfortable for visitors by reducing mosquito populations.

Removing bulkhead and restoring native shorelines at Wertheim and Seatuck would help to improve water quality, which will benefit commercial and sport fisheries by providing emergent vegetation to filter nutrients and contaminants, creating better conditions for healthy shellfish beds and a healthier environment for aquatic biota.

All other impacts from actions are described in other alternatives.

Cultural Resources

The management activities in alternative C will not impact protected historic sites.

Consequences Comparison Matrix

Resource Issue	Alternative A Current Management	Alternative B Service-Proposed Action	Alternative C
Effects on Physical Environment: water quality, soils, and air quality			
<i>Deer hunt</i>	No anticipated impacts due to hunt restrictions e.g. the number of hunters allowed in each hunt zone.	Same as alternative A.	Same as alternative A.
<i>Resident Canada goose hunt</i>	Without a resident Canada goose hunt, the heavier concentrations of nitrogenous wastes might lead to eutrophication, excessive algal growth, and decreased water quality.	The hunt will reduce the populations of resident Canada geese, and thus decrease their impacts (described in alternative A). The use of hunting dogs may increase turbidity, but this will be minimized by hunt restrictions. Removal of some geese will help us restore habitat for fall and spring migrants and wintering waterfowl and waterbirds like coots and grebes.	Same as alternative B.
<i>Invasive species removal</i>	All forms potentially may result in minimal or short-term adverse effects. In all cases, restored sites will tremendously improve habitat values. Herbicides and their surfactants possess odors that persist for roughly one day post-treatment, but do not have long-term effects.	Same as alternative A.	Same as alternative A, except eliminating all mute swans will further improve water quality.
<i>Mosquito control</i>	Minimal impacts because larvicide is more target-specific and less persistent in the environment than most chemical insecticides and because of spraying stipulations.	Same as alternative A.	Same as alternative A, except less spraying will occur and thus result in less impact.
<i>Open marsh water management</i>	In the short-term, OMWM might result in landscape alterations, hydrologic changes, and soil compaction. The techniques we use will mitigate these impacts. In the long-term, OMWM increases water quality by decreasing the negative impacts of nutrients, contaminants, and sediments and increasing native emergent vegetation which act as natural filters.	Same as alternative A.	Same as alternative A, but perhaps with a slight increase in impacts from the modification of Little Neck Run.

Consequences Comparison Matrix

Resource Issue	Alternative A Current Management	Alternative B Service-Proposed Action	Alternative C
<i>Prescribed fire</i>	<p>Our small-scale, confined fires with short durations are intended to simulate natural fires. They may minimally alter the amount of soil organic matter in treated areas, and alter soil chemistry and water repellency. The removal of litter and duff results in an overall reduction in the water-holding capacity of soils.</p> <p>Although it has not been quantified, protecting natural lands, vegetation, and wetlands that act as environmental filters helps offset pollution levels and last in perpetuity.</p>	<p>Same as alternative A, but since this alternative places more emphasis on mapping vegetation and researching historic fire regimes, our treatment areas will be more focused and efficient.</p>	<p>Same as alternative B.</p>
<i>Shoreline restoration</i>	<p>No action.</p>	<p>The potential exists for short-term negative impacts. However, since we are restoring natural hydrology and habitats, we expect a long-term improvement of water quality and soil function.</p>	<p>Same as alternative B.</p>
<i>Oyster Bay regulations</i>	<p>Docks contribute chemical and biological pollutants to aquatic ecosystems. The boats associated with docks directly affect sea grasses. The turbidity and sedimentation created during dock construction has numerous short and cumulative impacts on aquatic ecosystems.</p>	<p>Removing illegal private structures and moorings and closely regulating shell fishing and dredging will allow impacted areas to revegetate, thus restoring the bay's natural filtering system.</p>	<p>Same as alternative B.</p>
<i>Visitor center</i>	<p>No action.</p>	<p>Construction will likely cause localized and short-term impacts including soil erosion and compaction, run-off into the Carmans River and an increase in exhaust emissions of construction equipment and particulates raised during ground clearing.</p>	<p>No action.</p>
<i>Increased visitation</i>	<p>No impact.</p>	<p>Increased visitation and vehicle emissions may have long-term negative impacts on air quality but is insignificant compared with existing conditions. Limited parking spaces and visiting hours will control negative impacts.</p>	<p>No action.</p>

Consequences Comparison Matrix

Resource Issue	Alternative A Current Management	Alternative B Service-Proposed Action	Alternative C
Effects on Biological Environment: vegetation, habitats and wildlife			
<i>Deer hunt</i>	The population density of deer will be abated. Positive impacts include increased plant density, increased species diversity, and improved habitat for wildlife.	Same as alternative A.	Same as alternative A.
<i>Resident Canada goose hunt</i>	Resident Canada goose hunting is not proposed under this alternative. However, waterfowl hunting adjacent to and offshore from Conscience Point and Wertheim potentially disturbs birds. Occasional poachers or trespassers cause some disturbance of migratory and resident birds, but the level of that disturbance would likely be lower than that associated with any hunt alternative. The impacts of overabundant populations of resident Canada geese are described in "Effects on Physical Environment."	The proposed hunt will reduce the population of resident Canada geese, and thus decrease their impacts and help us restore habitat for fall and spring migrants and wintering waterfowl. Hunting dog impacts will be minimal because of the restrictions of the hunt. However, the dogs will reduce the loss of downed birds. Hunting parties may flush and displace birds and lead to the inadvertent or intentional take of non-target species. Again, the limitations established for the hunt will keep these impacts to a minimum.	Same as alternative B.
<i>Invasive species</i>	All forms may potentially result in minimal or short-term adverse effects. In all cases, restored sites will tremendously improve habitat values.	Same as alternative A.	Same as alternative A, except eliminating all mute swans will positively impact vegetation and wildlife species.
<i>Open marsh water management</i>	In the short-term, vegetation may appear impacted but will quickly rebound. We are now monitoring our OMWMM program to identify changes in vegetation, invertebrate, fish, and bird communities that may occur. We expect more fish habitat will be available, fewer mosquitoes and <i>Phragmites</i> , and an overall healthier aquatic ecosystem.	Same as alternative A.	Same as alternative A.
<i>Prescribed fire</i>	Reducing the accumulation of fuels with prescribed fire allows us to prevent larger, catastrophic fires. In turn, the burns benefit species and ecosystems maintained by natural fire.	Same as alternative A.	Same as alternative A.
<i>Oyster Bay regulations</i>	No action.	Removing illegal private structures and moorings and closely regulating shell fishing and dredging will enhance vegetation and habitats and benefit waterfowl.	Same as alternative B.

Consequences Comparison Matrix

Resource Issue	Alternative A Current Management	Alternative B Service-Proposed Action	Alternative C
<i>Walking, cross-country skiing, and snowshoeing</i>	These activities may disturb birds e.g., cause them to depart from a site, alter behavior, and increase energy expenditure. Since cross-country skiing and snowshoeing take place in the wintertime they have less of an impact.	Same as alternative A.	Same as alternative A.
<i>Maintenance dredging</i>	Affects wildlife habitats and resources, possibly some fish populations, invertebrates, and bird species.	Same as alternative A.	Same as alternative A.
<i>Sunbathing</i>	May cause various levels of wildlife disturbance and displacement.	Same as alternative A.	Same as alternative A.
<i>Fish stocking</i>	May adversely affect native populations by competing for food resources, preying on juvenile native fishes, introducing diseases, and interbreeding with other species.	Same as alternative A.	Same as alternative A.
<i>Non-motorized boating</i>	May disturb wildlife, particularly waterfowl broods, wintering waterfowl, shorebirds, raptors, and long-legged waders.	Same as alternative A.	Same as alternative A.
<i>Visitor center</i>	No action.	Construction will cause a loss of habitat, reduce the quality of surrounding habitat, and displace wildlife. Increased disturbance to wildlife will result from more vehicles using the new spur of the entrance road. More visitors using the White Oak Nature Trail may also disturb wildlife. We expect minimal impact on migratory birds from constructing a new road. The new half-mile nature trail will reduce the habitat quality of that area for some species. Overall, the disturbed area is minimal compared with the size of Wertheim. The effect on wildlife would be insignificant, and would not impact wildlife populations.	No action.

Consequences Comparison Matrix

Resource Issue	Alternative A Current Management	Alternative B Service-Proposed Action	Alternative C
Effects on Biological Environment: threatened and endangered species			
<i>Deer hunt</i>	The timing and location of deer hunting precludes disturbance of any federal- or state-listed endangered or threatened species; hence, the action will not affect any threatened or endangered species.	Same as alternative A.	Conserving or acquiring unprotected lands (e.g., Lloyd Harbor, private beach at Target Rock, sandplain gerardia sites) could help in reducing possible habitat degradation resulting from development. Protection of these sites would ensure that valuable habitat would be available long-term for Federal trust species (i.e., piping plover and/or sandplain gerardia).
<i>Resident Canada goose hunt</i>	No action.	We initiated the Intra-Service Section 7 Consultation. It will address all of the potential effects of the proposed hunting program on the bald eagle and its habitat. Depending on its results, we may modify the hunting program. The Intra-Service Section 7 Biological Evaluation Form is included in appendix H and will be completed before the release of the final CCP/EA.	Same as alternative B.
<i>Invasive species</i>	Both chemical and mechanical treatments will not impact any known threatened or endangered species.	Same as alternative A.	Same as alternative A.
<i>Open marsh water management</i>	Neutral or minimal benefit to bald eagles, northern harrier, least bittern, and king rail.	Same as alternative A.	Same as alternative A.
<i>Managing piping plover habitat</i>	No impact.	Management activities will benefit piping plovers, roseate terns, and least terns by increasing the amount of suitable nesting habitat, and reducing predator numbers. Bald eagles will have not be impacted.	Same as alternative B.
<i>Mosquito control</i>	No impact.	By reducing the use of mosquito larvicides, we expect higher trophic levels to benefit from a fuller assemblage of invertebrates over the long term. Likewise, marsh-nesting birds will not be subject to the disturbance caused by low-flying helicopters applying the larvicides.	Same as alternative B.
<i>Prescribed fire</i>	No impact.	The ability to plan and localize prescribed fires will alleviate any potential disturbance of threatened and endangered species. Prescribed fire benefits the federal-endangered sandplain gerardia.	Same as alternative B.

Consequences Comparison Matrix

Resource Issue	Alternative A Current Management	Alternative B Service-Proposed Action	Alternative C
<i>Oyster Bay</i>	No impact.	The proposed actions will result in enhanced vegetation and habitats with decreased human disturbance, thus we expect a positive	Same as alternative B.
<i>Visitor center</i>	No action.	No known threatened or endangered species will be impacted by the development, design, and construction of the office headquarters and visitors facility.	No action.
Effects on Socioeconomic Environment: local and regional economy			
<i>Deer hunt</i>	Reduced damage to gardens and ornamental plantings on private lands, fewer vehicle collisions, increase in revenue for local businesses selling food and supplies to hunters.	Same as alternative A.	Same as alternative A.
<i>Resident Canada goose hunt</i>	No action.	We expect negligible impacts to traffic and neighbors, and minimal additional revenues for local businesses and towns. Minor changes in our existing management budget may result.	Same as alternative B.
<i>Prescribed fire</i>	Reducing the accumulation of fuels with prescribed fire allows us to prevent larger, catastrophic fires that may cause loss of property on or near refuge units.	Same as alternative A.	Same as alternative A.
<i>Shoreline restoration</i>	No action.	Restoring shorelines and improving water quality will benefit commercial and sport fisheries by providing emergent vegetation to filter nutrients and contaminants, creating better conditions for healthy shellfish beds and a healthier environment for aquatic biota.	Same as alternative B.
<i>Oyster Bay</i>	No impact.	The removal of illegal private structures, including docks, and moorings, may result in some individuals seeking legal methods for access to the bay. Those legal methods will require individuals to pay fees to their respective local entities. The proposed action may boost the economy, and will certainly increase the demand for legal methods of access to the bay.	Same as alternative B.

Consequences Comparison Matrix

Resource Issue	Alternative A Current Management	Alternative B Service-Proposed Action	Alternative C
<i>Visitor center</i>	No action.	<p>The visitor center may increase visitation to Wertheim and provide an opportunity for local communities to promote and benefit from ecotourism.</p> <p>Noise from construction will be temporary. The facility will not be visible from any public road.</p> <p>The facility will increase the annual utility costs for the refuge, but will not impact the local community.</p> <p>The public will have access to the improved grounds, which will include the visitor center and parking area and the new nature trail. The entrance will be gated and locked after hours.</p> <p>The increase in traffic on both Montauk Highway and Smith Road will be insignificant compared to their present volume.</p>	No action.
<i>Increased visitation</i>	Because this alternative proposes no measures to increase visitation, local businesses will not reap additional benefits.	See consequences of "Visitor center" above.	Same as alternative A.
Effects on Socioeconomic Environment: public use, access, recreational opportunities, and outreach			
<i>Deer hunt</i>	Nature trails at Wertheim are closed when hunting occurs in their vicinity, thus non-hunting visitors are excluded during hunting days. Hunting contributes a negligible number of increased vehicle traffic on nearby roads and a negligible amount of noise to nearby residents.	Same as alternative A.	Same as alternative A.
<i>Resident Canada goose hunt</i>	No action.	We expect negligible impacts to traffic and neighbors, and minimal additional revenues for local businesses and towns. Minor changes in our existing management budget may result.	Same as alternative B.
<i>Invasive species removal</i>	We notify the public when herbicides and mechanical treatments are being used, and restrict access to treated areas throughout the treatment.	Same as alternative A.	Same as alternative A.

Consequences Comparison Matrix

Resource Issue	Alternative A Current Management	Alternative B Service-Proposed Action	Alternative C
<i>Prescribed fire</i>	We notify the public when we use prescribed fire in public use areas, and restrict access to those areas for the duration of the treatment. We offer a public education program and display about fire prevention, and are working with partners to develop more materials. Our goal is to gain understanding and support for our fire management program.	Same as alternative A.	Same as alternative A.
<i>Shoreline restoration</i>	No action.	Restoration on the Carmans River and Oyster Bay will provide an outlet to educate visitors about the importance of healthy ecosystems and the positive effects restoration will have on the river and bay flora and fauna.	Same as alternative B.
<i>Oyster Bay</i>	No impact.	Removing illegal private docks and moorings will increase the demand for, and possibly, revenue from legal methods of access. The benefit to wildlife will translate to increased opportunities for viewing, photographing, and public education and understanding of the refuge and its resources.	Same as alternative B.
<i>Managing piping plover habitat</i>	Closing nesting sites to public access during the breeding season should improve the nesting success of piping plovers and roseate terns.	Same as alternative A.	Same as alternative A.
<i>Increased visitation</i>	No impact.	The visitor center will increase opportunities for environmental education and interpretation by providing year round interpretive exhibits and programs, space for natural resource related events, and a classroom for school groups.	Same as alternative A.
<i>Outreach</i>	No action.	Our outreach proposals may result in additional support for all of our programs. In addition, the volunteer program could grow and the Friends of Wertheim could see enhanced membership and support.	No action.
Effects on Socioeconomic Environment: cultural resources			
<i>All actions</i>	None of the management actions in this alternative will impact any cultural resources.	The actions proposed for Oyster Bay will help protect cultural disturbances by limiting the disturbance of the shoreline and subtidal activities. None of the other management actions will have impacts on cultural resources.	None of the management actions in this alternative will impact any cultural resources.