4 Environmental Effects

Chapter 2 "Affected Environment" discussed the status and condition of Cherry Valley in terms of its physical (air, water, soil, and sound), biological (habitats and species), and socioeconomic environment (public use, land use, tax revenue, and cultural and historic resources), providing essential background status and trends information for assessing potential effects on that environment due to the establishment of a refuge in the valley. Chapter 3 presented alternatives to establishing a refuge and a number of management activities that may occur within each alternative. This chapter describes the foreseeable environmental effects (also impacts, results or consequences) to the Cherry Valley environment from implementing any of the three refuge alternatives described in Chapter 3. For quick reference, we created a table (Table 4-3) at the end of the chapter to compare and summarize the effects we predict for each alternative.

A comparison of potential effects from each alternative provides the Service and the public with important information about what may be the best way to protect valuable wildlife resources within Cherry Valley, yet remain sensitive and knowledgeable about what those land protection measures, and subsequent management activities, may effect in the valley. In this chapter, effects are considered in relation to the issues described in Chapter 1, "Study Purpose and Planning Considerations," and are addressed within three basic themes: physical, biological, and socioeconomic. Conclusions and discussions on effects are determined from published literature or other available information. In the absence of published and available information, we base our comparisons on our professional judgment and experience, and the professional judgment and experience of recognized experts. For details of the alternatives for establishing a refuge, see Chapter 3, "Alternatives." For details of the physical, biological, and human environment of the refuge, see Chapter 2, "Affected Environment."

When discussing effects we express them as "positive," "negative," or "no effect." A positive effect would benefit or enhance the fish and wildlife resources, or physical or socioeconomic environment under consideration and help accomplish Study Act and potential refuge goals. A negative effect arises from an action that we predict would be detrimental to the valley's natural resources, physical attributes, or socioeconomic environment, and that may impede our ability to achieve the intent of the Study Act and potential refuge goals. No effect means no recognized or discernible effect, either positive or negative. In addition, effects are discussed whether they are direct, indirect, or cumulative, and whether they are short-term or long-term.

As required by the Council on Environmental Quality (CEQ) and Service regulations implementing NEPA (Chapter 516 of the Departmental of Interior Manual), we assessed the importance of the effects of our alternatives based on their *context* and *intensity*. Their context ranges from site-specific to broad regional effects (Table 4-1). Although

any potential refuge would compose a small percentage of the context within the large regional ecosystems around it, we developed the alternatives in relation to how they may contribute to achieving fish and wildlife conservation in Cherry Valley. Context also addresses regional effects related to the socioeconomic and physical environment. We evaluated the intensity of effects based on the expected degree or percentage of natural resource, physical, or socioeconomic change from current conditions, and whether it is positive or negative, or neutral.

Table 4-1. Context Considerations for Potential Cherry Valley National Wildlife Refuge, Monroe County, Pennsylvania.

Region or Locale	Acres
Northern Appalachian Ridge & Valley Province	11.4 million acres
Appalachian Mountain Bird Conservation Region	100 million acres
Delaware River Watershed	8.66 million acres
Cherry Valley Watershed	30,000 acres
Cherry Valley Study Area (CVSA)	31,500 acres
CVSA Ecosystems	20,550 acres
CVSA Developed Lands	6,130 acres
CVSA Agricultural Lands	3,860 acres
CVSA Open Space & Recreational Lands	35 acres
CVSA Public Lands	4,480 acres

The refuge establishment alternatives and activities we propose are consistent with the mission of the Service, the mission of the Refuge System, and their respective policies and directives. They are also consistent with the international, national, state, regional, and local plans or initiatives identified in Chapter 1. At varying levels, each alternative would contribute neutrally or positively to larger, landscape-scale conservation. Finally, this chapter identifies any permanent commitment of resources and the relationship between short-term uses of the environment and its long-term productivity.

4.1 Effects on the Physical Environment

4.1.1 Effects on Air Quality

Monroe County is included in the Wilkes-Barre/Scranton, Pennsylvania airshed. Monroe County meets or is marginal for all regulated air pollutants including ozone, carbon monoxide, nitrogen diozide, sulfur dioxide, particulate matter and lead (DEP 2008). Two adjacent counties, however, are in non-attainment status including Northampton County, PA for 2.5 particulates and Warren County, New Jersey for sulfur dioxide (EPA 2008). No major stationary or mobile sources of air pollutants are present within the potential refuge boundary. None of the alternatives as defined herein would result in air quality exceeding EPA air quality criteria; all three would comply with the Clean Air Act. Wildfires are not a substantial concern in the region because they occur infrequently, and the rapid local response quickly limits their extent.

Alternative A -- No Refuge

In considering Alternative A, the No Refuge alternative, we have determined that there will be as yet unquantifiable negative effects from increases in the degradation of air quality in general in Monroe County and the region because of the continuing development. Although building and residential development has declined since 2005, development continues. That development brings with it pollution due to long term increases in traffic, industrial discharge, and construction related emissions. The same values that have shaped the landscape over the years also frame concerns related to the loss of agricultural land and open space to development, clean air and water quality, litter, wetland destruction, and increased traffic (BLOSS Associates 2004). Not having a refuge in the valley will simply mean that current land protection measures will have to be relied upon to protect open space and wildlife habitats that can help to mitigate the effects of an increasing population and development pressure on air quality.

Alternative B -- Diverse Habitat Complex

The most positive effect of establishing a refuge would be the natural role an intact vegetated environment serves in processing carbon dioxide and oxygen, and purifying air. Trees and other plants absorb and use carbon during photosynthesis, to build plant tissue while releasing oxygen in that metabolic process. Thus, through photosynthesis process, trees and other plants naturally remove excess carbon from the air, often expressed as carbon sequestration. According to Vicki Wolf (2004) in her article "Trees: A resource we can't afford to waste," one acre of trees provides enough oxygen for 18 people and absorbs as much carbon dioxide as a car produces in 26,000 miles. Additionally, during photosynthesis, other airborne chemicals are removed from the atmosphere such as nitrogen oxides, benzene, formaldehyde, airborne ammonia, some sulfur dioxide, and ozone, that are part of smog and greenhouse effect problems. Trees are natural filters that can significantly improve air quality by collecting dust and other impurities which are later washed to the ground during a rainstorm. Exposure to air pollutants, including ozone, toxins, and particulate matter, is associated with respiratory disease, asthma, heart disease and other illnesses. Car and industrial fumes and odors often can be processed and neutralized by trees, or masked by the more-pleasing smells of blooming trees or shrubs and conifer forests. "Rapid urbanization during the past 50 years has been associated with increases in downtown temperatures of nearly 1° F per decade – largely caused by the increase in exposed heat absorbing surfaces, such as dark rooftops, parking lots, and streets" (Local Government Commission, "Livable Communities and Urban Forests" fact sheet, pg 2). Consequently, trees and other plants directly contribute to maintaining the air quality of Monroe County and the surrounding region. Managing habitats through restoration measures and potential silvicultural practices could keep the vegetated landscape actively growing, thus contributing to carbon sequestration.

By creating a refuge, another significant positive effect would be the protection of this area from development which has inherent liabilities regarding air quality. Development activities often remove vegetation and its air purifying functions, while creating air pollution through heavy equipment and construction activities (road, sewage, electrical, and building construction). Once developments are in place, traffic increases with associated increases in air pollution. Industrial pollution may occur depending on the character of the development. Hard surface environments adsorb heat, causing ambient temperatures to increase.

The potential negative air quality effects of a Cherry Valley NWR could include standard management activities such as setting prescribed fires to manage grasslands, applying herbicides to control invasive plants, blowing dust from construction sites, roads, and trails, and emissions from vehicles and equipment. These are manageable activities and measures can be taken to assure minimal effects. The Service limits the uses of the refuge to compatible, wildlife-oriented, consumptive and non-consumptive uses, and thus, curtails anthropogenic sources of emissions by maintaining forested and non-forested wetlands, grasslands, and early successional sites in natural vegetative cover. Trail maintenance and parking lot construction would cause negligible short term, localized effects from dust and vehicle and equipment exhausts. Operating the refuge facilities would continue to contribute slightly in local stationary source emissions. Therefore, in analyzing the effects on air quality, we considered only how Service actions at the refuge might affect criteria air pollutants, visibility, and global warming to a minimal degree, focusing instead on the potential for localized air quality impacts or improvement. None of the potential conceptual management activities would affect visibility due to emission haze.

In the future, positive effects on air quality could occur by restoring developed areas that are no longer needed for refuge administration or programs to natural conditions, thus eliminating these locations as potential air emission sources. To offset energy use at an established refuge that would be expected to have buildings and associated facilities, the Service would adopt energy efficient practices to reduce the refuge's contribution to emissions.

Projected annual refuge use levels are impossible to project at this time; however, we predict some increase in vehicle emissions on and near the refuge in the long term. The contribution to cumulative local and regional air quality effects would likely be compensated for to a large degree by precluding development in the refuge area. There would be virtually no localized increases on the refuge, compared to the current off-refuge contributions to pollutant levels and likely increases in air emissions from land development in the valley during the foreseeable future. The benefits of maintaining the refuge in natural vegetation would more than offset the predicted increase in vehicle emissions associated with creating a refuge. Consequently, we conclude that the emissions from sources on the refuge would not cause cumulative effects on air quality.

Alternative C – Wetlands & Ridge Forests

The effects of Alternative C on air quality would be largely positive, and would contribute all of the benefits as described in Alternative B. The benefits derived from this alternative would be somewhat less since the size of this refuge would be 14,124 acres instead of 20,466 acres. In a similar fashion, the negative effects would be essentially identical to Alternative B but of a slightly lesser degree due to the smaller potential size of this alternative.

4.1.2 Effects on Water Quality

Cherry Creek is a second-order stream contained within a 13,343 acre watershed (of which 12,958 acres are within the Study Area). It benefits from numerous tributaries erupting from limestone aquifers, which account for most of the available water in the valley (BLOSS Associates 2004). Because of the limestone formations, Cherry Creek has a higher pH, alkalinity, and total dissolved solids than is found in most area streams, which are generally acidic and have a low mineral content. Consequently, water quality throughout the Cherry Creek watershed is generally excellent (Brodhead Watershed Association 2008). Monitoring sites on Cherry Creek are tested each month as part of the Cherry Creek Streamwatch Program, which reports unusual results to Department of Environmental Protection for follow-up and action.

Alternative A -- No Refuge

While water quality scoring for repeat sites through 2003 by the Cherry Creek Streamwatch Program have displayed an upward trend, strong growth pressures in the region and sprawl development patterns could have adverse negative effects on both the quality and quantity of the watershed's surface and groundwater. Rooftops, increasing traffic, parking lots and streets are slowly replacing forests and fields. Rain and snowmelt run rapidly off these man-made surfaces instead of soaking into the ground. This storm water, non-point runoff carries sediment and petroleum based pollutants into the streams, accelerates steam-bank erosion and in-stream turbidity, and raises stream temperatures (BLOSS Associates 2004). These effects can have a direct effect on aquatic life in stream habitats, including submerged aquatic vegetation, breeding fish and invertebrates. The No Refuge alternative would result in the reliance on existing land protection and water quality control measures to help safeguard surface and ground water quality in the valley.

Alternative B -- Diverse Habitat Complex

By establishing a refuge up to 20,466 acres in land acquisition and easements, we would provide substantial additional watershed benefits by limiting land clearing and development, non-point sources of sediment-laden pollution and petroleum-

hydrocarbon pollution, and detrimental changes in local hydrology due to increases in impervious surfaces that might otherwise affect valley areas from development. Establishing a refuge under this alternative would enable the protection of emergent, shrub, and forested wetlands, creek and river segments, ponds, vernal pools, and extensive upland forests. Retaining these habitats would enable them to continue their ecological functions for dispersing flood waters along bottomlands and adsorbing precipitation, facilitating a more natural snow melt and surface flow runoff, promote groundwater recharge, and purify water through soil and bedrock percolation. Management of selected agricultural lands as grasslands could reduce or eliminate the use of herbicides and pesticides. Having refuge lands would promote improved water quality monitoring for early problem identification, and would improve cooperation of other landowners in watershed to influence water quality.

If a refuge were established, we would take a number of steps to insure that we have sufficient scientific data to support management decisions regarding refuge hydrology and water quality. We would work with State agencies and other conservation partners to identify sources of point and non-point sediment and nutrient loading (e.g. septic systems, erosion, etc) impacting refuge wetlands, and associated lakes and rivers, and address these sources where possible. We would closely monitor and mitigate all of our routine activities that have some potential to 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 salts and chemicals for de-icing roads and walkways, and use of soaps and detergents for cleaning vehicles and equipment. All staff would be trained in spill prevention and spill response, and all appropriate steps and training would be conducted to assure the effective control of invasive plants using herbicides.

The Service limits the uses of the refuge to compatible, wildlife-oriented, consumptive and non-consumptive uses, and thus, curtails anthropogenic sources of water-borne pollutants by maintaining forested and non-forested wetlands, grasslands, and early successional sites in natural vegetative cover. Currently there is no reliable way to estimate potential visitor use and effects on natural resources and water quality due to potential future use. We expect use would include walking trails and related “non-motorized” activities. These activities tend to be of minimal damage to a landscape unless use occurs in steep, highly erodible areas., which is avoided. In analyzing the effects of public use on water quality, we principally considered how Service actions at the refuge might affect criteria water pollutants locally, which will enable an ability to determine any effects on regional water quality conditions.

Alternative C -- Wetlands & Ridge Forests

The effects of Alternative C on water quality would be largely positive, and would contribute all of the benefits as described in Alternative B. The benefits derived from this alternative would be smaller since the size of this refuge would be 14,124 acres

instead of 20,466 acres. In a similar fashion, the negative effects would be essentially identical to Alternative B but of a slightly lesser degree due to the larger potential size of this alternative.

4.1.3 Effects on Soils

Soils are the structural matrix and nutrient source for plant productivity at the refuge and must be protected to sustain the variety of wetland, riparian, and upland habitats that would meet our habitat and species management goals. Most of the soil types within the Study Area were formed from glacial till, outwash, and alluvium, and tend to erode easily. Overall, however, the soils within the Study Area are productive and in good condition, with no substantive erosion, compaction, or contamination problems. In certain areas such as Kittatinny ridge cliffs, soils are absent or patchy, thin, and susceptible to disturbance so we would manage these areas to limit any human disturbance. We evaluated and compared the management actions suggested for each alternative on the basis of their potential to benefit or adversely affect upland soils and soils of the refuge's floodplains and riparian areas. Impacts of the alternatives to wetland soils are discussed in the wetlands section.

Alternative A -- No Refuge

Alternative A is the least desirable alternative in terms of potential benefits from acquisition and conservation of lands and the potential for habitat protection and soil preservation. Although development in the valley has declined since 2005, it continues nevertheless and the Service would not be able to contribute to measures that maintain and protect soils . There would be no opportunity for the USFWS to protect or restore roads, trails, or other existing sites within the potential acquisition boundary, thus soil impacts from development or unmanaged use of those lands would continue and likely would increase over the long term.

Alternative B -- Diverse Habitat Complex

Alternative B would provide positive effects compared to alternative A since creation of a Cherry Valley NWR would reduce the potential for large-scale development and related human disturbance on these lands and reduce the long term potential for the resulting soil impacts. Maintaining and improving extensive habitat areas for fish and wildlife would automatically provide for the retention of healthy soils. It is unlikely that any significant forest management operations or extensive land alterations would occur on new refuge lands. However, restoration of roads and trails and fire suppression practices on new refuge lands would help reduce soil erosion from such disturbed sites.

The potential adverse soil effects of conceptual refuge management activities that were evaluated included impacts from construction of buildings, parking facilities,

access roads, and interpretive trails forest management activities, including tree-cutting, and use of roads for focal species management, hiking and other refuge visitor activities. We would use best management practices in all management activities that might affect refuge soils to ensure that we maintain refuge soil productivity. We would restore developed sites with buildings or other infrastructure that have been acquired or that are no longer needed for refuge purposes to natural topography and hydrologic conditions and return to native vegetation as quickly as feasible. In general, existing main access roads would remain open to provide motorized and non-motorized access for approved activities. Other designated motorized access may be developed but cannot be defined at this time. Off-road vehicles, such as motorbikes and ATVs, would not be allowed on the refuge since these vehicles can cause serious soil disturbance, compaction, and erosion. Deteriorating forest roads can also be a locus for such soil impacts, and these would be eliminated or improved as appropriate.

Creation of a Cherry Valley NWR would stimulate visitor use of refuge lands. The Service limits the uses of the refuge to compatible, wildlife-oriented, consumptive and non-consumptive uses, and thus, curtails anthropogenic sources of soil disruption and erosion by maintaining forested and nonforested wetlands, grasslands, and early successional sites in natural vegetative cover. Currently there is no reliable way to estimate potential visitor use and effects on natural resources and soils due to potential future use. We expect use would include walking trails and related "non-motorized" activities. These activities tend to be of minimal damage to a landscape unless use occurs in steep, highly erodible areas, which is avoided. In some cases, for example, protective boardwalks and topographically sensitive trails are used to minimize soil disturbance. The potential negative soil effects of the suggested conceptual management activities could include, for example, burning prescribed fires, grazing to maintain bog turtle sites and grassland, constructing parking facilities, access roads, and interpretive trails, and providing refuge visitor activities and hunt programs. In analyzing the effects of public use on soils, we principally considered how Service actions at the refuge might affect soils locally, which will enable an ability to determine any effects on regional basis if necessary.

Alternative C -- Wetlands & Ridge Forests

The effects of Alternative C on soils would be largely positive, and would contribute all of the benefits as described in Alternative B. The benefits derived from this alternative would be smaller since the size of this refuge would be up to 14,124 acres instead of up to 20,466 acres. In a similar fashion, the negative effects would be minimal, and would be essentially identical to Alternative B but of a slightly lesser degree due to the smaller size of the potential refuge in this alternative.

4.2 Effects on the Biological Environment

4.2.1 Effects on Habitats and Ecosystems

In 2008, the Pennsylvania Natural Heritage Program identified and mapped thirteen ecological system types (Table 2-2) totaling 20,548 acres within the Cherry Valley National Wildlife Refuge Study Area (WPC 2008). The ecological systems cover about 65 percent of the Study Area and are located within a mosaic of forest, wetlands, agriculture (active and abandoned fields), quarries, villages and housing developments (Figure 2-4). For convenience, these ecosystems are discussed in three broad habitat categories: wetland and riparian; forested uplands; and agricultural lands and grasslands. Within the Study Area there are 1,746 acres of wetlands and riparian areas, 18,800 acres of upland forest, and 3,864 acres of agricultural lands and grasslands. Of these, 6,312 acres are currently protected with the remaining acres subject to potential development and potential degradation. A summary of acres within each of the three broad habitat types by alternative is presented in Table 4-2.

Table 4-2. Summary of Broad Habitat Types Protected by each Alternative for establishing a Cherry Valley National Wildlife Refuge, Monroe County, Pennsylvania.

Broad Habitat Type	Alternative A No Refuge	Alternative B Diverse Habitat Complex	Alternative C Wetlands and Ridge Forests
Wetlands and Riparian	450 acres	1,436 acres	1,089 acres
Forested Uplands	4,360 acres	12,921 acres	9,912 acres
Agricultural Lands and Grasslands	1,502 acres	3,425 acres	1,713 acres
Total Acres	6,312	17,782 acres	12,714 acres

Alternative A -- No Refuge

Currently 450 wetland acres, over 4,300 acres of upland forests, and 1,500 acres of agricultural lands and grasslands are protected in the valley. As discussed in Chapter 2 (Affected Environment) and Chapter 3 (Alternatives), these broad habitats provide habitat for a broad array of federal trust species and state species of importance, representing a major component of the valley's biodiversity and providing an intact environment for Cherry Creek. These habitats help protect the creek from the effects of nearby human activities and development. Some of the prominent wetland areas already protected include emergent wetlands and riparian areas along Cherry Creek conserved by The Nature Conservancy and the Pocono Heritage Land Trust. Expansive forest tracts already protected include lands along the top of Kittatinny Ridge managed by the National Park Service and the Pennsylvania Game Commission, and agricultural

lands and grasslands protected under Pennsylvania's agricultural easement program are scattered across the valley.

The no refuge alternative would likely present long term and cumulative negative effects since it would not provide any of the additional and needed protection measures for the valuable inter-montane wetlands, Kittatinny Ridge forests, and grasslands in the valley. Lack of strengthened protection measures would impede abilities to enhance habitat for federal trust species (e.g., bog turtle) and associated plants and animals. Continued development could lead to siltation and other forms of non-point source pollution, and also exacerbate the chronic struggle to prevent habitat fragmentation and its known negative effects on many species of wildlife and plants. Continued development invites the spread of invasive species, widely recognized as pioneer species that quickly establish in disturbed landscapes. Land and habitat protection efforts and programs noted in earlier chapters would continue to be the basis of protecting these areas, and conclusions have been reached already that these measures are inadequate. As noted earlier, development in Monroe County has declined somewhat since 2005. However, development pressure still exists and without further guarantees for protecting the wildlife habitat values in the valley, the development pressures in the valley could just as easily increase at some point in the future thereby jeopardizing or displacing these essential habitat areas.

Alternative B -- Diverse Habitat Complex

With Alternative B, the Service would potentially protect through conservation easement or fee title up to 20,466 acres of wetland , forested upland, and agricultural/grassland habitats, an additional 6,332 acres compared to Alternative C (Table 3-2). We conclude that establishing the refuge to embrace these habitats would be a major positive effect for Cherry Valley. This alternative would enable protection of over 1,400 wetland acres, 12,900 upland forest acres, and 3,400 acres of agricultural and grasslands (Table 4-2).

One of the primary benefits of Alternative B is the protection of various aquatic resources in the valley. The amount of protected wetlands and streams is more than triple the "No Action" alternative (Table 4-2). The extremely diverse wetlands and calcareous fens are of singular importance because their continuous groundwater seepage and open vegetation create habitat suitable for the threatened bog turtle as well as supporting an assemblage of plant species unique to this wetland type. Protecting additional riparian and creek habitat would benefit other aquatic resources as well including native brook trout, American eel, and possibly dwarf wedgemussel.

This area within Cherry Valley contains one significant cave, known as Hartman's Cave, which has been listed as a "special concern" bat hibernaculum by the Pennsylvania Game Commission because at least five species of bats have been known to use the cave (WPC 2008). Emergent wetlands provide spring and fall migratory waterfowl and

shorebird habitat, and foraging bats and wintering raptor foraging habitat. Upland forests would serve as breeding, foraging, migratory, and wintering habitat for a host of neo-tropical migratory birds and resident gamebirds. Maintenance of existing grasslands and conversion of select agricultural lands to grassland habitat would benefit bobolink, meadowlark, grasshopper sparrow, and other grassland birds suffering from habitat loss. Further details on habitat benefits for trust species and species of concern offered by this alternative are presented in Chapter 3 -- Alternatives B and C, and Chapter 2 -- Affected Environment.

This alternative would almost certainly present long term and cumulative positive effects since it would provide the additional and needed protection measures for the valuable inter-montane wetlands, Kittatinny Ridge forests, and grasslands in the valley. Having the ability to protect lands and habitats within a refuge would greatly strengthen protection measures, thereby enhancing abilities to improve habitat for bog turtle and associated wetland plants and animals. Buffering these sensitive habitats from development while maintaining the current vegetation cover, would impede siltation and other forms of non-point source pollution, and it would directly mitigate the threat of habitat fragmentation and its known negative effects on many species of wildlife and plants. Curtailed development provides a natural barrier to the spread of invasive species, thus preventing these pioneer species from quickly establishing stable and expanding populations in disturbed landscapes. Refuge land protection in concert with existing land and habitat protection efforts and programs noted in earlier chapters would represent a much stronger “tool box” of protection mechanisms to better guarantee the integrity of the valley’s natural and rural character. Management of new refuge habitats would conserve the values discussed above, through habitat improvements and progressive acquisition and protection of additional habitat areas.

We believe habitat management activities conducted by the Service, although not yet well defined, would have minimal negative effects. We would not significantly alter any of the intact habitats, but may conduct activities (e.g., forest cuttings, invasive species control, permitted grazing) that could have very temporary negative effects. Wetlands and floodplains may be at some minimal risk of indirect effects from Service activities in upland areas that drain into them from leaks or spill accidents involving chemicals or petroleum products used in refuge management operations. Our leak and spill prevention and emergency clean-up procedures should ensure that such occurrences are rare, small, and are addressed immediately, limiting those short-term effects to the immediate location. We would employ accepted forest management practices on these lands, typically with longer rotation ages than commercial timber operations use, which would result in increased carbon sequestration. The predominance of more mature stands would improve the health, diversity, and resilience of the forest to disturbance and disease and insect outbreaks, thus maintaining an important carbon “sink.” Conversion of select agricultural lands to grasslands through soil grading, preparation, and seeding, would present minimal negative effects, and any appropriate non-point source controls would be practiced

Alternative C -- Wetlands & Ridge Forests

In the "Wetlands and Ridge Forests" alternative, the Service would potentially protect through conservation easement or fee title up to 14,124 acres of wetland, forested upland, and agricultural/grassland habitats. We conclude that establishing the refuge to embrace these habitats would be a major positive effect for Cherry Valley. This alternative would enable protection of over 1,000 wetland acres, 9,900 upland forest acres, and 1,700 acres of agricultural and grasslands.

Alternative C would encompass many of the benefits of Alternative B; however, the benefits derived from this alternative would be smaller since the size of this refuge would be 14,124 acres instead of 20,466 acres. In a similar fashion, the negative effects would be essentially identical to Alternative B but of a slightly lesser degree due to the smaller potential size of this alternative.

4.2.2 Effects on Migratory Birds

Alternative A -- No Refuge

There would be negative effects on migratory birds resulting from the No Refuge alternative, principally due to the lost opportunity to protect significant amounts of habitats relied upon by these species on a local, regional, and continental scale. All of the habitat types and ecosystem types within the valley offer different forms of habitat to nearly every group of birds that inhabit eastern North America – raptors, waterfowl, colonial nesting birds, shorebirds, secretive marsh birds, grassland birds, and a diverse array of neotropical migratory birds. These habitat types and ecosystem types would continue to be threatened by encroaching development and other disturbances of an expanding human population competing for lands and water. Species in decline, or that are otherwise of conservation concern (Table 2-4), would directly be effected by an inability to further protect their habitats through refuge acquisitions, and subsequent habitat management improvements. The negative effects would be cumulative over time, and in a broader context may contribute to a diminished regional habitat complex for these important denizens of the valley.

Alternative B -- Diverse Habitat Complex

In the "Diverse Habitat" alternative, the Service would potentially protect through fee and easement acquisition up to 20,466 acres of wetland , forested upland, and agricultural/grassland habitats (Table 3-2). Protection of these lands and habitats for migratory birds is a driving factor in the Study Act and this Study Report, and would have direct, immediate and long term positive effects on resident, breeding, migratory, and wintering species of migratory birds and game birds. Narrative background on the status of migratory birds in the valley, along with Table 2-4 in the Affected Environment

chapter, provides a clear indication of the species that are imperiled or in some stage of decline, and the habitats they rely upon.

As discussed in Chapter 2, the large blocks of unfragmented forest throughout the Kittatinny Ridge serve as key breeding sites for many interior-forest birds, including ruffed grouse, wood thrush, ovenbird, scarlet tanager, cerulean warbler, worm-eating warbler, Louisiana waterthrush, Acadian flycatcher, and many others. Some of these are species of conservation concern that may be on the brink of being threatened or endangered, or are on the Audubon National Bird Conservation WatchList. Others such as the bald eagle have improved significantly over their range and were removed from Endangered Species Act protections in 2007. As provided by the National Bald Eagle Management Guidelines, it is imperative to continue to protect vital eagle habitat and avoid habitat fragmentation and human disturbance.

Providing a diversity of habitats and ecosystems defined in Alternative B would contribute significantly to wellbeing and stability of birds in the valley while also contributing to the regional and continental goals of the Appalachian Mountain Bird Conservation Region and its associated conservation concept plan. Even more broadly, land protection carried out through Alternative B would contribute directly to goals of the Conservation Plan for the Kittatinny Ridge in Pennsylvania, and the other bird conservation plans noted in Chapter 1 – Study Purpose and Planning Considerations and Chapter 3 –Alternatives.

Once acquired, habitats would be managed to enhance their ecological function for migratory bird and to maintain their health and viability over the long term. Wetlands would be a priority for protection, and would be managed for waterfowl and associated colonial wading birds and secretive marsh birds. Forests would be managed to assure their value as breeding habitat for neotropical migrants, along with other needs such as black bear and balanced populations of white-tail deer. Grasslands would serve the needs of bobolink, meadowlark, and several sparrow species, and could be expanded into viable breeding units for select species through wildlife management applications on adjacent agricultural lands.

Further details on management for migratory birds are presented in Appendix B – Conceptual Management Plan, and potential negative effects of habitat management activities on a new refuge are covered above in the “Habitat and Ecosystems” section.

Alternative C -- Wetlands and Ridge Forests

In the “Wetlands and Ridge Forests” alternative, the Service would potentially protect through fee and easement acquisition up to 14,124 acres of wetland , forested upland, and agricultural/grassland habitats (Table 3-3). As described in Alternative B, protection of these lands and habitats for migratory birds is a driving factor in the Study Act and

this Study Report, and would have direct, immediate, and long term positive effects on resident, breeding, migratory, and wintering species of migratory birds and game birds.

Providing a diversity of habitats and ecosystems defined in Alternative C would contribute significantly to the wellbeing and stability of birds in the valley while also contributing to the regional and continental goals of the Appalachian Mountain Bird Conservation Region and its associated conservation concept plan. Even more broadly, land protection carried out through Alternative C would contribute directly to goals of the Conservation Plan for the Kittatinny Ridge in Pennsylvania, and the other bird conservation plans noted in Chapter 1 – Study Purpose and Planning Considerations and Chapter 3 –Alternatives.

Alternative C would encompass all of the benefits of Alternative B; however, the benefits derived from this alternative would be smaller since the size of this refuge would be 14,124 acres instead of 20,466 acres. In a similar fashion, the negative effects would be essentially identical to Alternative B but of a slightly lesser degree due to the smaller potential size of this alternative.

4.2.3 Effects on Endangered and Threatened Species

Alternative A -- No Refuge

The no refuge alternative would likely present long term and cumulative negative effects on threatened and endangered species (i.e., listed species) since it would not provide any additional protection measures for the valuable inter-montane wetlands, Kittatinny Ridge forests, and grasslands in the valley. Lack of strengthened protection measures would impede abilities to enhance wetland habitat for bog turtle, and would directly impede opportunities to meet the multiple goals (re: Affected Environment – Chapter 2) of the bog turtle recovery plan which recognizes extant habitats in the Delaware recovery unit as critically important for the overall recovery of this threatened species (USFWS 2001) . Continued development could lead to siltation and other forms of non-point source pollution, and also exacerbate the chronic struggle to prevent habitat fragmentation and expansion of invasive plants, both known to have negative effects on this species, as well as most others. The no refuge alternative would also hamper any efforts to acquire and manage new habitats that may serve to attract formerly occurring listed species such as the Indiana bat and the dwarf wedgemussel, species that live nearby and could expand into the valley with appropriate habitat protections and management. Local land and habitat protection efforts and programs noted in earlier chapters would continue to be the basis of protecting these areas, and conclusions have been reached already that these measures are inadequate, especially for sensitive species such as bog turtle and dwarf wedgemussel. Without further guarantees for protecting the wildlife habitat values in the valley, the development pressures in the valley could ultimately jeopardize displacing habitats for these imperiled species.

Alternative B -- Diverse Habitat Complex

Narrative background on the status of listed species in the valley in Chapter 1 and 2, and Table 2-4 in the Affected Environment -- Chapter 2, provide ample information on the nature and status of listed species that are imperiled or in some stage of decline, and the habitats they rely upon.

Protection of these lands and habitats for threatened and endangered species, as with migratory birds, is also a driving factor in the Study Act and this Study Report, and would have direct, immediate, and long term positive effects on the bog turtle, and would offer immediate opportunities to assist in the recovery of the Indiana bat and the dwarf wedgemussel. For bog turtle, refuge wetland habitat protection would provide opportunities for the refuge to contribute to six of eight goals in the 2001 recovery plan: 1) secure long-term protection of bog turtle populations, 2) conduct surveys of known, historical, and potential bog turtle habitat, 3) investigate the genetic variability of the bog turtle throughout its range, 4) manage and maintain bog turtle habitat to ensure its continuing suitability for bog turtles, 5) conduct an effective law enforcement program to halt illicit take and commercialization of bog turtles, and 6) develop and implement an effective outreach and education program about bog turtles. Within the recovery plan, the goal for the Delaware recovery unit is to protect at least 80 viable bog turtle populations and sufficient habitat to ensure the sustainability of these populations. This recovery unit is divided into east and west subunits, of which Cherry Valley lies in the Delaware west subunit, consisting of the Delaware River watershed west of the Delaware River. To meet the recovery criterion for this unit, at least 20 populations must be protected in the Delaware West Subunit (USFWS 2001). Establishment of a refuge in the valley through Alternative B would, again, contribute directly to this goal.

The large blocks of unfragmented forest, and forested and shrub wetlands, throughout the ridge and valley are believed to serve as valuable foraging habitat for Indiana bats. Alternative B offers a chance to permanently secure Hartman's cave and its environs, widely recognized as a site that may once again serve as a hibernaculum for this species, if properly protected and managed. Acquiring select aquatic habitats and ecosystems defined in Alternative B offer an opportunity to secure habitats that could be improved for possible reintroduction of dwarf wedgemussel.

Once acquired, habitats would be managed to enhance their ecological function for listed species, notably bog turtle. Wetlands would be a priority for protection, and would be managed for bog turtles, and as mention previously, waterfowl, associated colonial wading birds, and secretive marsh birds. Forests would be managed to assure their value as foraging habitat and potential female maternity roosts in summer. While management activities could have some negative effects on listed species, there would be long-term benefits to the populations over time. Any effects on listed species associated with management activities would be addressed through consultation under the ESA. Further details on management for listed species is presented in Appendix B –

Conceptual Management Plan, and potential negative effects of habitat management activities on a new refuge are covered above in the "Habitat and Ecosystems" section.

Alternative C -- Wetlands & Ridge Forests

In this alternative -- "Wetlands and Ridge Forests" -- the Service would potentially protect through fee title and conservation easements up to 14,124 acres of wetland , forested upland, and agricultural/grassland habitats (Table 3-3). Alternative C would encompass all of the benefits of Alternative B; however, the benefits derived from this alternative would be smaller since the size of this refuge would be 14,124 acres instead of 20,466 acres. In a similar fashion, the negative effects would be essentially identical to Alternative B but of a slightly lesser degree due to the smaller potential size of this alternative. As with Alternative B, management activities could have negative effects on listed species; however, there would be long-term benefits to the populations over time. Any effects on listed species associated with management activities would be addressed through consultation under the ESA.

4.2.4 Effects on Interjurisdictional Fish and Aquatic Organisms

Alternative A -- No Refuge

The No Refuge alternative would likely present long term and cumulative negative effects on interjurisdictional fish and aquatic organisms since it would not provide newly needed protection measures for the valuable inter-montane wetlands, streams, and riparian habitats. In most areas, riparian vegetation is well-established and stable, providing a thick canopy important to fish, especially trout populations, including native brook trout in upper reaches or tributaries of Cherry Creek. Currently, about 78 acres of stream and riparian habitat are protected, considerable less than the additional acres that could be offered in the other alternatives. Some creeks and streams are more vulnerable to point- and non-point source pollution, depending on their proximity to development, and this "No Refuge" alternative would negate any new efforts to impede non-point source pollution. As noted in the "Habitat and Ecosystems" section above, the greatest impediment with Alternative A is the continued inadequacies of land protection measures for the valley's fish and wildlife resources.

Lack of strengthened protection measures would impede abilities to enhance stream and riparian habitats that are known to be used by American eel, an interjurisdictional fish species facing significant declines due to an internationally-based high consumer demand (especially for juvenile glass eels), insufficient harvest limits, hydropower dams and other blockages on rivers and streams used by migrating eel, and a general degradation of freshwater habitats. Concern for the eel by the Atlantic States Marine Fisheries Commission resulted in the Service and the National Marine Fisheries Service considering the species for possible listing under the ESA, but the review indicated that although there remain serious concerns, listing was not warranted (USFWS 2007a).

Protection of eel habitat is an essential measure needed to safeguard this species, a safeguard not provided by Alternative A. The no refuge alternative would also hamper any efforts to protect and manage habitats that may serve to attract other interjurisdictional species such as herring (*Alosa* spp) and striped bass. Further details on management for listed species are presented in Appendix B – Conceptual Management Plan, and potential negative effects of habitat management activities on a new refuge are covered above in the "Habitat and Ecosystems" section.

In addition to interjurisdictional fish, over 40 other fish species have been identified within the Study Area (Appendix C, Table C-2). Three mussel species have been identified in Cherry Creek. The relatively common eastern elliptio and creeper mussels appear to have stable populations, while the triangle floater has been classified as vulnerable by the Pennsylvania Natural Heritage Program. The alewife floater and the yellow lampmussel may also be in decline, and having no further habitat protection abilities through the No Refuge alternative would be a negative effect for these aquatic organisms. As mentioned above, the federally-listed, endangered dwarf wedgemussel is found in the Delaware River, upstream from the mouth of Cherry Creek, and the Eastern pearlshell mussel, a state-listed endangered species, once occupied habitat in the Cherry Creek watershed. The No Refuge alternative would offer no ability for reintroductions into Cherry Creek.

Alternative B -- Diverse Habitat Complex

Alternative B would have essential, positive effects on interjurisdictional fish and aquatic organisms since it would provide additional and necessary protection measures for valuable stream and riparian habitats. With this alternative, over 250 acres of riparian habitat could be protected, compared to the current 78 acres of riparian habitat in Alternative A. Protecting these habitats, and managing vegetation along shorelines, could significantly mitigate non-point source pollution. As noted in the "Habitat and Ecosystems" section above, the greatest benefit to be gained from Alternative B is a heightened ability to protect the valley's interjurisdictional fish and aquatic resources.

In contrast to the No Refuge alternative, having a refuge that embraces new riparian habitats strengthens protection measures in the valley, thereby directly contributing to the conservation and potential recovery of the declining American eel, noted above. Protection of eel habitat is an essential measure needed to safeguard this species, a safeguard not provided by Alternative A. Alternative B would also strengthen efforts to acquire and manage new habitats that may serve to attract other interjurisdictional species such as herring (*Alosa s*pp) and striped bass. Further details on management for trust species is presented in Appendix B – Conceptual Management Plan, and potential negative effects of habitat management activities on a new refuge are covered above in the "Habitat and Ecosystems" section.

Alternative B would also directly benefit other fish and aquatic resources in the valley. It would benefit the other 40 other fish species have been identified within the Study Area (Appendix C, Table C-2), and the three mussel species have been identified in Cherry Creek noted above. Notably, this alternative would enable reintroductions of the federally-listed, endangered dwarf wedgemussel and the state-listed, Eastern pearlshell mussel, alewife floater, and yellow lampmussel.

In contrast to the positive benefits, negative effects on riparian areas and surface waters would not likely be much greater. The Service would follow best management practices for avoiding negative effects to riparian and aquatic habitats when implementing management activities. There would not likely be a need to build refuge structures in these areas and any other management activities would likely be able to avoid or minimize impacts to these habitats.

Alternative C -- Wetlands & Ridge Forests

Perhaps the largest difference between Alternative B and Alternative C, in terms of overall effects, is likely within this category. Alternative C would protect significantly less riparian habitat than Alternative B; about 90 additional acres of riparian conservation compared to over 260 acres of riparian habitat in Alternative B. While the general types and value of effects associated with this alternative are similar to Alternative B, the over all magnitude of benefits would potentially be much less.

As described in Alternative B, there would be direct benefits to other fish and aquatic resources in the area including the many species of fish documented in the area (see Appendix C, Table C-2) as well as native mussel species.

Negative effects on riparian areas and surface waters would be somewhat greater with Alternative C compared to Alternative B. Without protection, approximately 110 acres of stream and riparian habitats could be subject to disturbances (e.g., forest clearing or road building that causes siltation in streams) that compromise their conservation value that could have adverse impacts on interjurisdictional fish and aquatic species.

4.2.5 Effects on Other Wildlife

Alternative A -- No Refuge

Currently, the extensive and relatively unfragmented forests along the Kittatinny Ridge provide habitat for resident animal species including large mammals such as white-tailed deer, black bear, coyote, and numerous smaller mammals including the Pennsylvania-threatened (and globally rare) Allegheny woodrat, Eastern small-footed bat, and Northern long-eared bat. Other habitats within the nearly 6,300 acres of currently protected habitat include gray and red squirrel, raccoon, woodchuck, skunk, and opossum, often found in the more developed areas of the watershed. Common

furbearers include mink, muskrat, beaver, and otter. Cherry Valley is also designated as an Important Mammal Area (Important Mammal Areas Project Website, 2008) due to the presence of Hartman's Cave and four bat species using the cave. Game birds can also be found in these forest habitats including ruffed-grouse in early successional forest, woodcock in mesic and wet forest areas, and wild turkey just about anywhere. The Kittatinny Ridge also supports cliffs and associated rocky talus slopes that provide habitat for black vultures, turkey vultures and common ravens. Spotted turtles, wood turtles, four-toed salamanders and marbled salamanders, all thought to be declining, can be found within the valley's wetlands and vernal pools. Though totaling a relatively small ten acres or so, the cliffs also support several reptile species such as the five-lined skink, fence lizard, timber rattlesnakes and other snake species.

The No Refuge alternative would offer no further protections for these habitats and species of concern, and would likely present long term and cumulative negative effects. This "No Refuge" alternative would negate any new efforts to impede encroaching development and it's introduction of wildlife-urban interface problems involving foraging skunks, raccoons, fox, bear, and coyote. Such wildlife-urban interface problems easily distract fish and game officials from performing duties that enhance wildlife populations and wildlife-dependent recreational opportunities. Lack of strengthened protection measures would impede abilities to manage habitats for species of concern, or for recreational hunting and fishing opportunities.

Alternative B -- Diverse Habitat Complex

In contrast to the No Refuge alternative, Alternative B would have positive, long lasting effects on other wildlife described above, and it would provide additional protection measures for all of the diverse habitats needed by these species. With this alternative, up to 20,466 acres of habitat could be protected, considerably more than the current 6,300 acres of protected habitat. Protecting these diverse habitats, and managing them to fully realize their ecological function and integrity, could significantly mitigate a host of potential negative effects discussed above that are likely to occur without establishing a refuge. This alternative would significantly curtail encroaching development and it's introduction of wildlife-urban interface problems, thus better enabling fish and game officials to perform duties that enhance wildlife populations and wildlife-dependent recreational opportunities. Further details on management for other wildlife is presented in Appendix B – Conceptual Management Plan, and potential negative effects of habitat management activities on a new refuge are covered above in the "Habitat and Ecosystems" section.

Alternative C -- Wetlands & Ridge Forests

Alternative C would encompass all of the benefits of Alternative B; however, the benefits derived from this alternative would be smaller since the size of this refuge would be 14,124 acres instead of 20,466 acres. In a similar fashion, the negative effects

would be essentially identical to Alternative B but of a slightly lesser degree due to the smaller potential size of this alternative.

4.2.6 Effects on Plants

Alternative A -- No Refuge

Currently over 6,300 acres of valuable habitat is protected in the valley. As discussed in Chapter 2 (Affected Environment, Table 2-4) and Chapter 3 (Alternatives), these broad ecological systems provide habitat for a broad array plants, especially for unique and rare plants currently in decline. These plants, listed as endangered, threatened, or at-risk by either the federal or Pennsylvania-state governments, include the Northeastern bulrush, Northern water plantain, Bebbs sedge, Yellow sedge, Variable sedge, Hemlock parsley, wild bleeding heart, matter spike-rush, and capitates spike rush, strongly indicating reliance on the valley's wetlands habitats for most of these species but not all. According to The Pennsylvania Natural Heritage Program (WPC 2008), at least ten globally rare plant species exist in the Cherry Valley area, including spreading globe flower, a small blooming aquatic buttercup that prefers open wetlands valleys.

The valley also suffers, as do most communities and regions, with invasive plants that quickly establish themselves in disturbed land areas. Grasslands throughout the physiographic area are being significantly degraded by succession and through colonization of these areas by invasive plant species. The expansion of fast spreading invasive species such as multi-flora rose, autumn olive, purple loosestrife, Japanese knotweed, and Common reed (*Phragmites* spp) into grassland and wetland habitats very quickly makes these habitats unsuitable for many species of birds and other wildlife.

The No Refuge alternative would offer no further protections for these habitats and plant species of concern, and would likely present long term and cumulative negative effects. This "No Refuge" alternative would negate any new efforts to impede encroaching development and it's displacement of rare plants and its concomitant introduction of invasive plants and the extremely difficult and expensive control measures that are needed to curb their spread.

Alternative B -- Diverse Habitat Complex

Compared to the No Refuge alternative, Alternative B would have positive, long-lasting effects on native and rare plants in the valley. It would provide additional protection measures for all of the diverse habitats needed by these plant species, and would offer new opportunities to improve habitats that may attract the reemergence of species such as the small-whorled pogonia. With this alternative, up to 20,466 acres of habitat could be protected, considerably more than the current 6,313 acres of protected habitat. Protecting these diverse habitats for native plants, and managing them to fully realize their ecological function and integrity, could significantly mitigate a host of

potential negative effects discussed above that are likely to occur without establishing a refuge. This alternative would significantly curtail encroaching development and its introduction of invasive plants. Invasive plants can cause major damage to native plant assemblages and the wildlife they support, and we would take steps to insure that invasive species do not become established and degrade the wetlands and grasslands. Further details on management for other wildlife is presented in Appendix B – Conceptual Management Plan, and potential negative effects of habitat management activities on a new refuge are covered above in the "Habitat and Ecosystems" section.

Alternative C -- Wetlands & Ridge Forests

Alternative C would encompass all of the benefits of Alternative B; however, the benefits derived from this alternative would be smaller since the size of this refuge would be 14,124 acres instead of 20,466 acres. In a similar fashion, the negative effects would be minimal, and would be essentially identical to Alternative B but of a slightly lesser degree due to the smaller potential size of this alternative.

4.3 Effects on the Socioeconomic Environment

Socioeconomic environment identifies those elements of the environment that are susceptible to change and may be affected by any of the potential alternatives. Specific characteristics of these alternatives, such as changes in potential public use or access to the refuge or changes to budget and staffing for the refuge, can be important sources of potential impact for the user base of the refuge and the surrounding Monroe County community. Changes in public use opportunities potentially affecting refuge visitation and visitor spending in the surrounding local communities, changes in land use potentially affecting local open space needs and land values, and changes in overall refuge management would potentially affect the area around the refuge.

4.3.1 Effects on Public Use and Access

Providing opportunities for compatible wildlife-dependent public uses, including hunting, fishing, environmental education, interpretation, wildlife observation and photography, is integral in our overall management of the refuge. Those are priority uses of the National Wildlife Refuge System. Other refuge uses that we determine to be appropriate and compatible with our goals in managing the refuge can also provide public benefit.

Alternative A -- No Refuge

The No Refuge alternative would not prevent but would have a negative effect on facilitating any opportunities for wildlife-dependent recreational opportunities as defined above. Hunting is a prized activity by many of the residents of Cherry Valley. Private lands are largely posted, greatly limiting hunting access. Non-residents of Cherry

Valley are sometimes able to obtain permission from landowners for hunting, but this occurs on a limited basis. Cherry Creek is a valued trout fishery. Several fishing clubs lease land along the Cherry Creek. Like hunting, fishing is limited due to the posting of private land and limited public access. Cherry Valley provides a wealth of wildlife for observation and photography; however, viewing opportunities are limited by access. The narrow county and township roads running through the valley do not provide adequate pull-offs so safety is of the utmost concern. Environmental Education is limited by the lack of support facilities in the valley, although there is a strong Environmental Education program at the Monroe County Conservation District that reaches out to more than 25,000 students annually. Currently, the Conservation District brings every 4th grader to the Tannersville Cranberry Bog in nearby Pocono Township, but there are few other easily accessible nearby habitats to take students.

Alternative B -- Diverse Habitat Complex

For this alternative, the Service would potentially acquire up to 20,466 acres of wetland, forested upland, and agricultural/grassland habitats (Table 3-2). We conclude that establishment of a refuge to embrace these habitats would be a major positive effect for promoting a number of wildlife-dependent uses on the new refuge. As the refuge matures in size and staff over time, and as the CCP and Visitor Use Plans are developed, the specific types and limits on public use would be determined. It is expected, however, that early in the process there would be new opportunities for the "Big-6" public uses defined above. Most notably is the potential for creation of trails, hunting and fishing access, wildlife interpretation, and wildlife observation and photography. Environmental education is typically more intensive in nature and may take time to develop. Determinations have been drafted on the compatibility of these wildlife-dependent public uses and are incorporated into the Conceptual Management Plan – Appendix B.

Establishing trails at the refuge is likely, and would facilitate environmental education, wildlife observation and photography, and wildlife interpretation. Foot travel from visitors using the refuge for walking/hiking, backpacking, cross country skiing, snowshoeing, or conducting research on the refuge increases root exposure, trampling effects, and crushing of plants. We would continue to expect and encourage refuge visitors to stay on designated trails, thus minimizing vegetation compaction and soil loss. Those impacts would primarily occur in the trail footprint. Visitors may also spread invasive plants. When people move from one area to another, they can be pathways for the seeds or other propagules of invasive plants. Once established, invasive plants can out-compete native plants, thereby altering habitats and affecting wildlife. The threat of invasive plants establishing themselves will always be an issue that requires monitoring.

Hunting can cause disturbance to vegetation because of trampling, and if vehicles are permitted on refuge roads, there is soil disturbance with that activity. We expect,

however, trampling of vegetation would be minimal. In addition, most hunt seasons occur during the winter months, when vegetation is dormant. Direct impacts on wildlife can be expected wherever humans have access to an area. In general, human presence disturbs most wildlife, which typically results in a temporary displacement without long-term effects on individuals or populations. Some species will avoid areas frequented by people, such as developed trails and buildings, while other species seem unaffected or even drawn to a human presence. When visitors approach too closely to nests, they may cause adult birds to flush, exposing the eggs to weather events or predators. Overall, direct effects should be insignificant from non-consumptive visitor activities because use of refuge lands is fairly dispersed, and large areas are not accessible. The direct effects of any authorized hunting would be carefully documented and reviewed as official hunt plans are developed. Hunt plans account for what harvest levels can be sustained for a species without adversely affecting its overall population. As such, hunting results in individual losses, but the projected cumulative harvest should not jeopardize the viability of any harvested species' population. Some disturbance to non-target wildlife species may occur; however, those impacts should be minimal because hunting pressure is moderate and usually occurs outside of breeding seasons.

Any permitted fishing on the refuge would follow Pennsylvania regulations, 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.

A national wildlife refuge at Cherry Valley would expand the Monroe County Conservation District's Environmental Education Program's ability to provide students with a diverse set of habitats and field education experiences, which are currently focused at Tannersville Cranberry Bog in Pocono Township.

Overall negative effects from public use in Alternative B would not necessarily be much greater than for Alternative C. While there will be more opportunity for public use of the refuge because of the additional lands, impacts will be spread out over the properties likely resulting in similar densities of use.

Alternative C -- Wetlands & Ridge Forests

Alternative C would encompass all of the benefits of Alternative B; however, the public use benefits derived from this alternative would be smaller since the size of this refuge would be 14, 124 acres instead of 20,466 acres. This could result in fewer areas for public use activities compared to Alternative B. In a similar fashion, the negative effects would be minimal, and would be essentially identical to Alternative B but of a slightly lesser degree due to the smaller potential size of this alternative. It is possible, however, that greater public use densities would occur in some areas under Alternative C due to the smaller refuge area and thus expose some sites to slightly more negative public use impacts.

4.3.2 Effects on Land Use

Within the Study Area, a majority of lands are considered to be in "open" (not developed) land uses and most parcels are in private ownership. Land use within the Study Area, classified into ten general categories based on Monroe County tax records (Table 2-5), can be easily grouped into open space parcels and developed parcels. Developed parcels, which include residential and industrial properties, collectively account for about one-third of the Study Area. Open space parcels, which include agriculture, parks, forest, vacant, and in this case, property owned by utilities, together account for nearly 70 percent of the Study Area. Figure 2-5 shows developed and open space lands within the Cherry Valley National Wildlife Refuge Study Area.

Alternative A -- No Refuge

The No Refuge alternative would most likely have a negative effect on land use since it would result in a continued reliance of current protection measures for controlling development and protecting valuable habitats. These measures do not provide for adequate protection of habitats and development pressures would continue without further consideration of wildlife habitats. As noted above, development pressure in the valley has declined since 2005 and, even though that is an encouraging statistic, the decline is the result of market forces and not land conservation priorities. Not having the ability to secure valuable habitat lands for acquisition within a refuge eliminates a significant conservation and wildlife-oriented recreational tool for the valley and its citizens.

Alternative B -- Diverse Habitat Complex

In the "Diverse Habitat Complex" alternative, the Service would potentially acquire in excess of 20,466 acres of wetland , forested upland, and agricultural/grassland habitats (Table 3-3). This would have a direct and long term positive effect on curbing development encroachment while maintaining and enhancing a significant amount of wildlife habitat and open space in the valley. Currently about 6,313 acres are protected. Having the ability to acquire lands and habitats for a new refuge would enable protection of most of the 13 extant ecosystems (Table 2-2) remaining in the valley, thus helping to maintain the exceptional rural and natural quality of Cherry Valley, while opening new opportunities for conserving declining species and opening wildlife-dependent recreational activities.

Alternative C – Wetlands & Ridge Forests

The effects of Alternative C – Wetlands and Ridge Forests – on land use would be largely positive, and would contribute almost all of the benefits as described in Alternative B. The benefits derived from this alternative would be somewhat less since the size of this refuge would be 14,124 acres instead of 20,466 acres but would enable the protection of portions of all thirteen ecosystems in the valley. In a similar fashion, the negative effects would be minimal, and would be essentially identical to Alternative B but of an even lesser degree due to the smaller potential size of the Wetlands and Ridge Forests alternative.

4.3.3 Effects on Local Economy

Alternative A – No Refuge

There would be no expected change in the local economy under the No Refuge alternative, as current the development rate, tax revenues, business revenue, would remain subject to non-refuge influence. Changes would be due to existing influences and market forces. A potential yet unsubstantiated economic outcome of not having a refuge in the valley would be loss of refuge visitor expenditures at local businesses and establishments. Visitors to the valley would be expected to grow steadily as the size of the refuge grew and an public use opportunities were created. Typical public use activities such as hunting and fishing, hiking, bird watching, wildlife photography, plant identification, and general scenic appreciation would become a normal economic mainstay for the valley.

Alternative B – Diverse Habitat Complex

Recreational use on refuges generated almost $1.7 billion in total economic activity during fiscal year 2006, according to a report released by the U.S. Fish and Wildlife Service (2006). The report, titled *Banking on Nature 2006: The Economic Benefits to Local Communities of National Wildlife Refuge Visitation* was compiled by Service economists. According to the study, nearly 35 million people visited refuges in 2006, supporting almost 27,000 private sector jobs and producing about $543 million in employment income. In addition, recreational spending on refuges generated nearly $185.3 million in tax revenue at the local, county, state, and federal levels. The economic benefit is almost four times the amount appropriated to the Refuge System in Fiscal Year 2006. About 87 percent of refuge visitors travel from outside the local area (USFWS, 2006). This information gives an indication of how the creation of a Cherry Valley NWR could be of economic benefit to the local economy.

The fiscal impact to Monroe County and its townships, if a refuge is established, would depend on both the quantity of land acquired and the rate of acquisition. While land owned by the U.S. Government is not taxable by state or local authorities, the federal

government has a program in place to compensate local governments for foregone tax revenues. The Refuge System typically makes an annual payment in lieu of taxes to local governments. The amount of the payment depends on the final Congressional budget appropriations for the Service for that year. Recently, the payment has been less than what the state or local government may have received through normal taxation. It should be noted that the parcels with the highest assessed value within the Study Area (i.e., residential, industrial, and retail) are parcels that have the least desirable characteristics for conservation. Additional details are provided in the Land Protection Plan (Appendix E) and the Conceptual Management Plan (Appendix B).

Local economies usually benefit from refuge staff who live and shop in the community. There is no ability yet to predict the staffing level at a potential refuge, although various scenarios are discussed in the Conceptual Management Plan (Appendix B). Once staff begin to be located in the Cherry Valley locale, there would be an expectation of some economic gain to the community, both with direct buying of goods and services by refuge staff but also secondary or multiplier effects for work generated by the various needs of the refuge resulting in some local financial output. Timber harvesting for saw timber, pulp, and fuelwood in support of local species habitat management is an economic activity that may be available to the local timber industry at some point in time. Such a determination would be made during development of the refuge's Habitat Management Plan or CCP.

Alternative C – Wetlands and Ridge Forests

The effects of Alternative C -- Wetlands & Ridge Forests – on the local economy would be largely positive, and would contribute almost all of the benefits as described in Alternative C. The benefits derived from this alternative would be somewhat less since the size of this refuge would be 14,124 acres instead of 20,466 acres, and there may be a smaller staff and work opportunities for the local community. In a similar fashion, the negative effects would be minimal, and would be essentially identical to Alternative C but of an even lesser degree due to the smaller potential size of the Wetlands and Ridge Forests alternative.

4.3.4 Effects on Cultural and Historic Resources

As noted in Chapter 2 – Affected Environment, there is some evidence of habitation in the valley and surrounding areas during pre-historic times by the Lenni-Lenape people whose occupation of the land preceded European settlers by thousands of years. Early records of contact between Native Americans and European colonists in the area date to 1609. Cherry Valley was well settled by European colonists before the middle 18th Century, and records show settlement by a large congregation of mostly German settlers who lived and worshiped within the valley.

Alternative A -- No Refuge

The No Refuge alternative would have a slight negative effect on the protection of historic and cultural resources, principally due to the lack of a continuous federal presence, which provides a clear responsibility for protection of these resources. There is an expectation on landowners and developers to take necessary precautions to ensure that no sites or structures on National Historic register would be affected by their activities in the valley. As part of our section 106 compliance, site disturbance activities will continue to be reviewed by the Pennsylvania State Historic Preservation Office (SHPO).

Alternative B – Diverse Habitat Complex

The Service's protection of up to 20,466 acres of habitat would benefit cultural resources by ensuring that none of the substantial impacts related to development for residential or commercial uses would affect known or undiscovered cultural and historic resources on those lands. Prior to any excavation or building site preparation, the refuge would conduct appropriate cultural and historic property surveys. There is some risk that refuge visitors may inadvertently or intentionally damage or disturb cultural and historic those sites; however, we would employ all means available to protect known sites, structures, and objects of importance for scientific study, public appreciation and socio-cultural use. We would also, where possible, promote archaeological research on, or relating to, refuge lands, add language from the Antiquities Resource Protection Act (ARPA) to appropriate public use materials to warn visitors about illegal looting, and maintain law enforcement personnel trained in ARPA enforcement.

Alternative C -- Wetlands & Ridge Forests

The effects of Alternative C -- Wetlands & Ridge Forests – on cultural and historic resources would be largely positive, and would contribute almost all of the benefits as described in Alternative B. The benefits derived from this alternative would be somewhat less since the size of this refuge would be 14,124 acres instead of 20,466 acres and the refuge would have a smaller area of influence. In a similar fashion, the negative effects would be essentially identical to Alternative B but of an lesser degree due to the smaller potential size of the Wetlands and Ridge Forests alternative.

4.3.5 Effects on the Soundscape

Emerging research from the National Park Service shows that there is serious concern about the effects of human induced sounds on the overall park experience. The agency also discovered that as many visitors said they were visiting parks to enjoy the "natural quiet" as much as to appreciate park's visual beauty (National Park Service, Effects of Sound). In addition, there is evidence that human induced noise can interfere with

various aspects of animal behavior including preventing predator warning signals, disrupting breeding behavior, and discouraging birds from singing during the day when noise levels are highest (Streater 2008). While the sounds of the wild are integral to the national park experience for visitors, reducing noise pollution is vital to the survival of wildlife, says the National Park Service (Streater 2008). Although there is no specific information about sound effects in the Cherry Valley area, the effects of man-induced sounds and noise on wildlife and visitors should not be underestimated.

Alternative A -- No Refuge

Distinct landforms, breathtaking vistas, unique habitats and species of special concern make Cherry Valley a special place for people and nature. Located less than two hours by car from Philadelphia and New York City, Cherry Valley's quiet landscape is threatened by the onrush of residential development. The Cherry Valley National Wildlife Refuge Study Area straddles parts of six municipalities in southeastern Monroe County. Developed parcels, which include residential and industrial properties, collectively account for about one-third of the Study Area. Residential properties, alone, cover nearly 20 percent of the total Study Area. Open space parcels, which include agriculture, parks, forest, vacant, and in this case, property owned by utilities, together account for nearly 70 percent of the Study Area, although much of the open space lands are not protected.

The No Refuge alternative for Cherry Valley would offer potential negative effects on increasing human-induced sounds due to the lack of new efforts to protect lands and waters that can serve as place of refuge from an anthropogenic landscape. With continuing development comes the associated sounds and noise from residential and commercial traffic, motorcycles, helicopters, other aircraft, heavy equipment, air conditioners, and the like.

Alternative B – Diverse Habitat Complex

Alternative B would provide positive effects compared to Alternative A since creation of a Cherry Valley NWR up to 20,466 acres would reduce the potential for large-scale development and related human generated noise. Maintaining and improving extensive habitat areas for fish, wildlife, and visitors will provide an expansive buffer against nearby urban noises, thus providing a less threatening environment for breeding and foraging wildlife and a more serene soundscape for the visiting public. Trees help reduce noise levels in urban and suburban areas. Even a fifty foot wide belt of trees can reduce noise levels by as much as 50 percent (USDA Forest Service 2006).

Creation of a Cherry Valley NWR potentially would stimulate some increase in human induced noise. Although visitors to a new refuge would generate traffic noise and some non-motorized noise (e.g., talking), it would be minimal in an overall landscape environment. The Service limits the uses of refuges to be compatible, wildlife-oriented,

consumptive and non-consumptive uses, and thus, greatly curtails anthropogenic sources of noise. Currently there is no reliable way to estimate potential visitor use and effects on potential refuge wildlife. However, we would employ our appropriate use and compatibility policies to ensure that noise levels would have no or minimal effects on wildlife. We expect use would include walking trails and related, non-motorized activities. These activities tend to generate low noise levels. The potential negative sound effects of the suggested conceptual management activities could include, for example, operation of refuge vehicles, constructing visitor interpretation and parking facilities, building refuge administrative headquarters, access roads, and constructing interpretive trails. We would use any available best management practices to help minimize noise levels at the refuge. In analyzing the effects of refuge management activities and public use on noise levels, we principally considered how Service actions at the refuge might affect sound locally, which will allow us to determine any effects on regional basis if necessary.

Alternative C -- Wetlands & Ridge Forests

The effects of Alternative C -- Wetlands & Ridge Forests – on the valley's soundscape would be largely positive, and would contribute almost of the benefits as described in Alternative B. The benefits derived from this alternative would be somewhat less since the size of this refuge would be 14,124 acres instead of 20,466 acres and the refuge would have a smaller area of influence on mitigating noise. In a similar fashion, the negative effects would be essentially identical to Alternative B but of a lesser degree due to the smaller potential size of the Wetlands and Ridge Forests alternative.

Cumulative Effects

According to the Council on Environmental Quality NEPA implementing regulations at 40 CFR 1508.7, "Cumulative impact" is the impact on the environment which 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 such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Physical Resources. Alternative A – No Refuge – would likely contribute to an acceleration of poor air quality over the long term simply due to the expected continued increases in development and its concomitant contributions to pollutant emissions. Neither Alternative B (Diverse Habitats) or C (Wetlands and Ridge Forests) are expected to have significant cumulative adverse impacts on air quality locally or regionally since they would help retain the natural habitat qualities within the proposed refuge boundary. Some short-term, local deterioration in air quality would be expected from air emissions of motor vehicles used by refuge visitors and staff. With our partners, we would continue to contribute to improving air quality through cooperative land conservation and management of natural vegetation and wetlands. We do not

envision any activities that would have cumulative negative effects on soils or water quality, or to the local soundscape, and conclude that protection of lands and habitats in the refuge acquisition boundary would have clear positive benefits to these environmental attributes.

We expect none of the alternatives to have significant adverse cumulative impact on cultural resources in the valley. Beneficial effects would occur at various levels, depending on the alternative, because of proposed environmental education and interpretation programs, increased land protection, and increased field surveys to identify and protect any discovered sites. In alternatives B and C we would identify high probability sites to survey more intensely.

Biological Resources. Under Alternative A – No Refuge – there would be an expectation of cumulative negative effects on the biological resources over the long term due to the lack of additional habitat protection for the fish and wildlife resources in the valley. No significant cumulative adverse effects to biological resources under Alternative B or C is expected since valuable habitats would be protected and their ecological integrity would be retained. Management activities proposed in Alternatives B and C, along with the Conceptual Management Plan, would be expected to have long term beneficial effects to the valley's fish and wildlife resources. Biological resources that we would manage over time to prevent their introduction, limit, or eliminate, such as invasive plants, are not natural components of the valley ecosystem. Losses of those biotic components where they occur would not be considered adverse.

National Wildlife Refuges, and other protected areas harbor unique environments and wildlife not found elsewhere. This raises particular concerns about the vulnerability of these ecosystems to a changing climate. Many refuges are designated to protect rare natural features or particular species of plants and animals. Changes in climate could create new and potentially serious stresses on natural communities, and, in the absence of adaptation, lead to the loss of valued resources. National Wildlife Refuges and other protected areas are currently susceptible to events influenced by climatic variability, such as drought, wild fires, impaired air quality, and severe storms. Climate change may change the frequency and severity of these kinds of events. In some regions, the risk for drought and wildfire, for example, may increase with climate change (IPCC 2007). Along coastal regions, sea level rise could erode and inundate the beaches of coastal refuges, precipitating loss of salt marshes, beaches, loss of habitat in estuarine ecosystems, and damage to property and natural resources from storm surges (IPCC 2007).

The consequences of accelerating climate change on Cherry Valley are as yet unknown and difficult to predict. A warming climate would most likely affect plant species composition and distribution, thus having an effect of wildlife and aquatic resources. The timeframe for these potential changes are unknown but management of the habitats (e.g., prescribed fire applications) and facilities (e.g., minimizing the carbon

footprint) of a Cherry Valley National Wildlife Refuge would clearly encompass the potential effects of climate change.

Socioeconomic Resources. There would be no expected long term cumulative change in the local economy under Alternative A – No Refuge – as current development rates, tax revenues, and business revenues would remain subject to non-refuge influences. A potential yet unsubstantiated economic long-term, cumulative outcome of not having a refuge in the valley would be a loss of refuge visitor expenditures at local businesses and establishments. Over time, visitors to the valley would be expected to grow steadily as the size of the refuge grew and public use opportunities were created. Typical public use activities such as hunting and fishing, hiking, bird watching, wildlife photography, plant identification, and general scenic appreciation would become a predictable and long term economic mainstay for the valley.

Unavoidable Adverse Effects.

Unavoidable adverse effects are the effects of those actions that could cause significant harm to the human environment and that cannot be avoided, even with mitigation measures. There would be some minor, localized unavoidable adverse effects under all the alternatives. The No Action alternative would maintain the status quo for development and growth in the valley, thus contributing to the unavoidable effects of such development (e.g., increased air emissions, increased impervious surface and stormwater runoff, increased noise). Under Alternatives B and C, there would be, for example, localized adverse effects of building the new refuge headquarters and upgrading access roads. There would be property tax losses to towns and increased visitation that could have unavoidable effects. However, none of these effects rises to the level of significance. All would be mitigated, so there would in fact be no significant unavoidable adverse impacts under any of the alternatives.

Relationship Between Short-term Uses of the Human Environment and Enhancement of Long-term Productivity.

Alternative A – No Refuge – would be expected to diminish the long-term productivity and sustainability of natural resources of the valley. In contrast, Alternatives B and C would strive to maintain or enhance the long-term productivity and sustainability of natural resources on the refuge. These alternatives would strive to conserve our Federal trust species and the habitats they depend on, as evidenced by management activities described in the Conceptual Management Plan. These alternatives outline outreach and environmental education activities that would encourage visitors to be better stewards of our environment.

Potential Irreversible and Irretrievable Commitments of Resources.

Alternative A – No Refuge – would no long term effect on potential irreversible and irretrievable commitments of federal financial resources. Establishing a refuge as described under Alternatives B and C may contribute to irreversible and irretrievable commitments of federal financial resources. For example, one would be the possible construction of a refuge office and associated visitor facility and access road, typically requiring long term commitments of resources. Another irreversible commitment of resources impacting local communities is Service land acquisition. Once these lands become part of the refuge, it is highly unlikely they would ever revert back to private ownership

Environmental Justice.

Executive Order 12898 " Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" (February 11, 1994), requires that Federal Agencies consider as part of their action, any disproportionately high and adverse human health or environmental effects to minority and low income populations. Agencies are required to ensure that these potential effects are identified and addressed. The communities surrounding the refuge are relatively homogenous; minority groups do not represent a substantial portion of the affected community. No differential impacts based on minority status would therefore be anticipated under any of the alternatives.

4.3.6 Summary of Effects

Table 4-3. Comparison of environmental effects from potential Alternatives for a Cherry Valley National Wildlife Refuge, Pennsylvania.

Environment	Alternatives		
	Alternative A No Refuge	**Alternative B Diverse Habitat Complex**	**Alternative C Wetlands & Ridge Forests**
Air Quality	Likely to degrade further due to continued development emissions; less carbon sequestration	Likely to improve due to curtailed development emissions and plant photosynthesis; greater carbon sequestration	Likely to improve due to curtailed development emissions and plant photosynthesis; greater carbon sequestration
Water Quality	Likely to degrade further due to continued development	Likely to improve due to curtailed development and water filtering through habitats and root zone	Likely to improve due to curtailed development and water filtering through habitats and root zone
Soils	Likely to erode due to continued development	Likely to be stable and functional due to curtailed development	Likely to be stable and functional due to curtailed development
Habitat and Ecosystems	Continued threat of development	U Up to 20,466 acres protected for benefit of wildlife and new public use opportunities p to	14,124 acres protected for benefit of wildlife and new public use opportunities
Migratory Birds	Continued threat of development jeopardizes their habitat	Up to 20,466 acres of diverse habitats protected for benefit of waterfowl, neo-tropical migrants, and raptors	Up to 14,124 acres protected of wetlands and forests for benefit of waterfowl, neo-tropical migrants, and raptors
Threatened and Endangered Species	Continued development threatens recovery of bog turtle and other federal and state listed species	Up to 20,466 acres protected of wetlands and forests for benefit of bog turtle, Indiana bats, small-whorled pogonia, and other listed federal and state species	Up to 14,124 acres protected of wetlands and forests for benefit of bog turtle, Indiana bats, small-whorled pogonia, and other listed federal and state species

Environment	Alternatives		
	Alternative A No Refuge	**Alternative B Diverse Habitat Complex**	**Alternative C Wetlands & Ridge Forests**
Interjurisdictional Fish and Aquatic Organisms	Continued development degrades habitat for American eel, dwarf wedge mussel, and other aquatic organisms of conservation concern	Up to 20,466 acres protected of wetlands and forests for benefit of American eel, dwarf wedge mussel, and other aquatic organisms of conservation concern	Up to 14,124 acres protected of wetlands and forests for benefit of American eel, dwarf wedge mussel, and other aquatic organisms of conservation concern
Other Wildlife	Continued development degrades habitat for state species of concern, game mammals and birds, and small mammals and amphibians and reptiles	Up to 20,466 acres protected of wetlands and forests for benefit of state species of concern, game mammals and birds, and small mammals and amphibians and reptiles	Up to 14,124 acres protected of wetlands and forests for benefit of state species of concern, game mammals and birds, and small mammals and amphibians and reptiles
Plants	Continued development degrades habitat for federal and state species of concern; curtails ability to provide habitat for small-whorled pogonia and other declining plants	Up to 20,466 acres protected of wetlands and forests for benefit of federal and state species of concern, and provide habitat for small-whorled pogonia and other declining plants	Up to 14,124 acres protected of wetlands and forests for benefit of federal and state species of concern, and provide habitat for small-whorled pogonia and other declining plants
Public Use	No new opportunities for wildlife-dependent recreation: wildlife observation, photography, interpretation, environmental education, or hunting and fishing	Creates ample new opportunities for wildlife-dependent recreation: wildlife observation, photography, interpretation, environmental education, or hunting and fishing; refuge will contribute to “Children in Nature” initiative	Creates ample new opportunities for wildlife-dependent recreation: wildlife observation, photography, interpretation, environmental education, or hunting and fishing; refuge will contribute to “Children in Nature” initiative

Environment	Alternatives		
	Alternative A No Refuge	**Alternative B Diverse Habitat Complex**	**Alternative C Wetlands & Ridge Forests**
Land Use	Continued threat of development will decrease percent of wildlife habitat and open space	Up to 20,466 acres protected of wetlands and forests will increase percent of wildlife habitat and open space	Up to 14,124 acres protected of wetlands and forests will increase percent of wildlife habitat and open space
Local Economy	No benefits from refuge staff living in valley and procuring goods and services, and no work opportunities for locals that would exist with a refuge	"Banking on Nature" report documents economic benefits of refuges for local economies; there would be expected benefits from refuge staff living in valley and procuring goods and services, and work opportunities for locals that would exist with a refuge; refuge revenue sharing funds provided to local government to offset loss of property taxes from lands acquired by the refuge	"Banking on Nature" report documents economic benefits of refuges for local economies; there would be expected benefits from refuge staff living in valley and procuring goods and services, and work opportunities for locals that would exist with a refuge; refuge revenue sharing funds provided to local government to offset loss of property taxes from lands acquired by the refuge
Cultural and Historic Resources	Cultural and historic resources retain protection through State Historic Preservation Office	Cultural and historic resources retain protection through State Historic Preservation Office but also become fully protected by presence of refuge and the federal oversight and responsibilities the refuge has to protect these resources	Cultural and historic resources retain protection through State Historic Preservation Office but also become fully protected by presence of refuge and the federal oversight and responsibilities the refuge has to protect these resources
Soundscape	Noise levels likely to increase due to continued development	Noise levels likely to remain low, and could be further mitigated, providing pleasant and quite experience for visitors to refuge	Noise levels likely to remain low, and could be further mitigated, providing pleasant and quite experience for visitors to refuge