IV. Environmental Consequences

This chapter analyzes and discusses the potential environmental effects on the resources outlined in Chapter II. Environmental effects include those that are direct, indirect, and cumulative. Direct effects are caused by the action and occur at the same time and place. Indirect effects are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Alternative B, if approved, is generally believed to have indirect effects since the majority of lands are not expected to be protected immediately. Cumulative impacts are effects on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. Cumulative effects are discussed in a separate section following the analysis of Alternatives A and B.

Potential effects or impacts, either positive (beneficial) and negative (adverse), to resources resulting from the implementation of the two alternatives were identified and placed into one of the listed categories, where possible.

- None - no effects expected
- Minimal - impacts are not expected to be measurable, or are too small to cause any discernible degradation to the environment
- Minor - impacts would be measureable, but not substantial, because the impacted system is capable of absorbing the change
- Moderate - effects would be measureable, but could be reduced through appropriate mitigation
- Major - impacts would be measurable and individually or cumulatively significant; an Environmental Impact Statement would be required to analyze these impacts

For the purposes of this Draft EA, the North Carolina and Tennessee portions of the Blue Ridge ecoregion delimit the AOI. The AOI is used solely to analyze the potential effects resulting from the No Action and Proposed Action to the environment (physical, biological, socioeconomic, and cultural resources). The effects of this proposal on visual resources are not addressed in this Draft EA. The CPAs are relatively small and many are embedded in a landscape that has already been altered by roads, tall towers, and other structures that have changed the aesthetics of the landscape from its former state. This AOI covers approximately 6.9 million acres (Figure 4). Within the AOI, approximately 2.6 million acres (38 percent) are currently in the public domain, with some type of conservation protection. The proposed refuge, if fully realized, would equal about 23,487 acres or less than one percent of the AOI.

ALTERNATIVE A: NO ACTION ALTERNATIVE

Under this alternative, the Service would take no action to acquire, protect, and manage any lands and Mountain Bogs NWR would not be established.

Although protection and conservation efforts by the Service's Asheville Ecological Services Office and bog conservation partners would continue, future habitat protection under existing laws and regulations and with existing resources would likely be insufficient to prevent significant degradation of the area's fish and wildlife resource values. Federal executive orders involving the protection of wetlands and floodplains only apply to federal agencies. They do not apply to habitat alterations by non-federal entities, which receive no federal funds.

The primary deterrent against the loss of wetland resource values is the U.S. Army Corps of Engineers' Section 404 permit program, which is administered under the authority of the Clean Water Act. This program requires permits for most types of work in wetlands. However, few of the mountain bogs would be protected through Clean Water Act regulations due to their small size. The states have regulatory authority over their respective areas and would not permit any developments that would violate water quality standards. However, these rules are unlikely to offer substantial protection to most bogs that are embedded in an increasingly urbanized landscape where the hydrology is being altered. Additionally, there is no assurance that the protection offered by these regulations would be consistent with protection of the area's fish and wildlife resources. The regulatory programs are designed to accomplish different objectives. Furthermore, these programs are subject to changes in the law and to varying definitions and interpretations, often to the detriment of wetlands. The Corps regulatory authority provides for the issuance of Section 10 and/or Section 404 permits when it is not contrary to the public interest to do so and provided other conditions are met. Fish and wildlife conservation is only one of several public interest factors that are considered in permit issuance decisions. If fish and wildlife conservation is outweighed by other factors, permits that would alter the wetlands in the proposed CPAs could be issued.

The desired fish and wildlife protection objectives, therefore, cannot be achieved to any degree under this alternative. Specifically, implementation of "No Action" would adversely impact the area's mountain bog habitats, listed plants, bog turtles, migratory birds, and other species associated with these rare wetlands.

EFFECTS ON THE PHYSICAL ENVIRONMENT

This section discusses potential effects to physical resources (e.g., topography, soils, water resources, etc.) under the No Action alternative.

Topography and Geology

Beneficial

Under this alternative, positive impacts with regard to the topography and geology in the AOI are not anticipated.

Adverse

Currently, there are at least 27 quarries (granite, mica, feldspar, etc.) and other mines in the AOI (NCDENR 2012) and more could be opened in the future. Open-pit mining is typically used, which can result in entire hills being leveled, resulting in a dramatically altered topography and geology at the local level. Mining and other operations that can alter the topography or geology are usually not considered appropriate or compatible uses on wildlife refuges. Hence, in the absence of a new refuge, the topography and geology on approximately 23,487 acres of land could potentially be affected. However, any adverse impacts to these resources would be minimal. The underlying geologic formations beneath CPAs are unlikely to contain mineral or energy resources currently of interest. Furthermore, the CPAs are relatively small compared to the AOI. Hence, it is unlikely that this proposal would have any significant effect on curbing the opening of new mines across the region.

Soils

Beneficial

No beneficial impacts to soils in the AOI are expected under the No Action alternative.

Adverse

In unprotected areas, soils would continue to be lost and degraded, leading to erosion and sedimentation as a result of various land use practices, including commercial logging, agricultural operations, road-building, and the construction of buildings, parking lots, and other infrastructure needed to support expanding human settlements. Natural soil-formation processes would no longer occur in areas covered by impervious surfaces (e.g., roads, parking lots, buildings). Soil compaction is also expected at sites where construction occurs. Additionally, soils would continue to be degraded by various contaminants resulting from the application of agricultural chemicals and run-off from roads and urban areas. Additionally, there would be no opportunity for the Service to protect or restore roads, trails, or other existing sites within the CPAs, thus soil impacts from development or unmanaged use of those lands would continue and likely would increase over the long term. However, adverse impacts to soils in the absence of a refuge would be minor, because the total area that could theoretically be protected under this proposal is relatively small compared to the entire AOI.

Climate Change

Beneficial

Under this alternative, fewer areas in the AOI are expected to remain or become carbon sinks, and positive impacts with regard to climate change are not anticipated.

Adverse

Vegetation, alive or dead, is an important carbon stock, and ecosystems in the United States contain approximately 66,600 million tons of carbon (Heath and Smith 2004). According to the U.S. Climate Change Science Program, the size of the carbon sink in U.S. forests appears to be declining, based on inventory data from 1952 to 2007 (Birdsey et al. 2007). The carbon density (the amount of carbon stored per unit of land area) is highly variable, as it is directly correlated to the amount of biomass in an ecosystem or plant community. The total carbon in an ecosystem also includes the organic component of soil, which can be substantial, depending on the vegetation cover type and other factors (Bruce et al. 1999). The total carbon stored in temperate forests (which are expected to be similar to the “deciduous forests” that comprise most of the land cover in the AOI) is about 70 tons per acre. Forests go through a cycle of growth and death, and consequently, sequester and release carbon dioxide. The timeframe and magnitude of these cycles of carbon storage and release varies with the size and type of forest, among other factors. However, when land is cleared of vegetation, carbon dioxide that was stored in plant material and soil is released relatively quickly into the atmosphere through such processes as decomposition, burning, and soil oxidation. Additionally, without vegetation, the ability of the land to sequester or store carbon is reduced to minimal levels. The exact extent of unprotected natural lands that would eventually be converted to agricultural or urban use is unknown. However, even in the unlikely event that an area equaling the proposed refuge (23,478 acres) were cleared of all forests (and assuming it was completely forested) in the AOI, it would represent a fraction of the over 9 billion tons of global carbon entering the atmosphere yearly. Impacts to climate change under this alternative are expected to be minimal.

Air Quality

Beneficial

Positive effects on air quality in the AOI are not expected under this alternative.

Adverse

Under this alternative, unprotected lands that are currently in a natural state would continue to be converted to commercial forests, and agricultural and urban areas. Air quality declines tend to be correlated to increasing urbanization, due to higher levels of traffic, increases in air pollution from point sources, and reductions in vegetated areas (Song et al. 2008). Trees have been shown to reduce the concentration of ozone (O_3), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), and particulate matter less than 10 and 2.5 microns in diameter (PM10 and PM2.5), primarily through direct uptake and adhesion to stems and leaves (Escobedo et al. 2007). Some tree species naturally produce volatile organic compounds that can convert to ozone under certain atmospheric conditions, such as high temperatures and stagnant air (Chameides et al. 1988). However, because vegetated areas also remove ozone and other air pollutants from the atmosphere, there tends to be net reduction in air quality as areas become increasingly developed and forests are lost (Song et al. 2008). The proposed refuge acreage, even if it were fully urbanized, is small relative to the AOI. Hence, we expect the No Action alternative to have a minimal impact on air quality across the AOI.

Water Quality

Beneficial

Under the No Action alternative, benefits to water quality are not anticipated in the AOI.

Adverse

Under this alternative, water quality is expected to generally be adversely affected in the AOI. Land use directly affects water quality, and in undeveloped areas, the natural physical, chemical, and biological processes interact to recycle most of the materials found in storm-water runoff. However, as natural vegetated lands are converted to farms or urban use, these natural processes are disrupted. As a result of everyday human activities, materials such as leaves, animal wastes, oil, greases, heavy metals, fertilizers, pesticides, and other materials are washed off by rainfall and are carried by storm water to rivers and wetlands. These materials can create high pollutant loadings of sediment, nutrients, heavy metals, petroleum hydrocarbons, and coliform bacteria and viruses (Gill et al. 2005). Overall, water quality in the AOI is likely to continue to be adversely affected by expanding urban land use, commercial logging, agricultural operations, and mining. Increased management efforts by state agencies and non-governmental partners to encourage low-impact development and the use of agricultural best management practices (e.g., controlled grazing, livestock exclusion fencing, stream buffer plantings) would help reduce water quality degradation. However, it is expected that urban growth would continue to cause declines in water quality across the AOI. Relative to the size of the watersheds, we expect this impact to be moderate.

Hydrology and Water Quantity

Beneficial

This alternative in not expected to result in positive impacts to the hydrology and water quantity of the area.

Adverse

The flow of water and water availability on most unprotected lands in the AOI would continue to be altered as a result of the land use changes, including urbanization, agribusiness, industry, mining, fracking, etc. Urbanization often requires the construction of drainage ditches, roads, and other impervious surfaces. Impervious surfaces associated with urbanized areas reduce the area available for rainwater to percolate into the soil. This generally has two direct consequences when it rains: (1) There is less water available for recharging the local surficial aquifer, while at the same time the amount of runoff that flows into low-lying area increases; and (2) low-impact development and storm water best management practices required or promoted by state and federal regulatory agencies and local governments (e.g.; rain gardens, storm-water bio-retention ponds, green roofs, permeable pavement installation) would help mitigate some of the impacts associated with impervious surfaces. However, extreme rainfall events would likely exceed the capacity of most storm water systems, and some runoff would be transported to area waters. At a more local level, increased storm water volumes and peak discharge rates associated with urbanization can produce drastic changes in stream channels, resulting in eroded banks and more frequent flooding that can cause damage to adjacent property, homes, and wildlife habitat. Increased surface run-off associated with urban areas would also have regional effects, with excess surface water flows from local watersheds making their way to larger rivers and associated reservoirs. Hence, large pulses of water would increasingly tax water management of reservoirs, whose water has to be maintained at specific levels for the purposes such as supplying water to urban areas, minimizing flood risk, providing recreational opportunities, etc. Conversely, developed areas also tend to exacerbate periods of water shortage. Because impervious surfaces limit the amount of water that seeps into the ground, less water is stored in subsurface areas. Subsurface water plays an important part in the hydrology of an area by providing streams and rivers with a steady supply of water during droughts. As more lands are urbanized, the water-storage ability of an area is reduced, limiting water supplies needed for wildlife and human uses.

As with hydrology, water quantity in the AOI is expected to continue to be negatively affected under this alternative. Growing human settlements increase the demand for water. Expanding agricultural, industrial, mining, and other economic sectors are also expected to compete for limited water resources. The amount of water available for wildlife, native habitats, and wildlife-dependent recreational opportunities would likely decline, as more water would be diverted to support increasing needs elsewhere.

Overall, the negative consequences on hydrology and water quality in the AOI are expected to constitute a moderate impact under the No Action alternative.

Noise

Beneficial

The soundscape of the AOI is not expected to benefit under the No Action alternative.

Adverse

Although noise from various sources currently affects rural lands in the AOI, substantial tracts of land remain where anthropogenic noise levels are relatively low. Without protection, additional lands in the AOI would continue to be converted to agricultural and urban use. Noise levels associated with farm equipment, road traffic, and industrial operations would increase. Increases in the intensity and frequency of noise associated with a growing population would alter the soundscape of the area. National Park Service (NPS) research shows that the effects of human-induced sounds on the overall park experience are cause for concern. In a 1998 survey conducted by the NPS, 72 percent of visitors stated that one of the most important reasons for having national parks was to provide opportunities to experience the natural quiet and sounds of nature. According to the NPS, uncharacteristic sounds or sound levels affect visitors' perceptions of solitude and tranquility and can generate high levels of annoyance (NPS 2009). Furthermore, 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 (Brown 2001). There is currently no specific information about the impacts of noise on the soundscape in the AOI, but human-induced sounds and noise on wildlife and visitors should not be underestimated, especially at local scales. Taken together, the impact of increased noise levels across the AOI within the No Action alternative is expected to constitute a minimal impact.

EFFECTS ON THE BIOLOGICAL ENVIRONMENT

This section discusses potential effects on biological resources (e.g., habitats, wildlife, and federal and state listed species) under the No Action alternative.

Habitats

Beneficial

Under the No Action alternative, benefits to this resource are not expected. Given past actions and land use trends, it is anticipated that human population growth, development, and other land use changes would continue. Within the AOI, native habitats and natural systems would continue to be converted to developed lands and other uses, resulting in continued loss of these resources and further fragmenting remaining natural lands and waters. Over 80 percent of mountain bogs have already been lost, and it expected that a steady decline would continue under this alternative.

Adverse

Existing native habitats, including bogs, would likely be lost to residential and agricultural development. The water resources within the AOI would be impacted by increased storm-water runoff from the growth in impervious surfaces (e.g., roads, parking lots), leading to a deterioration of water quality of the area waterbodies. Water levels in wetlands, streams, and rivers would likely fluctuate more, thereby altering their ecology. The loss of groundwater recharge (due to increased impervious surfaces) and the rise in residential, agricultural, industrial, and mining-related water consumption would increase the frequency of drying events of these wetlands and water bodies,

affecting many aquatic and semi-aquatic species. Currently, the percentage of three broad forest types (deciduous, evergreen, and mixed) in protected areas (versus those in unprotected) is relatively high, ranging between 76 percent (evergreen and mixed) and 97 percent (deciduous) (Table 17). The majority of these forests occur on public lands. Ecologically healthy forest habitats that are not protected would become increasingly fragmented, with negative consequences to various wildlife and watersheds. An increase in forest edges would promote the invasion of exotic plants. Compared to forests, other natural habitats on protected lands, such as woody wetlands, make up a relatively small percentage (28) compared to what is found in unprotected areas (Table 17).

Without a refuge, up to 23,478 acres of habitat could go unprotected. If this area were to be converted to other land uses (urban, agriculture, industrial), it would comprise approximately 0.5 percent of the land currently unprotected in the AOI. However, because all the CPAs (from which the proposed refuge lands would be selected) contain bogs, this scenario would likely also mean that a large percentage of the remaining bog habitat would be lost or seriously affected, constituting a moderate impact.

Wildlife

Beneficial

Under the No Action alternative, there would be no benefits to native fish or wildlife populations with the possible exception of those species that can tolerate or thrive in urbanized, agricultural, or otherwise altered environments. Examples of such species include deer, coyote, raccoon, gray squirrel, blue jay, mocking bird, and various fish species that can live in low-quality waters.

Adverse

As native and natural habitats continue to decline in quality and spatial extent, and as habitat patches become more fragmented, the animal species that use these habitats would decline in numbers or fitness. The No Action alternative would exacerbate this decline in the area's unique flora and fauna, and because some of these species are endemic or greatly restricted in their distribution, it may contribute to the future listing of species under the Endangered Species Act. Nuisance species that prefer forest edges would increase, such as the brown-headed cowbird, raccoon, fox, and opossum. These species are predators on other wildlife and increases in their populations would cause further disruption of native ecosystems. Nonnative aquatic species would also likely increase. Depending on the rarity of the native species affected that are likely to occur in the CPAs, this consequence is expected to be moderate.

Federal/State Listed and Priority Species

Beneficial Effects

Under the No Action alternative, there would be no benefits to at least thirteen federally listed (threatened or endangered) and one candidate species that are known to occur on some of the CPAs, including:

- Bunched arrowhead
- Mountain sweet pitcher plant
- Green pitcher plant
- Rock gnome lichen

- Roan Mountain bluet
- Spreading avens
- Virginia big-eared bat
- Carolina northern flying squirrel
- Swamp pink
- Small whorled pogonia
- Heller's blazing-star
- Virginia spiraea
- Bog turtle
- White fringeless orchid

Likewise, at least 36 federal species of concern would also not benefit under this alternative.

At least 83 state-listed species occur within the CPAs and there are likely more within the AOI. These include Appalachian Bewick's wren, Northern saw-whet owl, bog rose, cranberry, mole salamander, easten small-footed bat, and sharpnose darter, to name a few. Additionally, there are dozens of species that are identified as state priorities in the North Carolina and Tennessee state wildlife action plans.

Adverse Effects

Federally listed species that require bog habitats would be negatively affected under this alternative. There currently are several conservation efforts underway at select sites aimed at protecting these vulnerable plants and the bog turtle. However, it is believed that the scale and intensity of the threats (e.g., habitat loss, changes in water resources) are of such a magnitude that without a larger, more comprehensive effort to protect bog habitats and adjacent watershed buffers, several of these wetland plants and bog turtle populations would be extirpated within the AOI. Other federally listed species that are not bog obligates, but occur within the CPAs and potentially use bogs, would not benefit from the protection of these habitats. Under this alternative, impacts are expected to be moderate.

Similarly, federal/state priority and state listed species are generally not expected to benefit under this alternative.

Nonnative Species

Beneficial

Given the Service's policy that most exotic species are undesirable, there would be no positive consequences under this alternative.

Adverse

Many exotic species often thrive in habitats that have been disturbed (Byers 2002). In addition, increased human access (new settlements, roads, etc.) increases the opportunities for exotic species to spread. The opportunity for expanded urbanization and other land uses that are expected to occur under the No Action alternative could allow for the continued proliferation of numerous exotic species, furthering the disruption of the native ecosystems. As exotic species gain a greater foothold in the AOI, they colonize and negatively alter rare habitats and the native species associated with these areas. The impacts resulting from exotic species are expected to increase under this alternative;

however, the size of the area (23,478 acres) that would likely not receive substantial additional management is relatively small compared to the AOI.

EFFECT ON SOCIOECONOMIC ENVIRONMENT

This section discusses potential effects to socioeconomic resources (e.g., local tax revenues, wildlife-dependent economics, refuges and local real estate values, ecosystem services, and land use patterns) under the No Action alternative.

Local Tax Revenues

The effects, both beneficial and adverse, of Service lands on local tax revenues depends on several factors (federal government appropriations, land value trends, etc), further described below.

The Refuge Revenue Sharing Act of June 15, 1935 (16 U.S.C. 715s) offsets the loss of local tax revenues from federal land ownership through payments to local taxing authorities. The refuge provides annual payments to taxing authorities, based on the acreage and value of refuge lands located within their jurisdiction. Money for these payments comes from the sale of oil and gas leases, timber sales, grazing fees, the sale of other Refuge System resources, and from congressional appropriations, which are intended to make up the difference between the net receipts from the Refuge Revenue Sharing fund and the total amount due to local taxing authorities. The actual Refuge Revenue Sharing payment does vary from year-to-year, because Congress may or may not appropriate sufficient funds to make full payment. The exact amount of the annual payment depends on the congressional appropriation, which in recent years has tended to be less than the amount to fully fund the authorized level of payments.

The Refuge Revenue Sharing payments are based on one of three different formulas, whichever results in the highest payment to the local taxing authority. The payments are based on three-quarters of 1 percent of the appraised fair market value (or the purchase price of a property until the property is reappraised). The Service reappraises the value of refuge lands every five years, and the appraisals are based on the land's highest and best use. Refuge Sharing payments typically benefit local communities in areas where wetlands and formerly farmland-assessed properties make up a larger component of the landscape. On these types of lands, full entitlement Refuge Revenue Sharing payments sometimes exceed the real estate tax; in other cases, Refuge Revenue Sharing payments may be less than the local real estate tax.

In areas that are rapidly urbanizing and the land values are rising Refuge Revenue Sharing payments may be less than local tax rates. However, it is expected that these losses may be off-set by cost-savings to communities. Refuges can reduce costs to local communities because they require minimal infrastructure. Maintaining a system of open spaces, such as a refuge, is one important way to control the operating costs of local government. Land conservation is often less expensive for a local government than a suburban-style residential development. In general, refuges and other open spaces put little demand on the infrastructure of a municipality and should be considered in assessing the financial impact on the municipality. Conserving open space has the long-term benefit of avoiding future costs. Increasingly, communities and counties are finding that single-family residential tax rate tables do not cover the costs of municipal services, community infrastructure and local schools. Studies show that for every dollar collected in taxes, residential development costs between $1.04 and $1.67 in services. Furthermore, these costs continue into the future, generally increasing over time. Even including the initial cost of acquisition, open space is less costly to taxpayers over both the short term and long term than development of the same parcel, while the major public costs to conserve natural areas are finite (East Amwell Agricultural Advisory Board 1994, Mendham Township

Committee 1994, Pinelands Commission 1994, Burlington County Farmland Preservation Program 1996, Madsen et al. 2004).

Under this alternative (no new refuge), it is difficult to determine what the overall effects would be on local tax revenues. Generally, the area is experiencing population growth, but there are more localized areas where this is not the case. These trends could change over time. At this point in time, we are unable to predict (if the proposal were to be authorized) where and when refuge lands would be purchased within the CPAs.

Economics of Wildlife-dependent Recreation

Beneficial

Economic benefits associated with wildlife-dependent recreation would not be realized under this alternative.

Adverse

Without a new refuge, few new lands that offer wildlife-dependent activities are likely to be established in the foreseeable future. Refuges can contribute to the region's economy in several ways. First, a segment of the visiting public would spend its money at area hotels and restaurants. Second, visitors would locally buy some equipment and supplies associated with public uses such as hunting, fishing, and wildlife-watching/photography. A recent study by the University of Tennessee found that the economic activity generated by Tennessee state parks had a substantial impact on Tennessee's economy and created thousands of jobs in many rural areas of the state where jobs are needed most. In 2008-2009, an estimated 16.9 million people visited Tennessee state parks, resulting in $725.2 million in direct expenditures. For every dollar spent on trips to Tennessee state parks, an additional $1.11 of economic activity was generated throughout the state. When the direct and indirect expenditures were combined, the impact of Tennessee state parks to the state's economy was $1.5 billion in total industry output. The $725 million in direct expenditures supported almost 12,000 jobs across Tennessee, while associated industry output (i.e., indirect or secondary economic activity) supported over 18,600 jobs throughout the state (Fly et al. 2010). Wildlife-related activities are also important in North Carolina. Outdoor activities and beaches are among the main reasons people visit North Carolina. In 2001, outdoor recreation was the primary reason for 11 percent of all tourist travel to the state. Among all visitors, visiting beaches (15 percent) and outdoor activities (15 percent) were more popular than any activity but shopping (Madsen et al. 2004).

Hence, without a new refuge, these associated, additional economic activities would likely not be realized.

Effect of Refuges on Nearby Property Values

Beneficial

There would be no benefits to property values resulting from this alternative.

Adverse

A new study released by the Service, "Amenity Values of Proximity to National Wildlife Refuges," shows that in urban areas across three regions of the country, owning a home near a national wildlife refuge increases home value and helps support the surrounding community's tax base (Taylor et al.

2012). According to the study, homes located within half a mile of a refuge and within eight miles of an urban center were found to have higher home values of roughly:

- Seven to nine percent in the southeast
- Four to five percent in the northeast; and
- Three to six percent in the California/Nevada regions.

Hence, under this alternative, property values would not benefit from a nearby refuge and would rise only according to regional factors.

Ecosystem Services

Beneficial

Under this alternative, there would be no benefits to local communities associated with ecosystem services, and no cost savings to local communities would result from functioning natural systems, such as those provided by a refuge.

Adverse

Under this alternative, local communities would not benefit from an array of potential "ecosystem services" (McConnell and Walls 2005). Refuges and other open spaces can provide additional economic benefits, in terms of ecosystem services, which are the cost savings provided by functioning natural systems. These include all the functions performed by nature that provide benefits to humans, such as clean drinking water, reductions in storm-water runoff (i.e., flood prevention), air-pollution reduction, and reduced costs of government services. Several studies have been conducted to quantify the financial benefits that open spaces provide to local communities. For example, a 2010 study found that Long Island's parks and open space provided quantifiable economic benefits worth over $2.74 billion a year (The Trust for Public Land 2010). It must be noted that the agricultural lands were included in the analysis, and had a combined estimated worth of $288 million annually, slightly more than 10 percent of the total cost benefit. Nationwide, these cost-savings are substantial. It is estimated that within the contiguous 48 states, the total value of ecosystem services provided by wildlife refuge lands was estimated at over $32 billion annually (Ingraham and Foster 2008). Cost savings associated with flood prevention and mitigation provided by wetlands and other open space are among the most important of all array of ecosystem services. For example, a study by American Forests (2003) determined that the forested open space in Mecklenburg County (NC) provided 935 million cubic feet of storm-water retention capacity. The group estimated that replacing this capacity with man-made infrastructure would cost approximately $1.9 billion. Another study, conducted by the Minnesota Department of Natural Resources, showed that it would cost approximately $370 to replace each acre-foot of flood storage capacity naturally provided by a wetland with artificial flood controls (Floodplain Management Association 1994).

Land Use Patterns

Beneficial

Under the No Action alternative, lands trusts, national parks, Natural Resources Conservation Service, North Carolina and Tennessee state agencies, and other conservation land managers would continue to protect some of the lands in the AOI. North Carolina and Tennessee have a history of funding land protection efforts. The North Carolina Natural Heritage Trust Fund (NHTF) provides

financial support for the purchase of natural lands for recreation, forestry, fish and wildlife habitat, and wilderness. In 1987, the General Assembly created the NHTF to protect the state's natural and historic places from rapid development. Since then, over 264,459 acres of game lands, state parks and forests, and other natural and historic places of interest have been protected (North Carolina Natural Heritage Trust Fund 2007). In addition, over 100,000 acres have been set aside through private and non-profit efforts. However, the rate of land protection has declined substantially since 2006. For example, in 2006, approximately 120,000 acres were protected statewide, but in 2011 it was just over 20,000 acres. Meanwhile, loss of open space continues. Between 1997 and 2007, North Carolina added more than 1.1 million acres of developed land, while losing a roughly equivalent amount of cropland, pastures, and forests (Land for Tomorrow 2012).

In Tennessee, the Heritage Conservation Trust Fund, Wetlands and State Parks Acquisition Funds, and Natural Areas Preservation Act have acquired and protected over 379,000 acres since the 1970s. However, compared with years leading up to the economic downturn, states have recently seen relatively large reductions in land acquisition activities due to declining budgets. Even if the proposed refuge lands are acquired over the next several decades, lands in the AOI would be left unprotected and remain at risk from urban development, row-crop agriculture (including biofuel production), industry, mining, and other land uses generally deemed incompatible with natural resource protection efforts. Hence, in terms of conservation, which is an integral component of the Service's mission, there would be no beneficial impacts to land use under this alternative.

Adverse

North Carolina's and Tennessee's populations are likely to continue to rise during the next 50 years, with current decadal growth rates approximately 16 and 11 percent, respectively (U.S. Census Bureau 2012). With continued population growth, land use is likely to change, and areas currently covered by intact deciduous forests could be converted to commercial pine forests, urban use, and agriculture. According to a 2009 study of land use trends in western North Carolina (Kirk 2009), agricultural lands have declined, and are being replaced primarily by developed areas. It predicts that by 2030, agricultural areas and forests will decline by 12 and 4.8 percent, respectively. In Tennessee, farmland and other open space (including wildlife habitat and areas used for outdoor recreation) are also being converted to urban use. Based on a report prepared for the Tennessee Advisory Commission on Intergovernmental Relations (Thurmann et al. 2011), developed lands increased from about 7 percent in 1982 to over 12 percent in 2007, corresponding to a loss of about 25 percent of croplands during the same period. As expected, there were differences between the rates of urban land conversion (e.g., developed lands comprised about 4 percent in Hardeman County compared to about 36 percent in Blount County (Thurmann et al. 2011). Another land-cover study conducted in southern Tennessee showed that forest cover declined by 14 percent between 1981 and 2000. In addition, the rate of forest loss increased. Between 1981 and 1997, intact native forest area decreased at a rate of 3,012 acres per year, whereas between 1997 and 2000 the rate of decrease was almost two times greater at 5,823 acres annually (Reid et al. 2008). The replacement of open spaces (e.g., farmland, wildlife habitat, outdoor recreation areas) in the AOI by developed areas would continue to have potential negative consequences to people and wildlife. Impacts would be to clean and dependable supplies of water, local food/fiber production, outdoor recreation, etc. These effects are expected to be moderate, given the acreage of the refuge relative to the size of the AOI and potential mitigating circumstances (local/regional planning, etc.).

EFFECTS ON CULTURAL RESOURCES

This section discusses potential effects to cultural (e.g., archaeological, historical) resources under the No Action alternative.

Beneficial

No positive impacts to archeological and historic resources are expected under the No Action alternative.

Adverse

The No Action alternative could have a negative effect on the protection of historical and archaeological resources in the AOI. Without additional protection, cultural resources, whether listed or not, tend to be vulnerable to development, disturbance, take, and vandalism. Without a refuge, fewer lands would be managed by the Service and its partners, which have a clear responsibility for protection of cultural resources.

Landowners and developers have no similar legal responsibilities, unless one of their activities requires a federal permit (i.e., U.S. Army Corps of Engineers 404 Permit, or a Service Incidental Take Permit) or state permit. If permits are required, landowners or developers would have to comply with either Section 106 of the National Historic Preservation Act or state regulations regarding cultural resources prior to the issuance of any permit. In these cases, archaeological and historical investigations, if deemed necessary by the federal agency, the state agencies, and the tribes, would be limited to the project area in question. The activity could proceed provided that the landowner or developer has taken steps to avoid, minimize, or mitigate adverse impacts to historic properties identified within the specific project area. A number of landowners within the AOI possess a strong conservative ethic. Their efforts to protect and conserve important habitats on their holdings are often beneficial for cultural resource sites.

However, because of population growth, increased urbanization, and changing land use patterns projected for the AOI, a number of historical properties would likely be adversely impacted under the No Action alternative. These impacts are expected to be moderate.

ALTERNATIVE B: PROPOSED ACTION

Under this alternative, the Service would authorize a 42,250-acre conservation partnership area (CPA) from within which up to approximately 23,478 acres of lands and waters could be acquired as part of Mountain Bogs NWR. Proposed methods of acquisition are summarized in Section A.

EFFECTS ON THE PHYSICAL ENVIRONMENT

This section discusses potential effects to physical resources (e.g., topography, soils, water resources) under the Proposed Action.

Topography and Geology

Beneficial

Under this alternative, mining would not be permitted within the 23,478-acre proposed refuge, and the topography and geology would be protected from mining and other activities that could substantially

alter the landscape. As discussed under the "Topography and Geology" section under the No Action alternative, current mining operations are changing these resources at selected sites within the AOI. Given that the CPAs contain few mineral or energy resources currently of interest, they are unlikely to be targeted for these activities. Furthermore, the CPAs cover a small area compared to the AOI. Therefore, we expect there to be a minimal benefit with regards to topography and geology.

Adverse

If Mountain Bogs NWR were to be established, no construction activities would occur that would affect these resources. Any possible new construction (e.g., facilities to support refuge operations and visitor services) is not expected to result in adverse impacts to the topography or geology.

Soils

Beneficial

Under this alternative, there would be a minor benefit to soils within the proposed refuge. Within the refuge, this resource would largely be protected from disturbance and degradation associated with development, agriculture, mining, etc. The "Soils" section under the No Action alternative provides a more detailed discussion on how these land uses can affect soils.

Adverse

Within the proposed refuge, some soils would be disturbed due to the construction of one or more potential buildings, parking lots, and other infrastructure needed to support refuge visitors and operations. Natural soil-formation processes would no longer occur in areas covered by impervious surfaces (e.g., roads, parking lots, buildings). Soil compaction is also expected at sites where construction occurs. Best management practices would be used to minimize these impacts. Additional environmental analyses would be conducted in association with any substantial (e.g., roads, parking lots, buildings) construction projects, per Service policy. Although the exact acreage needed for any new refuge infrastructure is unknown at this point, it is believed it would be a small percentage of the total refuge area. The impacts to soils resulting from the alternative are expected to be minimal.

Climate Change

Beneficial

Under this alternative, there would be assurances that the approximately 23,478 acres of proposed refuge lands would continue to act as carbon sinks, resulting in a positive impact with regard to climate change. As further detailed in the "Climate Change" section under the No Action alternative, many natural areas have the ability to store carbon (live and dead vegetation, soil). Habitats differ in their ability to store carbon, depending on the amount of vegetation they support and other factors. Some habitats such as certain wetlands, although they store carbon, also produce methane (Bridgham et al. 2007), which is a powerful greenhouse gas (NOAA 2011). It is believed that the proposed refuge lands would provide a net reduction in greenhouse gases, even with potential anthropogenic sources (see discussion of Adverse Effects below) of these gases taken into account. Overall, this benefit would be minimal. Due to the comparatively small size of the proposed refuge, its carbon sequestration ability would likely not be measureable compared to the volume of Earth's atmosphere.

Adverse

Under this alternative, refuge operations and facilities, public visitation, and habitat management would contribute greenhouse gases to the atmosphere.

The amount of carbon that would potentially be released through refuge operations (e.g., combustion engines, electrical equipment use) was not estimated for this Draft EA. However, the proposed refuge would aim to minimize its carbon emissions. As the Refuge System works to implement many of the strategies for achieving Service-wide carbon neutrality by 2020 (USFWS 2011: "Strategic Plan for Climate Change"), refuge energy use is expected to decline. These actions would include use of hybrid vehicles, building energy efficient facilities, video-conferencing (to reduce travel-related energy use), and green purchasing. These strategies, combined with those of other Service offices and the Federal Government in general, would likely result in a beneficial reduction in the rate of greenhouse gas emissions nationally.

Refuge visitation would be associated with a number of vehicles on the refuge. The low rate of speed necessitated would minimize emissions. In addition, the number of vehicles on the refuge at any given time would not be expected to create a significant impact to greenhouse gas emissions.

Prescribed burning would be a valuable habitat management tool within several habitats of the proposed refuge. The primary gases released during prescribed fire include CO_2, CO, and water vapor, with other gases present in trace amounts (EPA 2011). Most of these are greenhouse gases. However, it has been shown that prescribed fires can decrease the risk of wildfires, which typically release greater amounts of greenhouse gases (National Science Foundation 2010). Wildfires tend to burn entire habitats including mature trees, whereas prescribed fires are aimed at reducing groundcover and low-growing shrubs. The amount of greenhouse gases contributed to the atmosphere as a result of prescribed fires on the proposed refuge is expected to be minimal.

Air Quality

Beneficial

A positive effect on air quality is anticipated as a result of this alternative. With the establishment of the proposed refuge, sources of air pollution resulting from urbanization, agricultural operations, industry, etc., would be halted within 23,478 acres. This benefit is expected to be minor, given that the proposed refuge would cover a relatively small percentage of the total AOI.

Adverse

Under this alternative, refuge operations and facilities, public visitation, and habitat management would contribute some pollutants to the atmosphere, affecting air quality.

Some air pollutants would be released through refuge operations (e.g., combustion engines, electrical equipment use). However, the proposed refuge would aim to minimize its emissions from vehicles as well as the indirect emissions associated with electrical energy use. As the Refuge System works to implement many of the strategies for achieving Service-wide carbon neutrality by 2020 (USFWS 2011: Strategic Plan for Climate Change), refuge energy use is expected to decline. These actions would include use of hybrid vehicles, building energy efficient facilities, video-conferencing, and green purchasing. These strategies, combined with those of other Service offices and the Federal Government in general, would likely result in a beneficial reduction air pollutants.

Refuge visitation would be associated with a number of vehicles on the refuge. The low rate of speed necessitated would minimize emissions of air pollutants. In addition, the number of vehicles on the refuge at any given time would not be expected to create a significant impact to air quality.

Prescribed burning would be a valuable habitat management tool within several habitats of the proposed refuge. Prescribed burning releases several air pollutants, including CO and particulate matter. The proposed refuge would work with its partners to reduce smoke-related issues in adjacent areas resulting from prescription fires. The risk of wildfires would be minimized through a fire management program. One positive consequence of prescribed fire is the reduction in the frequency and intensity of wildfires, which tend to release larger amounts of air pollutants (National Science Foundation 2010).

Overall, the negative consequences to air quality associated with this alternative are expected to be minor.

Water Quality

Beneficial

This alternative is expected to result in benefits to water quality in the AOI. The establishment of the proposed refuge would protect 23,478 acres from future urbanization, expanded agricultural operations, growing industries, etc. These land uses are typically associated with declines in water quality, as further detailed in the “Water Quality” section under the No Action alternative. Conservation lands, such as the proposed refuge, tend to improve water quality downstream as vegetated areas reduce run-off and sedimentation, while also absorbing some nitrogen and phosphorus. Installation of agricultural and storm water best management practices and the use of low impact development methods on refuge lands are expected to improve water quality within portions of the AOI. Sedimentation, excess nutrients, and other water pollutants are further discussed in the section on “Water Quality” under the No Action alternative. The positive impacts to water quality are expected to be moderate under the Proposed Action.

Adverse

Under this alternative, there would be some impacts to water quality resulting from new construction, refuge operations, and visitor use on the proposed refuge.

The construction of office and visitor use buildings, parking areas, trails, and other facilities and infrastructure needed for refuge operations and public use programs would cause some vegetation clearing, soil disturbance, and associated runoff. Low impact development methods and best management practices would be used to minimize these effects. Runoff from roads and parking lots would cause some oil, grease, and other materials from vehicles to leach into soils or be carried as runoff into low-lying areas. Storm-water wetlands and retention ponds, for example, would help mitigate many of the water quality impacts associated with runoff. The North Carolina Department of Environment and Natural Resources, Division of Water Quality, Storm-water BMP Design Manual (NCDWQ 2007) methods would be used as a reference during construction, and BMPs outlined within this manual would be employed to minimize impacts from refuge-associated development.

Prescribed fires and clearing of nonnative plants would cause some vegetation to be removed, leaving soils exposed to runoff and erosion. In general, it is expected that runoff would be buffered by vegetated areas and would likely not contaminate waterbodies. If nonnative plant removal operations were to occur in riparian zones, BMPs would help ensure that impacts to water quality

were kept to a minimum. Use of approved herbicides for controlling nonnative plants could cause some of these chemicals to leach into the groundwater or make their way into surface waters. Adherence to product usage guidelines and Service requirements would keep any of these adverse effects to water quality at a minimum. Herbicide use would likely be much less than occurs on farms and in developed areas.

Public use on the proposed refuge would include hunting (which, by its very nature, is off-trail), with some associated trampling of vegetation. This is expected to be a minimal impact, given that hunter densities would likely be sufficiently low to reduce the chances of foot paths (i.e., sources of erosion) from becoming established. Erosion associated with wildlife watching would be minimized by limiting these activities to trails, and possibly, overlooks and observation towers. For anglers, some improved access (e.g., boardwalks) to fishing areas might be constructed, which would minimize erosion to shorelines.

In general, it is believed that any negative consequences to water quality resulting from the proposed refuge would be minimal.

Hydrology and Water Quantity

Beneficial

This alternative is expected to result in positive impacts to the hydrology and water quantity of the area. About 23,487 acres of proposed refuge lands would be protected from the construction of extensive drainage ditches, roads, and large areas of impervious surfaces associated with development that would otherwise alter the hydrology. See the “Hydrology and Water Quantity” section under the No Action alternative for a discussion on the impacts of various structures on water flow and quantity. The benefit to these resources is expected to be moderate under the Proposed Action. Furthermore, the refuge would restore the hydrology where needed, which would be beneficial to refuge lands and areas outside of the refuge.

Adverse

Under this alternative, there would be some impacts to hydrology and water quantity resulting from construction projects on the proposed refuge. Infrastructure such as visitor and office facilities, paved areas, and landscaped areas would alter, to some degree, the local hydrology and amount of water available to down-stream areas. Specific site plans for public use building(s) and refuge offices have not yet been developed (where possible, existing structure would be evaluated to determine if they could serve refuge needs), so the amounts of impervious surfaces are unknown at this time. However, impervious surfaces, such as roads, sidewalks, and buildings, reduce the area available for rainwater to percolate into the soil. This generally has two direct consequences when it rains: there is less water available for recharging the local surficial aquifer, while at the same time the amount of runoff that flows into low-lying area increases. Low impact development methods and best management practices would be used to minimize these effects. Storm-water wetlands and retention ponds, rain gardens, and rooftop rainwater harvesting, for example, would help mitigate many of the water quantity impacts associated with impervious surfaces. The North Carolina Department of Environment and Natural Resources, Division of Water Quality, Storm-water BMP Design Manual (NCDWQ 2007) methods would be used as a reference during construction, and BMP’s outlined within this manual would be employed to minimize impacts from refuge-associated development. Although additional environmental studies would likely be conducted in association with any future construction, it is not believed that there would be significant impacts to the hydrology or water quantity resulting from the proposed refuge. Overall, the negative effects on hydrology and water quantity are believed to be minimal under this alternative.

Noise

Beneficial

The soundscape of the areas in which the refuge is proposed would benefit under this alternative. Sources of noise from heavy traffic, farm machinery, and industrial operations would not occur within the refuge boundary, providing minimal benefits to this resource.

Adverse

Some noise would be associated with use of vehicles by refuge staff and the visiting public on the refuge. Because high levels of speed would not be permitted, associated noise levels would be kept to a minimum. Hunting would cause some noise disturbance at some CPAs, but the frequency and duration would be at levels that would keep it at minimal levels. Overall, it is expected that the proposed refuge would have a minimal impact on this resource.

EFFECTS ON THE BIOLOGICAL ENVIRONMENT

This section discusses potential effects to biological resources (e.g., habitats, wildlife, federal/state-listed species, and exotic species) under the Proposed Action.

Habitats

Beneficial

With the implementation of Alternative B, bog habitats and adjacent uplands and stream habitats would be afforded additional protection, and we expect moderate benefits to natural habitats. From within the larger CPAs (42,250 acres), up to 23,478 acres would be conserved under this proposal. At this time, we cannot predict the relative amounts of different habitats that would eventually make up the refuge, but it would conceivably have similar ratios to what is found in the CPAs. In any event, the refuge would include bog habitats and adjacent watershed buffers.

Protecting the adjacent buffer areas would be critical to the long-term conservation of mountain bogs. These vegetated areas help protect water resources that are important to the bogs. Forests, for instance, can absorb and slowly release water; providing a flow of water that sustains bogs down-slope, even during some droughts. Conversely, vegetated lands upstream of bogs help prevent sedimentation and limit flash floods.

Adverse

Based on the information presented “North Carolina Natural Heritage Trust Fund: Celebrating 20 Years of Conservation” (North Carolina Trust Fund 2007), approximately 100,000 acres of forests, farmland, and other open space were converted to residential/urban land uses in 2007. Within parts of the AOI, Vogler et al. (2009) predicted that an additional 47,489 acres of forested and agricultural lands would be developed by 2030 at an average rate of 5.9 acres per day, with Buncombe and Henderson Counties accounting for the majority of the anticipated growth, contributing 22,101 and 18,381 acres, respectively. Henderson County was expected to undergo the greatest change in total developed land relative to county area in the region, with the total number of developed acres comprising 13.2 percent of the county in 2006 and 21.3 percent by 2030 (Vogler et al. 2009).

We anticipate that existing natural habitats would still be lost to urban development under Alternative B. This would fragment remaining natural lands and waters. However, we expect that the distribution of these impacts might change if Alternative B was implemented. For example, Alternative B would protect up to 23,478 acres from further agricultural or residential development, but it may also attract development to its periphery. A frequent real estate selling point is the ability to own land where there are fewer neighbors and some people may desire to live adjacent to a refuge or other protected natural area. This could entice residential development around the Alternative B Units on lands not already protected. In this event, the periphery of these Units could be affected by adjacent landowners (human disturbance) and wildlife connectivity could be reduced. In the interim, the price for these adjacent lots may also increase due to their anticipated desirability. That increase in cost, may make it more difficult for the Service or other conservation agencies or entities to buy additional lands or easements in those areas. In general, we expected impacts to habitats under this alternative to be minor.

Wildlife

Beneficial

There are hundreds of non-listed species including fish, mussels, amphibian, reptile, bird, and mammals potentially present in the AOI. The area is a center of biodiversity for salamanders and terrestrial snails. Numerous migratory birds utilize the forests and other habitats for breeding, wintering and as a stop-over location during their migration. Under this alternative, the habitats protected would benefit a range of species. Furthermore, on refuge lands, the mortality caused by high towers, roads, and other structures associated with expanding human settlements would be reduced.

Adverse

There could potentially be some minimal impacts to non-listed species resulting from the establishment of a refuge. Although pre-work surveys and best management practices would be used, restoration projects could temporarily displace or possibly kill individuals of some species in the short term. However, mitigation efforts would reduce those effects to a minimum and over the long term, impacts would be beneficial. Various wildlife-dependent public use opportunities (e.g. wildlife observation, hunting, etc.) could cause disturbance to vulnerable species (e.g. nesting birds, etc.) possibly resulting in reduced reproductive output or survival of individuals. Rare plants could get trampled or otherwise disturbed. These risks would be off-set by possibly limiting access during certain times of the year to particular sites, making some sites off-limits to the public, and other mitigating measures. These measures are described in more detail in Appendix B: Interim Appropriateness and Interim Compatibility Determinations.

Impacts to game species would include take by anglers and hunters, but this is already occurring in the area. Generally, hunting and fishing on sites where these activities would be permitted would be regulated according to state guidelines. In some cases and on specific sites, additional restrictions could be warranted (see Appendix B for further details). Overall, adverse effects on game species are expected to be minimal.

Federal/State Listed and Priority Species

Beneficial Effects

Under Alternative B, there would be benefits to at least thirteen federally listed (endangered or threatened) species and one candidate species that are known to occur on some of the CPAs:

- Bunched arrowhead
- Mountain sweet pitcher plant
- Green pitcher plant
- Rock gnome lichen
- Roan Mountain bluet
- Spreading avens
- Virginia big-eared bat
- Carolina northern flying squirrel
- Swamp pink
- Small whorled pogonia
- Heller's blazing-star
- Virginia spiraea
- Bog turtle
- White fringeless orchid

There are several conservation efforts underway at select sites aimed at protecting these vulnerable plants and the bog turtle. We believe that under this alternative, through the additional protection and conservation of bogs and watershed buffers, several of these wetland plants and bog turtle populations would benefit greatly and the establishment of a refuge is expected to contribute to their recovery. Under this alternative, these positive effects are expected to be moderate.

In addition, 36 federal species of concern can also be found within the CPAs, including Eastern hellbender, golden-winged warbler, Gray's lily and Cuthbert's turtlehead. The study area supports hundreds of state-listed and priority species with the CPAs supporting at least 20 state (North Carolina, Tennessee or both) threatened and endangered designations. These and additional state species of concern are outlined in Chapter 2 of the EA.

Adverse Effects

Impacts to federally/state listed and priority species are expected to be minimal. Bog restoration efforts could potentially have localized, short-term consequences to some of the plants or bog turtles, but the long-term benefits (e.g. increasing suitable habitat, growing population size of listed species, etc.) would outweigh those impacts. Best management practices and limiting public access on highly vulnerable sites would further reduce (to minimal levels) any negative effects associated with refuge operations and visitor use. In addition, residential development patterns could shift slightly towards refuge lands if people view it as a desirable recreational area. This could fragment adjacent unprotected habitats.

Invasive Species/Diseases/Pathogens

Beneficial

In our global society, invasive species, wildlife diseases and pathogens are an ever increasing threat to ecosystems and wildlife. We anticipate that exotic invasive plant species would be controlled under Alternative B, and regular assessment of wetlands and the surrounding areas included within the CPA's would be needed to control these threats. It might also be possible to control some plant diseases, such as hemlock wooly adelgid. Additionally, establishment of a refuge would provide good opportunities to educate the public about these threats and to serve as an example on how to minimize our impacts. Finally, the health of wildlife and plants could be monitored, which could help detect outbreaks. We envision that a management plan will be developed for each CPA, and this plan will include monitoring and control of these threats.

Adverse

The designation of bog sites as part of a National Wildlife Refuge will likely mean visitation by more people at some locations. High visitation can increase the risk of spreading diseases, pathogens and invasive plants. For example, ranavirus and chytrid fungi are two wildlife diseases that have devastated populations of amphibians and reptiles in certain regions. These two diseases can easily hitchhike a ride on the boots of visitors or biologists visiting these sites, as can seeds from invasive plants. A plan should be in place for decontamination by people entering different bog sites to minimize the chance of spreading invasive species, diseases and pathogens within and between bog sites, which will serve to minimize and reduce impacts from these threats.

EFFECTS ON SOCIOECONOMIC ENVIRONMENT

This section discusses potential effects to socioeconomic resources (e.g. local tax revenues, wildlife-dependent economics, refuges and local real estate values, ecosystem services, and land use patterns) under the Proposed Action.

Local Tax Revenues

The effects, both beneficial and adverse, of Service lands on local tax revenues depends on several factors (federal government appropriations, land value trends, etc), further described below.

The Refuge Revenue Sharing Act of June 15, 1935 (16 U.S.C. §715s) offsets the loss of local tax revenues from federal land ownership through payments to local taxing authorities. The refuge provides annual payments to taxing authorities, based on the acreage and value of refuge lands located within their jurisdiction. Money for these payments comes from the sale of oil and gas leases, timber sales, grazing fees, the sale of other Refuge System resources, and from Congressional appropriations, which are intended to make up the difference between the net receipts from the Refuge Revenue Sharing Fund and the total amount due to local taxing authorities. The actual Refuge Revenue Sharing payment does vary from year to year, because Congress may or may not appropriate sufficient funds to make full payment. The exact amount of the annual payment depends on the Congressional appropriation, which in recent years have tended to be less than the amount to fully fund the authorized level of payments.

The Refuge Revenue Sharing payments are based on one of three different formulas, whichever results in the highest payment to the local taxing authority. The payments are based on three-quarters of 1 percent of the appraised fair market value (or the purchase price of a property until the

property is reappraised). The Service reappraises the value of refuge lands every five years, and the appraisals are based on the land's highest and best use. Refuge Sharing payments typically benefit local communities in areas where wetlands and formerly farmland-assessed properties make up a larger component of the landscape. On these types of lands, full entitlements Refuge Revenue Sharing payments sometimes exceed the real estate tax; in other cases, Refuge Revenue Sharing payments may be less than the local real estate tax.

In areas that are rapidly urbanizing and land-values are rising, Refuge Revenue sharing payments may be less than local tax rates. However, it is expected that these losses may be off-set by cost-savings to communities. Refuges can reduce costs to local communities because they require minimal infrastructure. Maintaining a system of open spaces, such a refuge, system is one important way to control the operating costs of local government. Land conservation is often less expensive for a local government than a suburban-style residential development. In general, refuges and other open spaces put little demand on the infrastructure of a municipality and should be considered in assessing the financial impact on the municipality. Preserving open space has the long-term benefit of avoiding future costs. Increasingly, communities and counties are finding that single-family residential tax rate tables do not cover the costs of municipal services, community infrastructure and local schools. Studies show that for every $1.00 collected in taxes, residential development, costs between $1.04 to $1.67 in services. Furthermore, these costs continue into the future, generally increasing over time. Even including the initial cost of acquisition, open space is less costly to taxpayers over both the short and long term than development of the same parcel, while the major public costs to preserve natural areas are finite (East Amwell Agricultural Advisory Board 1994, Mendham Township Committee 1994, Pinelands Commission 1994, Burlington County Farmland Preservation Program 1996, Madsen et al. 2004).

Under this alternative (establishment of a new refuge), it is difficult to determine what the overall effects will be on local tax revenues. Generally, the area is experiencing population growth, but there are more localized areas where this is not the case. These trends could change over time. At this point in time, we are unable to predict (if the proposal were to be authorized) where and when refuge lands would be purchased within the CPAs.

Economics of Wildlife-dependent Recreation

Beneficial

We expect the establishment of a new refuge to have some positive economic effect. Refuges can contribute to the region's economy in several ways. First, a segment of the visiting public would spend its money at area hotels, restaurants, gas stations, etc. Secondly, visitors would locally buy some equipment and supplies associated with public uses such as hunting, fishing, and wildlife-watching/photography. Wildlife-related activities are important in North Carolina. Outdoor activities and beaches are among the main reasons people visit North Carolina. In 2001, outdoor recreation was the primary reason for 11 percent of all tourist travel to the state. Among all visitors, visiting beaches (15 percent) and outdoor activities (15 percent) were more popular than any activity but shopping (Madsen et al. 2004).

A recent study by the University of Tennessee found that the economic activity generated by Tennessee State Parks had a substantial impact on Tennessee's economy and creates thousands of jobs in many rural areas of the state where jobs are needed most. In 2008-2009, an estimated 16.9 million people visited Tennessee State Parks, resulting in $725.2 million in direct expenditures. For every dollar spent on trips to Tennessee State Parks, an additional $1.11 of economic activity was generated throughout the state. When the direct and indirect expenditures were combined, the

impact of Tennessee State Parks to the state's economy was $1.5 billion in total industry output. The $725 million in direct expenditures supported almost 12,000 jobs across Tennessee, while associated industry output (i.e. indirect or secondary economic activity) supported over 18,600 jobs throughout the State (Fly et al. 2010).

Adverse

Negative consequences could include additional congestion of area roads, for instance, resulting from an increase in refuge visitors. Heavy traffic and associated long delays could curb future visitation to the area. We expect this effect to be minimal.

Effect of Refuges on Nearby Property Values

Beneficial

A new study released by the U.S. Fish and Wildlife Service, "Amenity Values of Proximity to National Wildlife Refuges," shows that in urban areas across three regions of the country, owning a home near a national wildlife refuge increases home value and helps support the surrounding community's tax base (Taylor et al. 2012). According to the study, conducted for the U.S. Fish and Wildlife Service by economic researchers at North Carolina State University, homes located within half a mile of a refuge and within eight miles of an urban center were found to have higher home values of roughly:

- Seven to nine percent in the southeast
- Four to five percent in the northeast; and
- Three to six percent in the California/Nevada region.

Hence, under this alternative, property values could benefit from a nearby refuge.

Adverse

A rise in real estate values resulting from a nearby refuge could adversely affect some home owners with fixed or declining incomes.

Ecosystem Services

Beneficial
Under this alternative, local communities could receive some benefits from an array of potential "ecosystem services" (McConnell and Walls 2005). Refuges and other open spaces can provide additional economic benefits, in terms of ecosystem services, which are the cost savings provided by functioning natural systems. These include all the functions performed by nature that provide benefits to humans, such as clean drinking water, reductions in stormwater runoff (i.e. flood prevention), air-pollution reduction, and reduced costs of government services. Several studies have been conducted to quantify the financial benefits that open spaces provide to local communities. For example, a 2010 study found that Long Island's parks and open space provided quantifiable economic benefits worth over $2.74 billion a year (The Trust for Public Land 2010). It must be noted that the agricultural lands were included in the analysis, and had a combined estimated worth of $288 million annually, slightly more than 10 percent of the total cost benefit. Nationwide, these cost-savings are substantial. It is estimated that within the contiguous 48 states, the total value of ecosystem services provided by wildlife refuge lands was estimated at over $32 billion annually (Ingraham and Foster 2008). Cost savings associated with flood prevention and mitigation provided

by wetlands and other open space are among the most important of all array of ecosystem services. For example, a study by American Forests (2003) determined that the forested open space in Mecklenburg County (NC) provides 935 million cubic feet of storm-water retention capacity. The group estimated that replacing this capacity with man-made infrastructure would cost approximately $1.9 billion. Another study, conducted by the Minnesota Department of Natural Resources, showed that it would cost approximately $370 to replace each acre-foot of flood storage capacity naturally provided by a wetland with artificial flood controls (Floodplain Management Association 1994).

Adverse

None anticipated under this alternative.

Land Use Patterns

Beneficial

Under Alternative B, the total area of protected lands used for habitat and wildlife conservation and compatible wildlife-dependent recreation would increase in the AOI by approximately 23,478 acres. Approximately 2.6 million acres (38 percent) of the land in the AOI are protected, more than three times the amount found in North Carolina overall, where public conservation lands comprise about nine percent state-wide. Public conservation lands in Tennessee are about seven percent of the total state area (Alabama Forever Wild 2009). Still, unprotected lands would likely continue to be converted to development and other land uses (Reid et al. 2008, Kirk 2009, Thurmann et al. 2011), as further detailed in the Land Use Patterns section of Alternative A.

Adverse

Establishment of a refuge would prohibit or limit the future use of these areas to ones incompatible with the mission of the Refuge System (e.g. development, most forms of agriculture, etc.). However, because the total area of the refuge comprises less than one percent of the unprotected acreage in the AOI, the effect on land use patters under this alternative is expected to be moderate.

EFFECTS ON CULTURAL RESOURCES

This section discusses potential effects to cultural (e.g. archeological, historical) resources under the Proposed Action.

Beneficial

Beneficial impacts to cultural resources would be anticipated from the implementation of Alternative B. The 23,478-acre refuge would help increase the preservation of any archaeological and historic sites on otherwise unprotected lands within the AOI. The Service, like other federal agencies, has several legally mandated responsibilities that include development of a cultural resource management plan, compliance with the Section 106 of the National Historic Preservation Act prior to any undertaking that possesses the potential to impact historic properties, archaeological inventory of its lands and subsequent National Register eligibility testing, research-directed testing or excavation, site protection, and interpretation. Critical to these efforts are the NC and TN State Historic Preservation Offices, the Eastern Band of Cherokee Indians, and a number of interested parties, such as nearby universities, adjacent landowners, and State resource agencies. The Service would, when possible, partner with the Eastern Band of Cherokee Indians and/or other interested Native American Tribes to facilitate archaeological and ecological investigations, protection, and

interpretation of sites deemed to have culturally and religiously significance for the Tribe(s). Protection of historic properties would be enhanced by incorporating concepts of site stewardship and ownership, where appropriate, into public use materials and interpretive panels. This effort would be further enhanced by providing advanced archaeological resource protection training to refuge law enforcement personnel.

Adverse

Minimal impacts to cultural resources could be anticipated under Alternative B. There could be some risk that refuge visitors may inadvertently or intentionally damage or disturb cultural resource sites; however, we would employ all means available to protect archaeological sites, historic structures, cemeteries, and historic landscapes through scientific investigations, public education, partnerships with tribal, state, and local governments, and law enforcement efforts.

CUMULATIVE EFFECTS

According to the Council on Environmental Quality NEPA implementing regulations in 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. For the purposes of this EA, the cumulative effects on each resource are discussed in terms of the net positive or negative impact, if any.

PHYSICAL RESOURCES

Some minimal and minor impacts on physical resources are expected, under each of the alternatives, but none of these are anticipated to be cumulatively significant. Cumulative effects on individual physical resource categories are further discussed below.

Topography and Geology

The No Action alternative would have a minimal negative cumulative effect on the topography and geology of the AOI. CPAs generally do not overlay mineral or energy resources of interest, and extraction efforts would be unlikely to take place in those areas. Under Alternative B, no adverse cumulative effects are predicted to this resource.

Soils

Alternative A would likely result in minor negative cumulative impacts to soils in the AOI. Without protection, lands in the AOI would continue to be converted to urban use. Soil disturbance would result from the construction of buildings, roads, parking lots, and other infrastructure associated with development. Furthermore, an increase in impervious surfaces would alter natural soil formation processes. Alternative B is expected to have net beneficial effects on soils in the AOI as more lands would be protected from development.

Climate Change

Under alternative A (No Action), a minimal adverse cumulative impact on climate change is expected as land currently functioning as carbon sinks would likely become net sources of greenhouse gases. Conversely, lands protected under Alternative B would not have a significant cumulative negative

effect on climate change. Under this alternative, additional lands that are believed to function as net carbon sinks would be protected. Growing vegetation and natural soil formation processes would continue to sequester carbon.

Air Quality

Alternative A (No Action) would likely contribute to an acceleration of poor air quality, a minimal negative impact, over the long term due to the expected continued increases in development and its associated contributions to pollutant emissions. Alternative B is not expected to have significant cumulative adverse impacts on air quality, locally or regionally, since it would help retain vegetated areas within the proposed refuge. Some short-term, local deterioration in air quality would be expected from air emissions of motor vehicles used by refuge visitors and staff, as well as habitat management (e.g. prescribed burning).

Water Quality

The No Action alternative is expected to result in moderate adverse cumulative effects on water quality. Land conversion to development is likely to continue in unprotected areas, resulting in a deterioration of water quality. Overall, Alternatives B is predicted to have a net positive cumulative impact to water quality in the AOI as it would protect vegetated areas within the proposed refuge boundaries and help slow the flow of water, helping to improve water quality.

Hydrology and Water Quantity

Hydrology and water quantity would suffer moderate negative cumulative effects under the No Action alternative. Compared to the Service acquiring lands as proposed under Alternatives B, less lands would likely be protected from development and associated adverse impacts to these resources. Increased urbanization and associated changes in drainage patterns and declines in water availability would exacerbate current issues affecting these resources. As previously discussed, Alternatives B would result in net cumulative benefits to the hydrology and water quantity in the AOI by protecting vegetated areas.

Noise

Adverse cumulative effects on noise are anticipated to be minimal under the No Action. Increased urbanization and associated sources of noise would continue to negatively impact the soundscape of the AOI. Conversely, Alternative B would have a net beneficial effect on the area's soundscape by helping to maintain a more rural landscape.

BIOLOGICAL RESOURCES

Effects of Habitat Loss

Under both alternatives, there would be continued habitat loss in the AOI due to various land use changes. Some bogs would continue to be lost or degraded. In addition, habitat fragmentation would further impact species that require larger tracts of relatively intact habitat. An expanding network of roads and increased traffic resulting from a growing human population would likely result in increased road kills. As discussed above, water resources would continue to be degraded, affecting habitats and species. Overall, the cumulative effects on bogs resulting from habitat loss, fragmentation, and alteration are expected to be moderate. It is expected that the negative cumulative effects would be

greater under the No Action, compared to Alternative B. If fully realized, the proposed refuge would protect a relatively large number of mountain bogs, constituting a moderate cumulative benefit.

Hunting Impacts

Deer

Deer hunting on proposed refuge lands would not have regional population impacts due to restricted home ranges. In western North Carolina, deer home range are generally less than 400 acres (North Carolina Cooperative Extension Service. 2012). Therefore, only local impacts are expected to occur.

State-wide, roughly 180,000 deer were harvested in NC (2010 estimate) (NCWRC 2012). About the same number were taken in TN (2005 estimate) (TWRA 2011a). These annual totals represent approximately 16 and 20 percent of the total populations in North Carolina and Tennessee, respectively. Like many prey species, deer populations adjust to various harvest levels through a compensatory response. As deer densities are reduced through hunting (or predation), more forage is available for surviving deer, increasing their reproductive capacity. Additionally, white-tailed deer are adapted to and thrive in highly fragmented habitats (Nixon et al 2001) and their numbers are likely to remain at huntable levels even as the landscape becomes more urbanized. The proposed action would likely result in an increase in deer taken, as more lands that are currently closed to the public would opened. Under Alternative B, deer hunting opportunities would increase compared to the No Action alternative, but It is not expected that local deer populations would be significantly affected. Overall, regulated hunting is not expected to have any significant cumulative effects on deer populations in the AOI.

Feral Hog (Swine)

Feral hog is an invasive, nonnative species. The discussion below only pertains to North Carolina sites, as it is illegal to hunt this species in TN. Hence, on TN sites, no hunting of feral hog would be allowed.

With regards to North Carolina sites, hunting of feral hogs on proposed lands would be considered a management tool in reducing this detrimental species, while providing recreational opportunities to hunters. This species is classified as a nuisance in NC, with no bag limit. Cumulative effects to an exotic, invasive species should not be of concern because the Service would likely work to extirpate this species on refuge lands. Hunting of hogs is not considered detrimental to the biological integrity of the refuge, is not likely to create conflict with other public uses, and is within the wildlife dependant public uses to be given priority consideration. Since hogs are exotic, they are a priority species for refuge management only in terms of their negative impacts on refuge biota and need for eradication. Hence, Alternative B is expected to have a net positive effect through the reduction of feral hog. This would benefit any agricultural lands adjacent to the proposed lands, as feral hog can cause crop loss and other damage. Under the No Action alternative, feral hog numbers are unlikely to be controlled at minimal levels.

Wild Turkey

Turkey is a non-migratory species and therefore hunting only impacts the local population. Turkey populations in North Carolina have increased substantially since the 1970s, as evidenced by a state-wide distribution assessment conducted in recent years (see section on game species in Chapter 2: Affected Environment). In TN, it is also a huntable game species. Habitat loss, not hunting, appears to be the primary factor limiting their populations. Research has shown that in many cases hunters can remove a large portion of the gobblers from a population (up to 30 percent) and still have a

healthy turkey population (Vangiler 1992). The Alternative B could increase wild turkey hunting opportunities by opening up some land to the public. This alternative is not expected to have a significant cumulative effect on local wild turkey populations.

Hunted Migratory Game Birds

NEPA considerations by the Service for hunted migratory game bird species are addressed by the programmatic document, ‘‘Final Supplemental Environmental Impact Statement: Issuance of Annual Regulations Permitting the Sport Hunting of Migratory Birds (FSES 88– 14),’’ filed with the Environmental Protection Agency on June 9, 1988. We published Notice of Availability in the Federal Register on June 16, 1988 (53 FR 22582), and our Record of Decision on August 18, 1988 (53 FR 31341). Annual NEPA considerations for waterfowl hunting frameworks are covered under a separate Environmental Assessment, “Duck Hunting Regulations for 2006-07,” and an August 24, 2006, Finding of No Significant Impact. Further, in a notice published in the September 8, 2005, Federal Register (70 FR 53376), the Service announced its intent to develop a new Supplemental Environmental Impact Statement for the migratory bird hunting program. Public scoping meetings were held in the spring of 2006, as announced in a March 9, 2006, Federal Register notice (71 FR 12216). More information may be obtained from: Chief, Division of Migratory Bird Management, U.S. Fish and Wildlife Service, Department of the Interior, MS MBSP-4107-ARLSQ, 1849 C Street, NWR, Washington, DC 20240. Any hunting of migratory game birds on specific sites would not be expected to incur any significant negative cumulative effects on their populations.

Other Small Game

Squirrels, rabbit, raccoon, and opossum cannot be affected regionally by hunting on any proposed lands because of their limited home ranges. Therefore, only local effects will be discussed. Land use alterations and reductions in predators have contributed to increases in several small game species, particularly raccoon and opossum. Consequently, populations of these species sometimes become higher than optimal, with detrimental effects on other native wildlife (e.g. higher levels of predation on songbird eggs and nestlings), increased crop damage, and spread of diseases (e.g. rabies). Hunting can help regulate opossum and raccoon populations; however, unless the popularity of this type of hunting increases, the numbers of these species would likely be higher than desired. When these species become overabundant, diseases such as distemper and rabies reduce the populations. However, waiting for disease outbreak to regulate their numbers can be a human health hazard. Cumulative adverse impacts to raccoon and opossum are unlikely under Alternatives B, considering their high reproductive quickly, are difficult to hunt due to their nocturnal habits, and are not as popular for hunting as other game species.

SOCIOECONOMIC ENVIRONMENT

There would be no expected long term, significant cumulative change in the local economy under Alternative A. Current development rates, tax revenues, and business revenues would remain subject to market influences. There could be some loss of economic opportunities associated with wildlife-dependent recreation (e.g. hunting, fishing, wildlife watching, etc.). Some property owners and local taxing authorities would benefit from a potential increase in real-estate values shown to occur if there was a refuge nearby. In addition, there could be increased costs to local communities associated with the loss of vegetated areas as urban sprawl continued on unprotected lands. Vegetated areas have been shown to reduce costs of providing clean water and air. Furthermore, vegetated lands help reduce stormwater runoff, providing additional cost savings (e.g. less frequent repairs to water control structures) to nearby communities. Alternative B would have some positive effects on socioeconomic resources. Wildlife-dependent recreation would provide additional direct

and indirect economic benefits to the region by drawing visitors. Increased opportunities for wildlife-associated recreational opportunities would further help improve the quality of life in the AOI, particularly as open space available to the public becomes increasingly scarce over the next decades. Further, no significant negative impacts would be anticipated to neighboring landowners from the implementation of Alternative B including from management and public use activities.

CULTURAL RESOURCES

There could be some moderate cumulative adverse impacts to cultural resources under the No Action alternative. Less land would be protected from development, increasing the risk of disturbance or destruction of cultural resources. Under Alternative B, beneficial effects would occur because of increased land protection. In addition, increased field surveys would likely be conducted on Service-owned lands to identify and protect any sites discovered.

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 area, thus contributing to the unavoidable effects of such development (e.g. increased air emissions, increased impervious surface and stormwater runoff, increased noise). Under Alternative B, there could be, for example, localized adverse effects of building a new refuge headquarters and upgrading access roads. There would be property tax losses to towns and increased visitation that could be unavoidable effects in those years that revenue sharing payments are less than local property taxes. However, none of these effects rises to the level of significance. All would be mitigated, so there would be no significant unavoidable adverse impacts under the Proposed Action.

RELATIONSHIP BETWEEN SHORT-TERM USES OF THE HUMAN ENVIRONMENT AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The No Action alternative would be expected to diminish the long-term productivity and sustainability of natural resources in the AOI. In contrast, Alternative B would strive to maintain or enhance the long-term productivity and sustainability of natural resources on proposed refuge lands. This alternative would strive to conserve federal trust species and state-listed species and the habitats they depend on, as evidenced by management activities described in the Conceptual Management Plan. It also outlines outreach and environmental education activities that would encourage visitors to be better stewards of the environment.

POTENTIAL IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Alternative A would have no long term effect on potential irreversible and irretrievable commitments of federal financial resources. Establishing a refuge, as described under Alternative B, may contribute to irreversible and irretrievable commitments of federal financial resources. For example, one would be the possible construction or modification of a refuge office and associated visitor facility and access road(s). These typically require 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 unlikely they would 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 either of the alternatives.

SUMMARY OF EFFECTS

Table 18 summarizes the environmental effects, according to resource category.

Table 18. Summary of potential environmental effects analyzed under Alternatives A and B

Resource	Alternative A: No Action (No Refuge)	Alternative B: Proposed Action (Establishment of Mountain Bogs Refuge)
PHYSICAL RESOURCES		
Topography and Geology	*Beneficial:* none *Adverse:* minimal; CPAs generally do no overlay mineral or energy resources of interest	*Beneficial:* proposed lands protected from any future mining *Adverse:* none
Soils	*Beneficial:* none *Adverse:* minor; development, mining, agriculture would continue to disturb soils.	*Beneficial:* vegetative cover would continue to stabilize and form soils *Adverse*: some minimal impacts from infrastructure projects needed to support refuge operations and public uses
Climate Change	*Beneficial:* none *Adverse:* minimal; vegetative cover lost (net loss in carbon storage capacity). Emissions from agricultural operations, development (residential and commercial) would continue and likely increase over time.	*Beneficial:* net increase in vegetative cover (carbon sequestration) *Adverse:* minimal; emissions from refuge operations and visitor use
Air Quality	*Beneficial*: none *Adverse*: minimal; vegetative cover lost; wildfires; industry and traffic	*Beneficial*: net increase in vegetative cover *Adverse*: minor; prescribed fire, traffic associated with public use and refuge operations
Water Quality	*Beneficial*: none *Adverse*: moderate; development of unprotected lands would cause further declines in water quality	*Beneficial*: proposed lands remain vegetated, benefitting water quality; restoration activities would further improve water quality. *Adverse*: minimal effects on water quality from refuge operations and visitor uses

Resource	Alternative A: No Action (No Refuge)	Alternative B: Proposed Action (Establishment of Mountain Bogs Refuge)
Hydrology and Water Quantity	*Beneficial*: none *Adverse*: moderate; continued ditching, new roads and development on unprotected lands would alter hydrology and affect water quantity	*Beneficial*: some restoration of hydrology; vegetated areas would benefit hydrology and water quality *Adverse*: minimal impacts from refuge operations/visitor services
Noise	*Beneficial*: none *Adverse*: minimal; additional lands developed with higher associated noise levels	*Beneficial*: lands protected from urbanization and associated noise *Adverse*: minimal; some noise associated with refuge operations and visitor traffic
BIOLOGICAL RESOURCES		
Habitats	*Beneficial*: none *Adverse*: moderate; bog habitats and adjacent upland watershed buffers would continue to be lost or degraded due to development, lack of management, and spread of exotics.	*Beneficial*: bogs and adjacent upland areas would benefit from habitat protection, restoration and management (e.g., by protecting and improving hydrology) *Adverse*: some minor impacts from construction of refuge and public use infrastructure; public use (vegetation trampling)
Wildlife	*Beneficial*: none *Adverse*: moderate; land alterations and use would continue to reduce diversity, increased fragmentation would further isolate populations of some species	*Beneficial*: common species would be managed at more optimal levels; biodiversity would be maintained or increased. *Adverse*: minimal impacts resulting from some public uses
Federal and State Listed/Priority Species	*Beneficial*: none *Adverse*: moderate; listed/priority species would continue to suffer from habitat loss and degradation.	*Beneficial*: imperiled and T&E species would benefit from habitat protection/restoration/management. *Adverse*: none or minimal (localized, short term) impacts from habitat restoration, refuge operations/management, outweighed by long-term benefits to these listed species
Exotic Species	*Beneficial*: none *Adverse*: minor; continued degradation of natural habitats resulting from spread of exotics.	*Beneficial*: control of exotics would increase. *Adverse*: none
SOCIOECONOMICS		
Local Tax Revenues	Local tax revenues in the area would continue to be influenced by various market forces, population trends, etc.	Effects on local tax revenues could be positive or negative depending a factors such as congressional appropriations, local property values, etc.

Resource	Alternative A: No Action (No Refuge)	Alternative B: Proposed Action (Establishment of Mountain Bogs Refuge)
Economics of Wildlife-dependent Public Use	*Beneficial*: none *Adverse*: opportunities for appropriate and compatible wildlife-dependent uses would decline as more lands become developed, with a decline in associated economics	*Beneficial*: some local economic benefits associated with wildlife-dependent uses *Adverse*: none expected
Effect of Refuges on Nearby Property Values	*Beneficial*: none *Adverse*: local real estate values would not rise due to their proximity to a refuge	*Beneficial*: may benefit some homeowners and local taxing authorities *Adverse*: higher tax rates (associated with increase in property value) could negatively affect some property owners
Ecosystem Services	*Beneficial*: none *Adverse*: local communities would continue to see additional increases in costs associated with maintaining clean water, storm-water management, and other services otherwise provided by open spaces.	*Beneficial*: increased cost-savings to local communities with regards to maintaining clean water and reduced need for storm-water management infrastructure. *Adverse*: none
Land Use Patterns	*Beneficial*: lands available for development and agriculture *Adverse*: continued loss of natural areas through conversion to agriculture and developed areas; loss of lands open for public wildlife-appropriate and wildlife-compatible public use	*Beneficial*: additional lands open for public wildlife-appropriate and wildlife-compatible public use *Adverse*: potential for increased development pressure due to the desire to buy land adjacent to the refuge, leading to increased fragmentation of remaining lands, loss of some agricultural lands
CULTURAL RESOURCES		
Archaeological and Historic Resources	*Beneficial*: none *Adverse*: moderate; cultural resources on unprotected lands would continue to be at risk from development projects	*Beneficial*: cultural resources would be offered increased protection on refuge lands *Adverse*: risk from disturbance and damage caused refuge operations or public use would be minimal

Note: Potential impacts, positive (beneficial) and negative (adverse), to resources resulting from the implementation of the two alternatives were identified and placed into one of the listed categories, where possible.

- *None - no impacts expected*
- *Minimal - impacts are not expected to be measurable, or are too small to cause any discernible degradation to the environment)*
- *Minor - impacts would be measureable, but not substantial, because the impacted system is capable of absorbing the change*
- *Moderate - impacts would be measureable, but could be reduced through appropriate mitigation*
- *Major - impacts would be measurable and individually or cumulatively significant; an Environmental Impact Statement would be required to analyze these impacts*

SUMMARY

Based on the nature of the proposal, the location of the CPAs, and current land use, the Proposed Action would not have any significant adverse effects on the quality of the human environment including public health and safety. Further, because the purpose of the proposal is to protect, maintain, and where possible, enhance the natural habitat of the lands within the proposed acquisition area, the proposal is not expected to have any significant adverse effects on the area's wetlands and floodplains, pursuant to Executive Orders 11990 and 11988.

Implementation of the Proposed Action would not involve any highly uncertain, unique, unknown, or controversial effects on the human environment. The proposed action would not establish a precedent for future actions with significant effects, nor would it represent a decision in principle about a future consideration. No cumulatively significant impacts on the environment would be anticipated.

In addition, the proposal would not significantly affect any unique characteristic of the geographic area, such as historical or cultural resources, wild and scenic rivers, or ecologically critical areas. The proposal would not significantly affect any site listed in or eligible for listing in the National Register of Historic Places, nor would it cause loss or destruction of significant scientific, cultural, or historic resources. The area's cultural resources would be protected under the regulations of the National Historic Preservation Act of 1966, as amended, the Archaeological Resources Protection Act, and the Advisory Council on Historic Preservation (36 CFR 800). The NC and TN State Historic Preservation Offices would be contacted whenever any future management activities have the potential to affect cultural resource sites.

All tracts acquired by the Service in fee title would be removed from local real estate tax rolls because federal government agencies are not required to pay state or local taxes. However, the Service makes annual payments to local governments in lieu of real estate taxes, as required by the Refuge Revenue Sharing Act (Public Law 95-469). Payment for acquired land is computed on whichever of the following formulas is greatest: (1) three-fourths of 1 percent of the fair market value of the lands acquired in fee title; (2) 25 percent of the net refuge receipts collected; or (3) 75 cents per acre of the lands acquired in fee title. The estimated annual revenue-sharing payment that would be made to the individual county depending on the amount of acreage acquired in fee title. No actions would be taken that would lead to a violation of federal, state, or local laws imposed for the protection of the environment.

RECOMMENDATION

The Service recommends Alternative B as the Proposed Action because it better serves the outlined purpose and need, stated goals and objectives, and vision and purposes of the refuge. Through the establishment of a refuge as described in Alternative B, the Service would be able to fully participate with other conservation partners in the management and protection of the wildlife and habitats within the Conservation Partnership Areas. Threatened and endangered species would receive additional management attention. Connectivity between existing conservation lands would be enhanced, and movement corridors would be protected. Opportunities for wildlife oriented recreational activities would be increased. Further, any cultural resources found within the proposed refuge would be afforded protection by the Service.