
DRAFT LAND PROTECTION PLAN

I. Introduction and Purpose

The Fish and Wildlife Service (Service) proposes to protect and manage rare and severely threatened wetlands in the southern Appalachian Mountains of eastern Tennessee and western North Carolina through the establishment of Mountain Bogs National Wildlife Refuge (NWR). The land being proposed for protection includes a diverse system of bog and fen wetlands and surrounding upland buffers, including high-mountain grasslands, spruce-fir forests, and hardwood forests. This proposal represents an unprecedented opportunity to protect one of the rarest wetland community types and most imperiled habitat types in the southeastern United States (Noss et al. 1995 and references therein; Richardson and Gibbons 1993 and references therein), while also affording permanent protection and management of a number of federal trust species. Protection of mountain bogs is directly aligned with the Service's national priorities of threatened and endangered species recovery, migratory bird conservation, landscape-level conservation, and connecting people with nature. Protection of mountain bog habitats is likewise identified as a priority action in the Service's Strategic Plan for the Southern Appalachian Ecosystem, the Strategic Plan for the Asheville Ecological Services Field Office, and in the recovery plans for each of those federally listed species which occur within mountain bog habitats. Furthermore, many of the species that would be offered additional protection through this proposal have been identified in North Carolina and Tennessee state wildlife action plans.

The protection and management of these resources in western North Carolina and eastern Tennessee can be achieved through a combination of fee-title purchases from willing sellers and leases, conservation easements, cooperative agreements from willing landowners, and other options (e.g., donations). All land and water acquired would be managed by the Service or in partnership with other conservation organizations as the Mountain Bogs National Wildlife Refuge.

PROJECT DESCRIPTION

Mountain bogs are relatively isolated from one another and spread across the landscape. The proposed establishment of the Mountain Bogs NWR defines 30 Conservation Partnership Areas (CPA) encompassing approximately 42,250 acres as depicted in Figure 1. These CPAs provide an area within which the Service would have the authority to acquire up to 23,478 acres, in fee title or easements from willing sellers, scattered across as many as 30 sites. All lands acquired, up to 23,478 acres, would be contained within the boundary of the proposed Mountain Bogs NWR.

REFUGE PURPOSE(S)

It is envisioned that the proposed refuge would:

- Protect some of the last remaining examples of Appalachian Mountain bogs;
- Protect and maintain habitat for a diversity of fish, wildlife and plant species;
- Provide habitat for nongame neotropical migratory birds;

Figure 1. Location map of conservation partnership areas



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- Conserve habitat for 13 federally listed species including the bog obligate mountain sweet pitcher plant, green pitcher plant, bunched arrowhead, swamp pink and bog turtle; and 83 state listed species;
 - Provide breeding, wintering, and migration habitat for the American woodcock;
 - Provide opportunities for environmental education, interpretation, and wildlife-dependent recreation;

Four overarching goals were developed for the proposed Mountain Bogs NWR, as follows:

Goal 1. Protect, Restore, and Manage Habitats for Fish and Wildlife. The proposed Mountain Bogs NWR would conserve rare mountain bog habitat and associated species as well as adjacent upland habitats. The proposed refuge would aid in the recovery of 13 federally listed species and one candidate species and benefit many other state listed and imperiled species, including migratory birds and southern Appalachian brook trout.

Goal 2. Provide Landscape-Level Conservation. The proposed Mountain Bogs NWR, which would be within the Appalachian Landscape Conservation Cooperative, would contribute to a more connected and functional conservation landscape by reducing habitat fragmentation, and protecting and restoring a network of exceptionally rare wetland types and their surrounding landscapes. This proposed refuge would also protect and enhance water quality and quantity within multiple watersheds, benefiting both humans and wildlife.

Goal 3. Connect People with Nature. Visitors of all abilities to the proposed Mountain Bogs NWR would enjoy opportunities for compatible hunting, fishing, wildlife observation and photography, and environmental education and interpretation, while increasing knowledge of and support for conservation of southern Appalachian Mountain bogs.

Goal 4. Promote Conservation Partnerships. Collaboration in science, education, and research would strengthen and develop partnerships with bog conservation organizations, private landowners, government agencies, and others to help inform land management decisions and encourage continued responsible stewardship of mountain bogs and other associated natural resources.

Additional Goal detail is provided in Appendix A.

II. Resources

RESOURCES TO BE PROTECTED

The Southern Blue Ridge Ecoregion (Ecoregion) is one of the most biologically significant ecoregions in the United States due to its unique geology, topography, and floristics (TNC and SAFC 2000). At least 136 natural terrestrial communities have been identified in the region and more than 90 percent of these are considered endemic or limited to the Ecoregion. There are nearly 400 rare plant species while the forests are some of the most diverse in the United States. The Ecoregion is the center of the world's salamander diversity and has the highest number of terrestrial snail species of any Ecoregion in the United States. A high diversity of bird species breed and winter in the Appalachian Mountains and the region is very important for birds during migration. Additionally, the freshwater systems are exceptionally rich in species diversity, with 66 at-risk aquatic species occurring in the Ecoregion, 20 of which are federally listed as threatened or endangered (The Nature Conservancy and Southern Appalachian Forest Coalition 2000).

The following section describes vegetative communities; bog habitats; general fish and wildlife diversity; threatened, endangered, and imperiled species; and nonnative plants and animals found in the CPAs.

VEGETATIVE COMMUNITIES

This section provides a broad overview of the vegetative communities across the CPAs. For the purposes of this proposal, vegetative communities or ecological systems as defined by NatureServe were used (NatureServe 2007), which were mapped using Southeast Gap Analysis Project (SEGAP) land-cover data (U.S. Geological Survey and North Carolina State University 2010).

The CPAs included more than 20 different vegetative communities, which are further detailed in Chapter II (Affected Environment) of the Draft Environmental Assessment. Several of the dominant native vegetative types found in the CPAs are summarized below.

Southern and Central Appalachian Oak Forest

This is the largest vegetative community within the CPA and makes up 19,201 acres (45 percent) of the CPA's land cover. It consists primarily of dry-mesic forests occurring on open and exposed topography at lower- to mid-elevations. Typically, the vegetation consists of forests dominated by oaks, especially chestnut oak (*Quercus prinus*), white oak (*Q. alba*), red oak (*Q. rubra*), and scarlet oak (*Q. coccinea*), with varying amounts of hickories (*Carya* spp.), red maple (*Acer rubrum*), and other species. Successional communities within these forests are dominated by tuliptree (*Liriodendron tulipifera*), pines (*Pinus* spp.), and black locust (*Robinia pseudoacacia*), many of which have been impacted by logging or agriculture (NatureServe 2007). Selected priority species that utilize this habitat include Cooper's and sharp-shinned hawks (*Accipiter cooperii* and *A. striatus*), black-billed cuckoo (*Coccyzus erythrophthalmus*), cerulean warbler (*Dendroica cerulea*), golden-winged warbler (*Vermivora chrysoptera*), least weasel (*Mustela nivalis*), timber rattlesnake (*Crotalus horridus*), and tellico salamander (*Plethodon aureolus*) (North Carolina Wildlife Resources Commission/NCWRC 2005, Tennessee Wildlife Resources Agency/TWRA 2005).

Southern and Central Appalachian Cove Forest

Cove forests comprise about 4,597 acres (11 percent of the CPA's coverage), and are characterized by hardwoods or hemlock-hardwoods located in sheltered topographic positions, typically on concave slopes that promote moist conditions. Characteristic species in the canopy include yellow buckeye (*Aesculus flava*), sugar maple (*Acer saccharum*), American ash (*Fraxinus americana*), American basswood (*Tilia americana*), tuliptree, Carolina silverbell (*Halesia tetraptera*), eastern hemlock (*Tsuga canadensis*), American beech (*Fagus grandifolia*) and magnolias (*Magnolia acuminata* and *M. fraseri*) (NatureServe 2007). A developing threat to this community is the spread of the nonnative hemlock woolly adelgid (*Adelges tsugae*), which could cause substantial changes in the structure and function of this habitat (Ford et al. 2007, Spaulding and Rieske 2010). Examples of priority species supported by this habitat include yellow-bellied sapsucker (*Sphyrapicus varius*), woodland jumping mouse (*Napaeozapus insignis*), smoky shrew (*Sorex fumeus*), eastern hog-nosed snake (*Heterodon platirhinos*), seepage salamander (*Desmognathus aeneus*), and pigmy salamander (*D. wrighti*) (North Carolina Wildlife Resources Commission 2005, Tennessee Wildlife Resources Agency 2005).

Central and Southern Appalachian Montane Oak Forest

These forest types cover about 3,005 acres or 7 percent of the total CPA cover. These high-elevation deciduous forests occur on exposed sites, mostly between 3,000-4,500 feet in elevation. They are dominated by oaks, most commonly red and white, with trees often stunted or wind-flagged. American chestnut (*Castanea dentate*) sprouts are also common, but this species has been dramatically reduced by chestnut blight decades ago. Mountain holly (*Ilex montana*) and early azalea (*Rhododendron prinophyllum*) are characteristic shrubs. Major threats include fire suppression and gypsy moth (*Lymantria dispar*) (NatureServe 2007). This habitat supports many priority bird species also found in other oak-dominated forests. In addition, over 10 imperiled salamander species are found here (NCWRC 2005, TWRA 2005).

Central and Southern Appalachian Northern Hardwood Forest

These hardwood forests are found at higher elevation, generally above 4,500 feet. Comprising 2,336 acres (6 percent) of the CPAs, they are dominated by yellow birch, American beech, yellow buckeye, and sugar maple on mesic sites and northern red oak on drier sites. This vegetative community is rare as these high elevations are uncommon regionally (NatureServe 2007). Priority species found in this habitat include northern saw-whet owl (*Aegolius acadicus*), rose-breasted grosbeak (*Pheucticus ludovicianus*), northern flying squirrel (*Glaucomys sabrinus*), Appalachian cottontail (*Sylvilagus obscurus*), and Weller's salamander (*Plethodon welleri*) (NCWRC 2005, TWRA 2005).

BOG HABITATS

Bogs can be found embedded in a variety of vegetative communities. In addition, their relatively small size generally makes it difficult for them to be resolved at the scale used for SEGAP land cover data. Hence, a more detailed description of the diversity of bog habitats is provided below.

Throughout the southern Appalachians, the terms "bog," "fen," or "seep" are variously applied to mountain wetlands. This document adopts this common usage, and that of the North Carolina State Wildlife Action Plan (NCWRC 2005) in referring to a variety of mountain wetland habitats as "mountain bogs." Specifically included here are swamp forest-bog complexes, southern Appalachian bogs and fens, hillside and low mountain seepage bogs, high and low elevation seeps, and meadow bogs as classified by the North Carolina Natural Heritage Program (Weakley and Schafale 1994; Schafale and Weakley 1990).

Mountain bogs are widely accepted as among the rarest and most imperiled habitat types in the southeastern United States (Noss et al. 1995 and references therein; Richardson and Gibbons 1993 and references therein). These habitats are typically small (most are less than 20 acres, and many are less than 2 acres) and can be isolated from more extensive wetland systems; features which have contributed to their having been mostly overlooked by larger scale wetland classification systems (e.g., Cowardin et al. 1979) and in the interpretation of remotely sensed imagery (e.g., Landsat imagery, National Wetlands Inventory Maps). As a result of climate fluctuations since the last glacial retreat, southern Appalachian Mountain bogs may contain disjunct or relict species of northern and Coastal Plain origin (Weakley and Schafale 1994). Several authors have acknowledged a role for logging, fire, grazing, and beaver activity in the creation or maintenance of these habitats (Weakley and Schafale 1994).

Mountain bog vegetation is variable within the CPAs, and many bogs contain a diverse mixture of herbaceous and woody plants. The vegetative community is influenced by hydrology, soils, topography, disturbance history, and current land use activities. Each site can be quite different floristically from one to the next. Sphagnum is thought to be a keystone species in many mountain wetlands because it maintains the hydrology of the site by holding and slowly releasing water, and prevents soils from drying out during periods of drought. Many of the rare species associated with these habitats, including the bog turtle, four-toed salamander, orchids, and pitcher plants, live in or reproduce in this moss.

Some of the rare plants that can be found in bogs include cinnamon fern, royal fern, bog laurel, golden club, cranberry, carnivorous plants, beak rush, bulrushes, and sedges. Trees associated with bogs may include red maple, white pine, hemlock, pitch pine, river birch, and occasionally red spruce. Shrubs such as rhododendron, alder, poison sumac and bog rose are often found in and around bogs. Herbaceous vegetation may include many species of sedges and rushes, and mountain wildflowers (herbs).

Mountain bogs are recognized hotspots for biodiversity and endemism, containing numerous rare and declining plant species (Weakley and Schafale 1994). Of these species, 17 are either federally listed under the Endangered Species Act or recognized by the Service as federal species of concern. In addition, several plant species listed by the North Carolina Plant Conservation Program (NCPCP) are found in mountain bogs. Another 41 plant species associated with mountain bog species have been proposed for state listing by NCPCP. Numerous rare plants associated with bogs in the Blue Ridge Mountains have also been identified by Tennessee's Natural Heritage Program (2012). As in many parts of the country, rare plants are at risk from development, invasive plants, poaching, and other threats. Even if a site is protected from development, plants sought after by collectors can be at risk. For example, several endangered bunched arrowhead plants were recently removed from a protected site in South Carolina, one of the few locations worldwide that supports these imperiled plants (South Carolina Department of Natural Resources 2012).

FISH AND WILDLIFE

General Wildlife Diversity

A variety of wildlife species use the diverse habitats within the CPAs. Common game species are described in Chapter II of the Draft EA.

Mammals

Mammal species include many of those commonly found in the eastern United States, including raccoon, mink, muskrat, river otter, and beaver and a variety of small mammals. Several species of bats breed and hibernate in the area, and the Blue Ridge Mountains serve as a major avenue for migrating bats.

Birds

Mountain bogs and adjacent habitats provide important habitat for a variety of bird species. In addition to many resident and short-distance migratory species, these habitats are important to many neotropical migratory songbirds, providing breeding and wintering habitat and serving as stopover sites during migration. In southern Appalachian wetlands, habitat succession ranges from open, early-successional grasslands to late-successional, forested bogs; thus, these wetlands may provide important breeding habitats for both early- and late-successional breeding species, some of which are undergoing the greatest rates of population decline (Bullock and Rowe 2006). A list of several imperiled avian species often associated with mountain bogs can be found in Chapter II of the Draft EA.

Amphibians and Reptiles

The area provides habitat for many generalist and opportunistic amphibian and reptile species. In addition, several rare reptile species are supported, including timber rattlesnake (*Crotalus horridus*) and coal skink (*Eumeces anthracinus*). Common reptile species often found in mountain wetlands include queen snake, Eastern kingsnake, and Eastern box turtle. The Blue Ridge Ecoregion has the highest diversity of salamanders in the world (Hicks and Pearson 2003). Species found within the CPAs include seepage salamander (*Desmognathus aeneus*), shovel-nose salamander (*Desmognathus marmoratus*), green salamander (*Aneides aeneus*), and Eastern hellbender (*Cryptobranchus alleganiensis alleganiensis*). Priority salamander species associated with bogs include mole salamander (*Ambystoma talpoideum*), marbled salamander (*Ambystoma opacum*), four-toed salamander (*Hemidactylium scutatum*), three-lined salamander ([*Eurycea guttolineata*](#)), and spotted salamander ([*Ambystoma maculatum*](#)).

Fish and Other Aquatic Animals

Commonly known species of fish include bluegill (*Lepomis macrochirus*), muskellunge (*Esox masquinongy*) large- and small-mouth bass (*Micropterus salmoides* and *M. dolomieu*), and brook trout (*Salvelinus fontinalis*). Less well-known species include redlip shiner (*Notropis chiliticus*), golden redhorse (*Moxostoma erythrurum*), and rosyside dace (*Clinostomus funduloides*). In addition to fish, the area supports a variety of mussels, crayfish, and other invertebrate species. A number of these aquatic invertebrates are rare and imperiled.

THREATENED, ENDANGERED, AND CANDIDATE SPECIES

Federally Listed Species

Habitat within the CPAs supports at least 13 threatened and endangered species, and one candidate species. Six of these are bog obligate species and are listed in Table 1.

Table 1. Federally listed and candidate species found in mountain bog habitats

Common name	Scientific name
<i>Endangered</i>	
Bunched arrowhead*	<i>Sagittaria fasciculata</i>
Mountain sweet pitcher plant*	<i>Sarracenia rubra</i> ssp. <i>jonesii</i>
Green pitcher plant*	<i>Sarracenia oreophila</i>
Rock gnome lichen	<i>Gymnoderma lineare</i>
Roan Mountain bluet	<i>Houstonia Montana</i>
Spreading avens	<i>Geum radiatum</i>
Virginia big-eared bat	<i>Corynorhinus townsendii virginianus</i>
Carolina northern flying squirrel	<i>Glaucomys sabrinus coloratus</i>
<i>Threatened</i>	
Swamp pink*	<i>Helonias bullata</i>
Small whorled pogonia	<i>Isotria medeoloides</i>
Heller's blazing-star	<i>Liatris helleri</i>
Virginia spiraea	<i>Spiraea virginiana</i>
Bog turtle* (T(S/A))^a	<i>Glyptemys muhlenbergii</i>
<i>Candidate</i>	
White fringeless orchid*	<i>Platanthera integrilabia</i>

^a The southern population of the bog turtle is listed as Threatened due to Similarity of Appearance (T(S/A)) with the northern population of the bog turtle.

*Bog obligate species

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.

State Listed Species

The study area supports hundreds of state listed and priority species. The CPAs support at least 20 state (North Carolina, Tennessee, or both) threatened and endangered designations. These and additional state species of concern are outlined in Chapter II of the Draft EA.

THREATS

HABITAT LOSS THROUGH LAND CONVERSION

It is estimated that bog habitats have been reduced by some 80-90 percent (Noss et al. 1995; Weakley and Schafale 1994). Most of this habitat loss is the result of decades of land use conversion undertaken in support of agricultural, industrial, commercial, or residential development and disruption of normal hydrologic processes. Currently, the single greatest threat to mountain bogs is the loss and alteration of habitat resulting from development.

Another threat, often indirectly associated with increasing urbanization, is an increase in woody vegetation that shades out rare bog plants. It is believed that vegetative succession is occurring at an accelerated rate at remaining bog sites because historical disturbance regimes (grazing, browsing, beaver activity, and fire) have been eliminated or drastically reduced across the landscape (North Carolina Wildlife Resources Commission 2005). In human-modified landscapes, the elimination or reduction in these disturbance regimes not only degrades existing sites, but often precludes the formation of new bogs, further compounding the problem (Smith 1993).

NONNATIVE PLANTS

Nonnative plants are known to occur across southern Appalachian forests, accounting for 15-20 percent of the documented flora. While not all nonnative species are known to disrupt native ecosystems, of particular concern are those that are successful at invading and rapidly spreading through natural habitats, resulting in changes in the native vegetative community. A list of some of the more problematic nonnative plants that invade bog habitats can be found in Chapter II of the Draft EA.

CLIMATE CHANGE

Chapter II of the Draft EA includes a more detailed discussion on climate change. Overall, the effects of climate change are expected to have a negative effect on mountain bogs, as summarized below (excerpt taken from Draft North Carolina Ecosystem Response to Climate Change: DENR Assessment of Effects and Adaptation Measures; NC Department of Environment and Natural Resources/NC DENR 2010).

“The effect of an expected increase in both droughts and intense rainfall events may be particularly important for these systems. Many bogs are located in bottomland locations that do not regularly flood, but which would flood in extreme events. Besides stream flooding, overland runoff from adjacent uplands during severe storms would be a problem in many bogs. The nutrient input and potential scouring of severe floods would be detrimental to bog communities. While plants in bogs are probably never

truly limited by moisture, droughts would have significant effects on competitive relationships among species and on the community as a whole. Droughts in the present climate appear to have exacerbated the ongoing invasion of upland and generalist wetland plants in some bogs.”

RELATIONSHIP OF PROJECT TO LANDSCAPE CONSERVATION GOALS AND OBJECTIVES

The proposed Mountain Bogs NWR, within the Appalachian Landscape Conservation Cooperative (LCC), would contribute to a more connected and functional conservation landscape by reducing habitat fragmentation, and protecting and restoring a network of exceptionally rare wetland types and their surrounding landscapes. This refuge would also protect and enhance water quality and quantity within multiple watersheds, benefiting both humans and wildlife.

The Service would work with public and private partners to restore and maintain habitat connectivity throughout the landscape in part by working to reduce habitat fragmentation by connecting and buffering lands that are already protected. Many bog sites are hydrologically connected and these connections support important movement corridors for wildlife from one small site to another, thus creating local populations of particular species not associated with a single site, but a larger complex of sites within the drainage (NCWRC 2005). Populations of plants and animals are becoming increasingly isolated as more wetlands are destroyed. This proposed refuge would work to connect disjunct populations by protecting corridors. It is vital to recreate and retain these connections to facilitate movement of wildlife and gene flow between populations. Connections to nearby streams and forests would help maintain/create healthy populations and would also allow certain species to migrate and adapt to changes in habitats such as those that might result from climate change. Furthermore, this proposed refuge would work to buffer existing bogs and associated streams to improve water quality/quantity not only for the bogs and associated flora and fauna, but also for wildlife and humans downstream. These efforts would allow for a more intact and functional landscape.

Proposed management would complement the management of adjacent and nearby conserved lands, both public and private, thus enhancing the Service’s wildlife management contribution to the region and helping to create a more functional conservation landscape.

The proposed refuge would contribute to many landscape conservation goals and objectives, as well as partner efforts, including the Appalachian Landscape Conservation Cooperative (USFWS 2011); conservation and mitigation banks; and international, national, and regional conservation plans and initiatives. Several of these are listed below.

International:

Partners in Flight (PIF) North American Landbird Bird Conservation Plan (Rich et al. 2004)

National:

America’s Great Outdoors (AGO) Initiative (AGO 2011)

Wetlands Reserve Program (WRP) of the Natural Resources Conservation Service (NRCS 2011)

Partners for Fish and Wildlife (USFWS 2007)

Forest Stewardship Program (USDA Forest Service 2011)

Strategic Plan for Responding to Accelerating Climate Change (USFWS 2009)

Regional:

Partners in Flight Bird Conservation Plan for the Southern Blue Ridge (Hunter et al. 1999)
Threatened and Endangered Species Recovery Plans (USFWS 2012)
Southern Blue Ridge Ecoregional Conservation Plan (The Nature Conservancy and Southern Appalachian Forest Coalition 2000)
Blue Ridge National Heritage Area (BRNHA) Management Plan (BRNHA 2008)
Southern Blue Ridge Fire Learning Network (2012)

State:

North Carolina Wildlife Action Plan (NCWRC 2005)
North Carolina Department of Environment and Natural Resources 2009-2013 Strategic Plan (NCDENR 2009)
Tennessee's Comprehensive Wildlife Conservation Strategy (TWRA 2005)
Climate Change and Potential Impacts to Wildlife in Tennessee (TWRA 2009)
North Carolina's Blue Ridge Forever (Conservation Trust for North Carolina 2012)

County:

Henderson County 2020 Comprehensive Plan (Henderson County 2008)
Growing with Green in our Minds: Strategies for Land Conservation in Jackson County (Jackson County 2008)
Citizens' Plan for Watauga (Watauga County 2010)

PARTNERSHIP EFFORTS/RELATED RESOURCES

Several state and federal agencies are among the partners in this landscape, including the North Carolina Wildlife Resources Commission (NCWRC), North Carolina Forest Service, North Carolina Natural Heritage Program, Tennessee Wildlife Resources Agency (TWRA) North Carolina Division of Parks and Recreation, North Carolina Department of Transportation, USDA Forest Service, USDA's Natural Resources Conservation Service (NRCS), and National Park Service.

The proposed Mountain Bogs NWR would provide local and regional benefits to wildlife by working in concert with existing conservation areas and partners, including Nantahala, Pisgah and Cherokee National Forests, The Nature Conservancy, North Carolina Wildlife Resources Commission, North Carolina Plant Conservation Program, North Carolina State Parks, and area land trusts. Restoration and management activities would assist in accomplishing the goal of providing landscape-level conservation by contributing to ecological resiliency across the landscape.

Figure 2 depicts current conservation lands and waters within the study area. Many of our partners already own or have future plans to protect lands in the project area through conservation or agricultural easements. Still others have completed on-the-ground habitat restoration projects throughout the area. Taken together, the efforts have aided the protection of state and federal listed threatened and endangered species, mountain forests, farmlands, and recreational areas that contribute to the long-term ecological health, economy, and way of life of the region. The Service's proposed refuge provides an overarching level of protection which complements and enhances the partnership efforts in the area and takes the protection of these valuable resources to a new level.

III. Land Protection Strategy

ACTION AND OBJECTIVES

AUTHORITIES FOR ESTABLISHING THE REFUGE

Based on the refuge purposes, a refuge could be established under the following statutory authorities:

1. National Wildlife Refuge System Administration Act; (16 U.S.C. 668dd(b))
2. Endangered Species Act of 1973 (16 U.S.C. 1534)
3. Emergency Wetlands Resources Act of 1986 (16 U.S.C. 3921-3923);
4. Fish and Wildlife Act of 1956 (16 U.S.C. 742a); and
5. Migratory Bird Treaty Act (16 U.S.C. 703-712).

LAND USE

Land use has similarities to land cover, but is often used to show anthropogenic uses of an area. For the purposes of this Draft Land Protection Plan (Draft LPP), the National Land Cover Dataset (NLCD) was used to portray land use. The majority of the lands in the CPAs is considered to be in “open” or undeveloped land uses and most parcels are in private ownership (Fry et al. 2011). Table 2 summarizes the general types of land cover of the entire area contained in the CPAs. In general, the land is a mix of forested and non-forested wetlands, forested uplands, and agricultural lands. Deciduous forest is the dominant land cover type (over 73 percent), followed by planted/cultivated land, evergreen forest, and mixed forest. All other land use classes each contributed less than 5 percent of the total cover.

LAND PROTECTION PRIORITIES

The Service’s proposed action (Alternative B) would result in the establishment of Mountain Bogs NWR through the protection of up to 23,478 acres, including critically rare mountain bogs and surrounding wildlife habitats. This would be accomplished through a combination of fee-title purchases from willing sellers and less-than-fee-title purchases (e.g., conservation easements and cooperative agreements) from willing participants. The Service believes these are the minimum interests necessary to conserve and protect the fish and wildlife resources associated with mountain bogs and other habitats in the proposed area.

Much of the land included in the CPAs currently has (or could have, upon restoration) important resource values and high potential for helping support a range of bog-dependent species, in accordance with fulfilling the purpose of the refuge. Lands included in the CPAs also have high potential for ensuring habitat connectivity between the proposed refuge and surrounding conservation lands and in providing corridors between individual bog sites.

Figure 2. Conservation partner protected lands

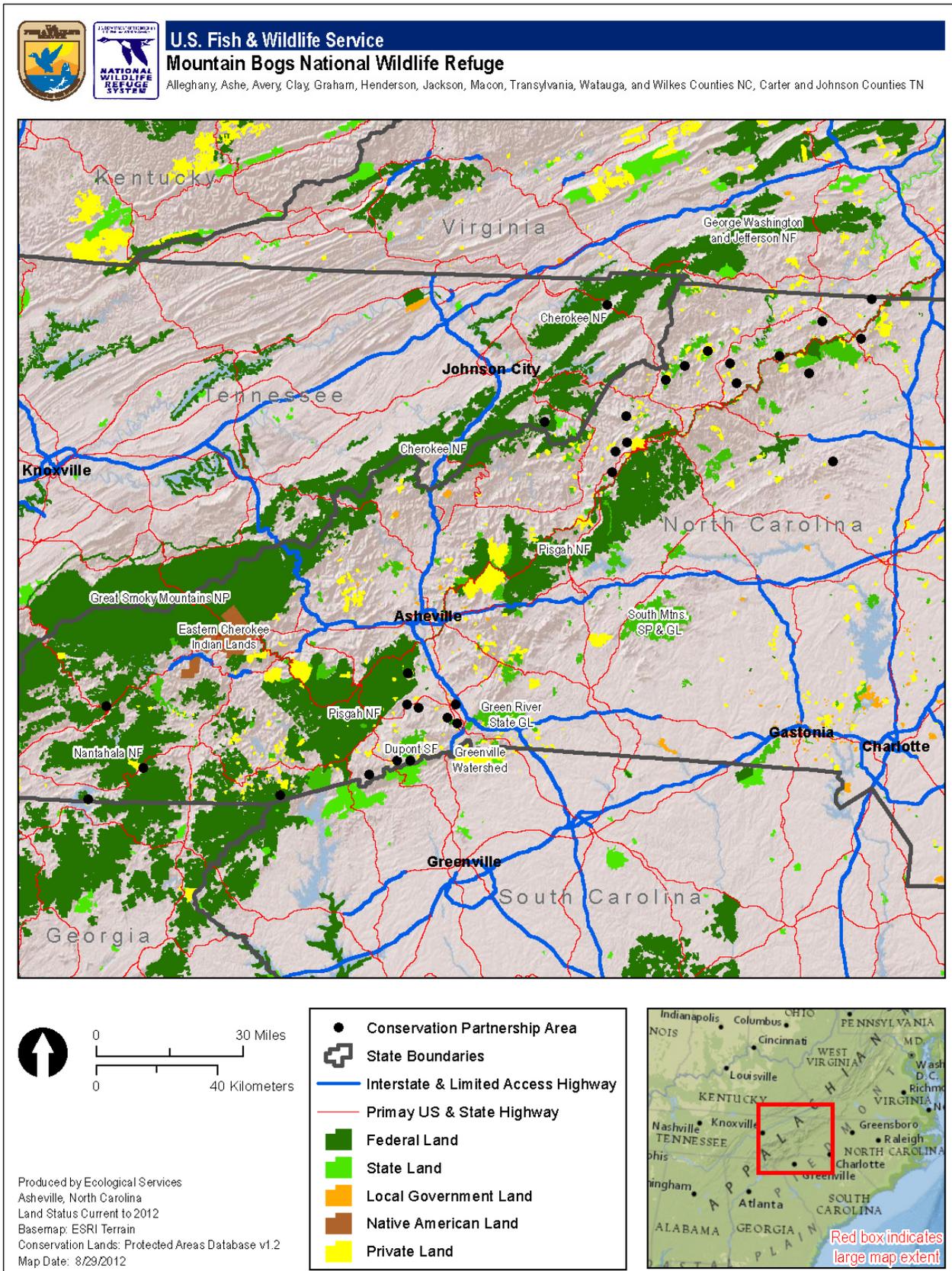


Table 2. Land use in the conservation partnership areas, 2006

Land Use Class	Conservation Partnership Area	
	Acres	Percent
Deciduous Forest	30,888	73.1
Planted/Cultivated	4,776	11.3
Evergreen Forest	2,977	7.0
Developed	1,214	2.9
Mixed Forest	899	2.1
Shrub/Scrub	578	1.4
Grassland/Herbaceous	414	1.0
Woody Wetlands	385	0.9
Open Water	120	0.3
Totals	42,250	100

Source: Fry et al. 2011

¹Includes "Barren Areas"

Key: Deciduous Forest - dominated by trees > 25 ft tall, > 20% of total cover, and where 75% of the trees are hardwoods. Planted/Cultivated – hay, pasture, row crops. Evergreen Forest - dominated by trees > 25 ft tall, > 20% of total cover, and where 75% of the trees keep their leaves. Developed - characterized by a high percentage (30% or greater) of constructed materials (e.g. asphalt, concrete, buildings, etc.). Mixed Forest - dominated by trees > 25 ft tall, > 20% of total cover. Neither deciduous nor evergreen species are greater than 75% of total tree cover. Shrub/Scrub - dominated by shrubs; < 25 ft tall with shrub canopy typically greater than 20% of cover, includes true shrubs, includes young or stunted trees. Grassland/Herbaceous - dominated by graminoid/herbaceous vegetation, > 80% of total vegetation. Woody Wetlands - forest or shrubland vegetation comprise > 20% of cover and the soil/substrate is periodically saturated/covered with water. Open Water – lakes/ rivers, with < 25% covered by ground or vegetation.

When initially proposed in the mid-1990s, the Mountain Bogs NWR focused on three main components. Fourteen bog sites in North Carolina were originally selected because they were: (1) Considered to be a nationally significant bog by the North Carolina Natural Heritage Program, (2) contained either federally listed and/or federal candidate species, and (3) the biotic community was relatively intact and contributed significantly to conservation of biodiversity. In 2009, the proposal was updated to include 25 sites selected by their ability to protect the highest quality mountain bog habitat, with an emphasis on those sites with nationally significant bog habitat and/or potential to afford significant conservation benefit to federal trust resources.

During detailed planning for the proposed Mountain Bogs NWR, a review of bog sites was conducted to ensure that all important bog sites were included in the refuge proposal. Service biologists first investigated the North Carolina Natural Heritage Program database of known bog sites and species element occurrences to see if any significant changes to bog sites had occurred since original site selection. Next, Service biologists referenced a list of bog recommendations submitted to the Service following a meeting of representatives from the North Carolina Wildlife Resources Commission, the North Carolina Natural Heritage Program, and the North Carolina Division of Parks and Recreation. The state agency staff met to discuss the proposed list of sites included in the Mountain Bogs NWR preliminary project proposal and make additional recommendations based on bog size, ownership, connectivity to other mountain bog habitats, and the relative size of bog turtle populations. Where Service biologist felt it was appropriate and necessary, additional sites were added to the proposal. Service biologists feel these sites identify the highest quality mountain bog sites not under state or federal ownership in the southern Appalachians.

From these bog-specific sites, CPAs were delineated by land ownership parcels, taking into consideration existing land ownership, existing parcel development, land use and land cover, proximity to existing conservation lands, and plant and wildlife element occurrence. CPAs strive to protect the bogs themselves, protect the bog watershed, and connect with other bog sites and existing conservation lands. In total, 30 CPAs have been identified. Table 3 summarizes the CPS for the proposed establishment of Mountain Bogs NWR.

Table 3. CPAs for the proposed establishment of Mountain Bogs NWR

CPA Name	County*	Number of Parcels	Acres	Protected Acres	Percent Protected
Cherry	Alleghany	78	2,182.62	23.15	1.06
Sparta	Alleghany	9	588.84	309.53	52.57
Stateline	Alleghany	29	1,003.95	47.75	4.76
Bluff	Ashe	33	4,078.67	2,286.80	56.07
Othello	Ashe	14	167.19	0.00	0.00
Transou	Ashe	59	1,283.66	5.40	0.42
Yates	Ashe	54	1,125.63	0.00	0.00
Flattop	Avery	1	182.03	0.00	0.00
Montezuma	Avery	24	504.95	87.48	17.32

CPA Name	County*	Number of Parcels	Acres	Protected Acres	Percent Protected
Snakeden	Avery	22	251.26	76.71	30.53
Chestnut	Carter, TN	1	739.54	3.92	5.30
Garland	Clay	9	111.48	11.45	10.27
Nolton	Graham	1	228.80	228.72	99.97
Bryson	Henderson	1	159.62	2.54	1.59
Butt	Henderson	17	367.45	16.50	4.49
Jackson	Henderson	12	236.94	15.85	6.69
Pine Knob	Henderson	27	120.14	9.01	7.50
Riverbend	Henderson	19	433.95	14.88	3.43
Rutledge	Henderson	8	197.85	32.86	16.50
Mulkey	Jackson	17	148.89	39.02	26.21
Holston	Johnson, TN	67	1,379.82	254.26	18.43
Firescald	Macon	34	1,403.58	84.07	5.99
Blue Ridge	Transylvania	20	1,368.82	0.00	0.00
Burnt	Transylvania	99	3,851.09	48.65	1.26
East Fork	Transylvania	16	7,372.76	0.00	0.00
Long Hope	Watauga	14	4,808.68	8.51	0.18
Pinnacle	Watauga	27	410.88	121.93	29.68
Three Peaks	Watauga	73	3,919.61	1,179.86	30.10
Old Gilreath	Wilkes	47	1,068.61	0.00	0.00
Widow	Wilkes	86	2,552.37	0.00	0.00
Total		918	42249.67	4908.84	

**All counties are in North Carolina, except where noted.*

LAND PROTECTION OPTIONS

The Service acquires lands and interests in lands, such as easements, and management rights in lands through leases or cooperative agreements, consistent with legislation or other congressional guidelines and executive orders, for the conservation of fish and wildlife and to provide wildlife-dependent public use for recreational and educational purposes. These lands include national wildlife refuges, national fish hatcheries, research stations, and other areas.

We will use the following options to implement this Land Protection Plan, if approved:

- Option 1: Management or land protection by others;
- Option 2: Less-than-fee-title acquisition by the Service;
- Option 3: Fee-title acquisition by the Service;

When land is needed to achieve fish and wildlife conservation objectives, the Service seeks to acquire the minimum interest necessary to meet those objectives, and acquire it only from willing sellers. Our proposal includes a combination of Options 1, 2, and 3 above. We believe this approach offers a cost-effective way of providing the minimal level of protection needed to accomplish refuge objectives, while also attempting to meet the needs of local landowners.

OPTION 1. MANAGEMENT OR LAND PROTECTION BY OTHERS

Bogs have long been recognized for their biological importance, and the Service has worked since the early 1990s in conjunction with federal, state, and non-governmental partners and private landowners to develop a coordinated restoration and protection strategy for mountain bogs in the southern Appalachians. A portion of the land adjacent and ecologically important to the proposed project is already owned by our partners or managed by our partners through conservation easements. Protection of these sites fits well into a large landscape scale bog protection effort in the area. Management and protection of lands by others would continue, and this proposed project would complement and expand on those efforts.

The following partners provide assistance to manage or own property in or that are ecologically associated with the project area:

- The Carolina Mountain Land Conservancy
- Blue Ridge Conservancy
- U.S. Highlands Biological Foundation
- North Carolina Department of Environment and Natural Resources Division of Parks and Recreation
- North Carolina Department of Agriculture Forest Service
- North Carolina Department of Agriculture Plant Conservation Program
- North Carolina Department of Transportation
- North Carolina Wildlife Resources Commission
- The Conservation Fund
- The Nature Conservancy

OPTION 2. LESS-THAN-FEE-TITLE ACQUISITION BY THE SERVICE

Under Option 2, we would protect and manage land by purchasing only a partial interest, typically in the form of a conservation easement. This option leaves the parcel in private ownership, while

allowing us control over the land use in a way that enables us to meet our goals for the parcel or that provides adequate protection for important adjoining parcels and habitats. The structure of such easements would provide permanent protection of existing wildlife habitats while also allowing habitat management or improvements and access to sensitive habitats, such as those important to endangered species or migratory birds. It would also allow for public use where appropriate. We would determine, on a case-by-case basis, and negotiate with each landowner, the extent of the rights we would be interested in buying. Those may vary, depending on the configuration and location of the parcel, the current extent of development, the nature of wildlife activities in the immediate vicinity, the needs of the landowner, and other considerations.

In general, any less-than-fee-title acquisition by the Service would maintain the land in its current configuration with no further subdivision. Easements are a property right, and typically are perpetual. If a landowner later sells the property, the easement continues as part of the title. Properties subject to easements generally remain on the tax rolls, although the change in market value may reduce the assessment. The Service does not pay refuge revenue sharing on easement rights. Where we identify conservation easements, we would be interested primarily in purchasing development and some wildlife management rights. Easements are best when:

- Only minimal management of the resource is needed, but there is a desire to ensure the continuation of current undeveloped uses and to prevent fragmentation over the long-term and in places where the management objective is to allow vegetative succession;
- A landowner is interested in maintaining ownership of the land, does not want it to be further developed, and would like to realize the benefits of selling development rights;
- Current land use regulations limit the potential for adverse management practices;
- The protection strategy calls for the creation and maintenance of a watershed protection area that can be accommodated with passive management; or
- Only a portion of the parcel contains lands of interest to the Service.

The determination of value for purchasing a conservation easement involves an appraisal of the rights to be purchased, based on recent market conditions and structure in the area. The Land Protection Methods section further describes the conditions and structure of easements.

OPTION 3. FEE-TITLE ACQUISITION BY THE SERVICE

Under Option 3, we would acquire parcels in fee title from willing sellers, thereby purchasing all rights of ownership. This option provides us the most flexibility in managing priority lands, and ensuring the protection in perpetuity of nationally significant trust resources.

Generally, the lands we would purchase require more than passive management (e.g., controlling invasive species, mowing or prescribed burning, planting, or managing for the six priority public uses). We only propose fee-title acquisition when adequate land protection is not assured under other ownerships, active land management is required, or we determined the current landowner would be unwilling to sell a partial interest like a conservation easement.

In some cases, it may become necessary to convert a previously acquired conservation easement to fee-title acquisition: for example, when an owner is interested in selling the remainder of interest in the land on which we have acquired an easement. We would evaluate that need on a case-by-case basis.

LAND PROTECTION METHODS

We may use several methods of acquiring either a full or a partial interest in the parcels identified for Service land protection: (1) Purchase (e.g., complete title, or a partial interest like a conservation easement), (2) leases and cooperative agreements, and (3) donations.

PURCHASE

The preferred acquisition methods for protecting land within the CPAs are fee-title acquisition and conservation easements; however, the method ultimately used depends partly on the wishes of the landowners.

Fee-Title Purchase

A fee-title interest is normally acquired when: (1) The area's fish and wildlife resources require permanent protection not otherwise assured, (2) land is needed for visitor use development, (3) a pending land use could adversely impact the area's resources, or (4) it is the most practical and economical way to assemble small tracts into a manageable unit.

Fee-title acquisition conveys all ownership rights to the Federal Government and provides the best assurance of permanent resource protection. A fee-title interest may be acquired by donation, exchange, transfer, or purchase (as the availability of funding allows).

Easement Purchase

Easement purchase refers to the purchase of limited rights (less-than-fee-title) from an interested landowner. The landowner would retain ownership of the land, but would sell certain rights identified and agreed upon by both parties. The objectives and conditions of our proposed conservation easements would recognize lands for their importance to wildlife habitat or outdoor recreational activities, and any other qualities that recommend them for addition to the Refuge System. Land uses that are normally restricted under the terms of a conservation easement include:

- Development rights (agricultural, residential, etc.);
- Alteration of the area's natural topography (unless for restoration);
- Uses adversely affecting the area's floral and faunal communities;
- Private hunting and fishing leases;
- Excessive public access and use; and
- Alteration of the natural water regime.

COOPERATIVE AGREEMENTS

Management control on privately owned lands could be obtained by entering into cooperative agreements with the landowners.

DONATIONS

We encourage donations in fee title or conservation easement in the approved areas. We are not aware currently of any formal opportunities to accept donations of parcels within the proposed CPA boundary.

SERVICE LAND ACQUISITION POLICY

Once a CPA boundary has been approved, we contact landowners within the CPA to determine whether any are interested in selling. If a landowner expresses an interest and gives us permission, a real estate appraiser would appraise the property to determine its market value. Once an appraisal has been approved, we can present an offer for the landowner's consideration.

Appraisals conducted by Service or contract appraisers must meet federal as well as professional appraisal standards. In all fee-title acquisition cases, the Service is required by federal law to offer 100 percent of the property's appraised market value, which is typically based on comparable sales of similar types of properties.

We based the proposed CPA boundaries on the biological importance of species' needs and key habitats. The establishment of this boundary would give the Service the approval to negotiate with landowners that may be interested or may become interested in selling their land in the future. With this internal approval in place, the Service can react more quickly as important lands become available. Our long-established policy is to work with willing sellers as funds become available, and we continue to operate under that policy. Lands within this proposed boundary do not become part of the refuge unless their owners willingly sell or donate them to the Service.

FUNDING

The source of appropriated dollars for the purpose of land acquisition is the Land and Water Conservation Fund (LWCF). The primary source of income to this fund is fees paid by companies drilling offshore for oil and gas, as well as oil and gas lease revenues from federal lands. Additional sources of income include the sale of surplus federal real estate and taxes on motorboat fuel. The Service would seek appropriations from the LWCF for fee-title acquisition and conservation easements, if the proposed project is approved. Establishment of a national wildlife refuge in the southern Appalachians would build upon and strengthen the Service's work in this ecosystem, and would enable the Service to implement a landscape-level conservation program centered on the globally imperiled mountain bog ecosystem.

During planning for this refuge the Service identified 42,250 acres within 30 CPAs, which span 11 counties in western North Carolina and 2 counties in eastern Tennessee. Of these 42,250 acres, the Service is seeking authority to acquire up to 23,478 acres by fee-title, conservation easement, lease, cooperative agreement, or donation. The estimated cost to acquire in fee title the entire 23,478 acres for the proposed Mountain Bogs NWR is \$58.7 million. The cost-per-acre values used in this rough estimation are based on actual sales data derived from recent land sales (2008 - 2012) from the 13 counties in the project area, as well as data obtained from 2010 county assessment parcel data. For this exercise, we extrapolated a high-to-low range of values.

Because the method of acquisition would be determined on a case-by-case basis, for each landowner, it is impossible to pre-determine how many acres would be acquired in fee title and how many would be in a conservation easement, so we have provided a high range based on the fee-title acquisition of all 23,478 acres, and a low range based on the acquisition of conservation easements on all 23,478 acres. This range in value is affected by the following factors:

- The per-acre value is affected by the various land uses within the CPAs. There are approximately 5,000 acres in agricultural use and 1,200 being affected by development. Of the remaining acreage, there are approximately 200 acres in open water with the majority of the area being categorized as a variety of forested habitats.

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- The size of the tracts within the CPAs range from less than one acre to more than 8,000 acres.

Our total estimated cost to acquire in fee title all 23,478 acres is \$58,695,000 at \$2,500 per acre. This is based on an average per-acre-cost of all size tracts and various land uses. Our total estimated cost to acquire conservation easements on 23,478 acres is \$28,173,600 at \$1,200 per acre. This is also based on an average per-acre-cost of all size tracts and various land uses. This provides us with a high/low range of value for acquisition of the entire acreage.

It is important to note that these costs are only provided as an approximation based on current market value. Donations, the ratio of fee-title to conservation easement purchases, and land value fluctuations over time are among the factors that would likely influence the costs associated with completion of the proposed Mountain Bogs NWR.

IV. Coordination

INFORMATIONAL MEETINGS WITH BOG CONSERVATION PARTNERS

In the past, southern Appalachian bog conservation has involved a number of partners and the proposal to protect bogs via a national wildlife refuge is but one of numerous endeavors to protect and manage these sites. During the early stages of outreach, several meetings were held to brief our conservation partners on our intentions to move ahead with developing the proposed refuge, including the refuge establishment process, and conservation priorities. Partners in attendance included:

- The Conservation Fund
- North Carolina Wildlife Resources Commission
- North Carolina Department of Parks and Recreation
- The Nature Conservancy
- North Carolina Department of Environment and Natural Resources
- Carolina Mountains Land Conservancy
- North Carolina Museum of Natural Sciences
- Project Bog Turtle and University of North Carolina
- North Carolina Plant Conservation Program

ELECTED OFFICIAL CONTACTS

Contact was made with congressional offices representing the affected areas (North Carolina 11th, 10th, and 5th Congressional Districts, Tennessee's 1st Congressional District, and the four senators from the two states). The offices were contacted via e-mail or telephone and we offered to personally brief their staffs, which was done for two senate staffers (one from Senator Burr's office and one from Senator Hagan's office). Additionally, congressional staff received copies of the letters the Service sent to private landowners, as well as the press release we distributed announcing the project. Tennessee staffs of U.S. Senators' Lamar Alexander and Bob Corker, and U.S. Representative Chuck Fleischmann were briefed by Service staff in January 2013.

Additionally, state and county elected representatives from the affected areas were mailed letters describing the project and we offered to meet personally with the representatives to brief them on the proposed project.

PUBLIC OUTREACH

Other methods of outreach to private landowners, state and elected officials, other state and federal natural resource agencies, natural resource non-governmental organizations, and the general public included direct mailings, e-mails, digital media (a dedicated project website and by Facebook), a press release distributed on June 6, 2012, and by open houses.

Four open houses, each lasting two hours, provided the public with an opportunity to interact individually with Service experts in real estate, bog biology, private land stewardship, and refuge creation. All events were held in the early evening at local libraries. These open houses were

announced in the press release concerning the project, as well as in letters and e-mails sent to CPA landowners, state and local elected officials, bog conservation partners, and other state and federal natural resource agencies. Open house dates were:

- June 26, 2012 – Hendersonville, North Carolina
- June 27, 2012 – West Jefferson, North Carolina
- July 10, 2012 – Franklin, North Carolina
- July 11, 2012 – Boone, North Carolina

The purpose of public scoping was to seek input from the public regarding the proposed establishment of Mountain Bogs NWR and to identify the issues that needed to be addressed in the planning process. These issues/comments are documented in Appendix E.