U.S. Fish & Wildlife Service

DRAFT LAND PROTECTION PLAN AND ENVIRONMENTAL ASSESSMENT FOR THE PROPOSED ESTABLISHMENT OF PAINT ROCK RIVER NATIONAL WILDLIFE REFUGE

Franklin County, Tennessee

"Turkey Creek at Walls of Jericho"
Photo Credit: Todd Crabtree

Southeast Region

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I. Introduction and Purpose

The Paint Rock River watershed is nationally recognized for its aquatic biodiversity. Although the area contains several conservation lands, including state wildlife management areas, wetland easements, non-governmental conservation areas, and privately held conservation properties, the watershed remains largely unprotected. Approximately 7 percent of the watershed is currently dedicated to conservation. The proposed Paint Rock River National Wildlife Refuge (NWR, refuge) would play an important role in protecting riparian areas and large tracts of deciduous forest, helping connect existing conservation lands, further safeguarding the watershed, enhancing the ecological functioning of the area, and providing opportunities for compatible outdoor recreation and conservation education.

As part of the planning process, coordination and collaboration between the various management entities within the watershed was undertaken to develop a landscape-level land protection plan that aims to fill some of the conservation gaps in the watershed. Key conservation agencies and organizations have a long tradition of working in the Paint Rock River watershed, including the Alabama Department of Environmental Management (ADCNR), Alabama Division of Wildlife and Freshwater Fisheries (ADWFF), Natural Resources Conservation Service (NRCS), Tennessee Wildlife Resources Agency (TWRA), non-governmental conservation organizations, and private landowners. The Fish and Wildlife Service (Service) also works with Native American tribes to ensure timely and effective cooperation and collaboration. During this planning process, the Service contacted the following Native American tribes with interest in this landscape:

- Eastern Band of Cherokee Indians
- Muscogee (Creek) Nation
- Poarch Band of Creek Indians
- Seminole Tribe of Florida

Recognizing the generations of responsible stewardship within this working rural landscape, this proposal seeks to work with willing landowners to secure a legacy of conservation lands for future generations to enjoy. This proposal aims to protect and restore one of the most biologically diverse and unaltered river systems in eastern North America. Further, the proposal aims to address threats from habitat fragmentation and urban development, altered ecological processes, and impacts from climate change. Key species and habitats of conservation concern for this area include Alabama lampmussel, fine-rayed pigtoe, pale lilliput, pink mucket, rough pigtoe, shiny pigtoe, slabside pearlymussel, Anthony's riversnail, palezone shiner, snail darter, gray bat, Indiana bat, American Hart's tongue fern, Morefield's leather flower, Price's potato bean, and Hine's emerald dragonfly, cerulean warbler and other neotropical migratory birds, bottomland hardwoods, canebrake, and cave and karst systems.

Working with the key partners, as well as with other state and local governments, Native American tribes, businesses, non-governmental organizations, and the public, the Service examined the needs for wildlife habitat protection within the biologically important Paint Rock River watershed of Alabama and Tennessee (Figure 1). During the planning process, this area was further refined to encompass several smaller conservation partnership areas, wherein the Service proposes to acquire fee-title (or

less-than-fee-title) interest in up to 24,508 acres. It is critical to note that the Service's policy is to work with willing landowners.

This Draft Land Protection Plan and Environmental Assessment (Draft LPP/EA) identifies the proposed establishment of Paint Rock River NWR, as outlined in the Service's Proposed Action (Alternative B). The purposes of this Draft LPP/EA are to:

- Announce the Service's intent to establish the proposed refuge;
- Inform landowners about the Service's long-standing policy of acquiring land only from willing sellers (it is the Service's policy to work with willing sellers to acquire fee-title or less-than-fee-title interest in property);
- Provide landowners and the public with an outline of Service policies, priorities, and protection methods for property in the project area; and
- Assist landowners in determining whether their properties are located within the proposed project.

This Draft LPP/EA presents the methods the Service, conservation partners, and interested landowners could use to accomplish wildlife and habitat goals and objectives for the proposed refuge.

The table and maps at the end of this Draft LPP/EA identify the land parcels contained within the proposed Conservation Partnership Area (CPA). A CPA is a specified area within which the Service would have the authority to acquire property from willing landowners for a proposed refuge, but where the Service would be limited to an acquisition cap smaller than the CPA itself. The Service would be limited to acquiring property within the CPA, but would have the ability to adjust specific parcel acquisition to respond to changing landowner interest, conditions, and opportunities. In the CPA, the Service would seek to acquire up to 25,120 acres in fee-title interest or less-than-fee-title interest (Figures 2a, 2b, and 2c). A corresponding table (Table 3) groups parcels together by landowner and lists each parcel, each parcel identification number, estimated acres, type of ownership, preferred method of acquisition, overall priority ranking for a single or group of parcels under one landowner, acres by parcel and landowner in the tiers I, II, and III; and the figure number where each parcel or group of parcels can be found.

One of the objectives of establishment of a refuge is to contribute to a more connected and functional conservation landscape that will provide effective habitat connections between existing and future conservation areas. Identification of land parcels in this Draft LPP/EA does not preclude the acquisition of those parcels by other agencies, organizations, or individuals in their efforts to develop connections between existing or future conservation areas.

The scope of this Draft LPP/EA is limited to the proposed acquisition of lands, in fee-title and less-than-fee-title, within the CPA. The Draft LPP/EA is not intended to cover the development and/or implementation of detailed, specific programs for the administration and management of those lands. A conceptual management plan and interim compatibility determinations would guide management and public use on newly established refuge lands and conservation easements until a comprehensive conservation plan (CCP) and compatibility determinations are developed (Appendices A and B).

PROJECT DESCRIPTION

The proposed establishment of Paint Rock River NWR defines a CPA encompassing approximately 40,505 acres as depicted in Figure 1. For this project, the CPA consists of the upper portion of the Paint Rock River watershed (Tennessee), and provides an area within which

the Service would have the authority to acquire up to 25,120 acres, in fee-title or less-than-fee-title (e.g., easements) from willing sellers. All lands acquired, up to 25,120 acres, would be contained within the boundary of the proposed refuge.

It is envisioned that the proposed refuge would:

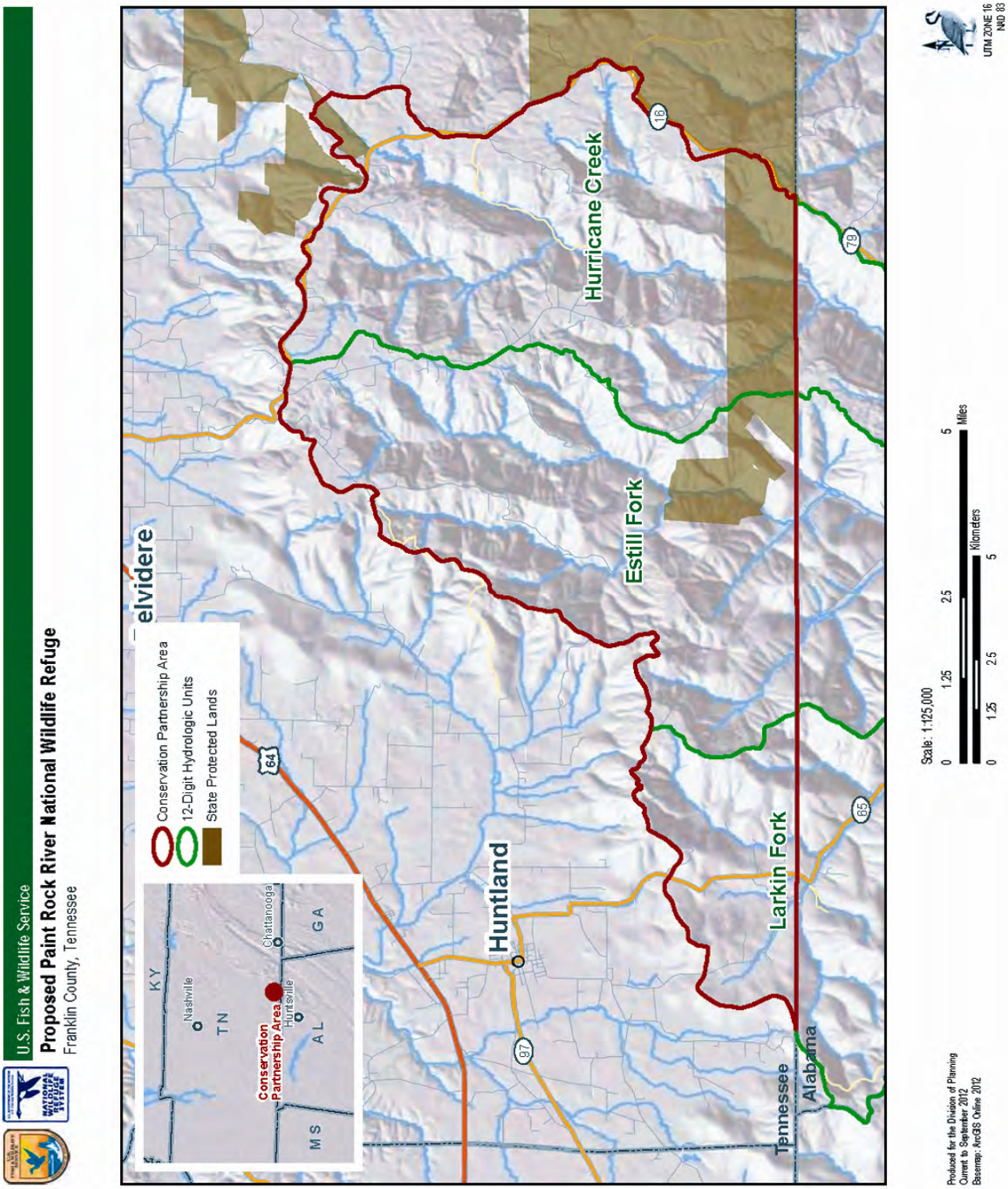
- Protect and restore habitat for at least 15 federally listed species and three candidate species;
- Protect and maintain habitat for a diversity of fish, wildlife, and plant species, including more than 40 state listed species;
- Protect some of the last remaining large tracts of eastern deciduous forests;
- Provide habitat for migratory birds, including neotropical migratory birds and other species of conservation concern;
- Provide opportunities for a variety of wildlife-dependent recreation, including hunting, fishing, wildlife observation and photography, and environmental education and interpretation;

REFUGE PURPOSE(S)

Emphasizing listed species, while protecting the important fish and wildlife resources of this landscape, the following purposes have been developed for the establishment of the proposed refuge:

> *"conservation, management, and ... restoration of the fish, wildlife, and plant resources and their habitats ... for the benefit of present and future generations of Americans" 16 U.S.C. 668dd(a)(2) (National Wildlife Refuge System Administration Act), as amended by amended by Pub. Law 105-57(The National Wildlife Refuge System Improvement Act of 1997);*
>
> *"to conserve (A) fish or wildlife which are listed as endangered species or threatened species…or (B) plants" 16 U.S.C. 1534 (Endangered Species Act of 1973);*
>
> *"the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions" 16 U.S.C. 3901(b), 100 Stat. 3583 (Emergency Wetlands Resources Act of 1986);*
>
> *"for use as an inviolate sanctuary, or for any other management purpose, for migratory birds" 16 U.S.C. 715d (Migratory Bird Conservation Act);*
>
> *"for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude" 16 U.S.C. 742f(b)(1) "for the development, advancement, management, conservation, and protection of fish and wildlife resources" 16 U.S.C. 742f(a)(4)(Secretarial powers to implement laws related to fish and wildlife) (Fish and Wildlife Act of 1956);*

Figure 1. Location of CPA



"suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species" 16 U.S.C. 460k-1 "the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors" 16 U.S.C. 460k-2 [Refuge Recreation Act (16 U.S.C. 460k-460k-4), as amended]

The vision for the Paint Rock River NWR, if established, is as follows:

The Paint Rock River National Wildlife Refuge will protect important wildlife and habitats of the Paint Rock River watershed, a unique ecosystem that supports a high diversity of aquatic, terrestrial, and karst habitats. Together with partners, the Fish and Wildlife Service will help protect and improve the water quality, water quantity, and hydrology of the Paint Rock River, benefitting numerous imperiled freshwater species and human communities utilizing the area's water resources. The refuge will conserve, protect, and manage one of the largest contiguous tracts of hardwoods remaining in eastern North America for current and future generations. As part of a system of public and private conservation lands, the refuge will expand outdoor recreational opportunities, helping maintain a way of life and supporting local economies.

Refuge goals are intentionally broad, descriptive statements of the desired future conditions. They embrace the proposed refuge purposes and vision statement. Four overarching goals were developed for the proposed refuge:

***Goal 1.* Functional Conservation Landscape**
The Paint Rock River NWR, as part of the Appalachian Landscape Conservation Cooperative (LCC), would contribute to a more connected and functional conservation landscape that would provide effective habitat connections between existing conservation areas, reducing fragmentation, and protecting and restoring large tracts of contiguous hardwood forests.

***Goal 2.* Habitat for Fish and Wildlife**
The refuge would provide a wide range of quality Cumberland Plateau habitats to support native wildlife and plant diversity, including migratory birds, federal and state listed species, and other imperiled species.

***Goal 3.* Enhanced Water Quality, Water Quantity, and Improved Hydrology**
The refuge would contribute to water quality, water quantity, and hydrology of the Paint Rock River watershed to benefit the area's high aquatic diversity and help protect the water supply for residents downstream.

***Goal 4.* Wildlife-dependent Recreation and Education**
Refuge visitors of all abilities 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 the important landscape of the Paint Rock River watershed.

II. Resources

RESOURCES TO BE PROTECTED

HABITAT AND WILDLIFE RESOURCES

Habitat
The proposed refuge lies in the Paint Rock River watershed of the Cumberland Plateau, a largely rural area that has a long history of agriculture, forestry, hunting, and fishing. The Paint Rock River watershed drains into the Tennessee River. As further detailed in the Affected Environment chapter of this Draft LPP/EA, important habitat types in the conservation partnership area consist of in-stream habitats, bottomland hardwoods, canebrake, upland hardwoods, and cave/karst systems.

Wildlife
The variety of habitats found in the area supports a range of wildlife, including various amphibians and reptiles that tend to stay in localized areas to wide-ranging species such as an occasional black bear. Numerous bird species, both resident and migratory, utilize project area habitats for foraging, resting, and nesting. Common species include white-tailed deer and a host of other mammals, including raccoons, opossums, various rodents, and bats. Project area waters provide habitat for a number of fish species, most of which are found along the Cumberland Plateau and Tennessee River.

Threatened and Endangered Species
As is further detailed in the "Affected Environment" chapter of this Draft LPP/EA, the refuge provides habitat for at least 15 federally listed (threatened and endangered) and three candidate species. In addition, this Draft LPP/EA discusses habitat needs of several listed species and factors contributing to population declines. Listed species include most major taxonomic groups. However, mussels, fishes, and plants represent a large component of the imperiled species (Table 1). The watershed also supports more than 50 Tennessee listed species.

Table 1. Federally listed species likely to occur in the Paint Rock River watershed and Franklin County, Tennessee

Common Name	Scientific Name	Status
Mammals		
Gray Bat	*Myotis grisescens*	E
Indiana Bat	*Myotis sodalis*	E
Fish		
Palezone Shiner	*Notropis albizonatus*	E
Snail Darter	*Percina tanasi*	T

Common Name	Scientific Name	Status
Invertebrates		
Alabama Lampmussel	*Lampsilis virescens*	E
Fine-rayed Pigtoe	*Fusconaia cuneolus*	E
Pale Lilliput	*Toxolasma cylindrellus*	E
Pink Mucket	*Lampsilis abrupta*	E
Rough Pigtoe	*Pleurobema plenum*	E
Shiny Pigtoe	*Fusconaia cor*	E
Slabside Pearlymussel	*Pleuronaia dolabelloides*	C
Anthony's Riversnail	*Athearnia anthonyi*	E
Plants		
American Hart's-tongue Fern	*Phyllitis scolopendrium* var. *americana*	T
Morefield's Leather-flower	*Clematis morefieldii*	E
Price's Potato-bean	*Apios priceana*	T
White Fringeless Orchid	*Platanthera intergrilabia*	C

Key: C=Candidate (for Federal listing), E=Endangered, T=,Threatened

Source: USFWS Endangered Species Program 2012

THREATS

A variety of factors have been implicated in the decline of habitats and wildlife species in the CPA. In addition to habitat loss, the alteration of the area's hydrology and decline in water quality are of particular concern, as many of the species in the Paint Rock River and its tributaries are adapted to a predictable supply of clean water. Most of the threats summarized below are likely to adversely affect the hydrology and water quality of the watershed, with negative consequences to a range of species.

Residential Development/Urban Sprawl
Although still largely rural, the CPA lies near Huntsville, a city that has experienced substantial growth during the last decade. Development within the watershed would have direct negative effects on its natural resources, impacting the system's hydrologic regime, water quality, and water quantity.

Commercial Timber Operations
More than 90 percent of the area is forested with commercial timber production occurring at some level across the region. Commercial timber operations have the potential to adversely affect aquatic species by increasing erosion. Once cleared of vegetative cover, lands adjacent to streams and rivers can become sources of sediment-laden runoff, which can smother mussels and increase turbidity.

Mining Operations
Although there have been only limited mining operations in the past, there has been at least one oil and gas exploration effort in the watershed since 2000. Limited limestone rock mining is ongoing, and because coal and limestone rock resources are present in the watershed, it is likely they would be exploited in the future under favorable economic conditions, ultimately resulting in landscape changes. Mining operations have the potential to impact the area's hydrology and water quality.

Invasive Species
While there are numerous exotic or nonnative invasive species within the proposed project area, serious environmental harm is usually associated with a select few. Chapter II in this Draft EA lists some of the more ecologically harmful exotic plants and animals that are found within the proposed project area. When possible or feasible, eradication or control would concentrate on these species. Additional species, particularly invasive plants, are found within the proposed project area and may also require control efforts in the future to meet restoration goals.

Climate Change
While the effects of climate change are predicted to vary regionally, it would generally hold that already wet areas would become wetter, while dry areas would become dryer. Many regions would also find rainfall patterns tending more towards the extreme, torrential downpours interspersed with prolonged dry spells, in other words rain storms would become more intense, but less frequent. There would be major implications for stream flows and availability of water for wildlife, fish, and people (Karl and Melillo 2009). From a hydrologic standpoint, stream flows are expected to be more sporadic with greater fluctuation between high and low flows on a seasonal basis. The effects of such a scenario can be presumed to be stressful to many species and habitats, particularly those adapted to more stable environments. Mussels and smaller fish species with narrow habitat preferences may suffer disproportionately. Excessive nutrient loading and sedimentation are also possible consequences to greater stream-flow fluctuation. Other declines in water quality and thermal changes to streams could possibly affect habitat conditions and the reproductive capacity of aquatic species.

RELATIONSHIP OF PROJECT TO LANDSCAPE CONSERVATION GOALS AND OBJECTIVES

The proposed Paint Rock River NWR, within the Appalachian LCC (USFWS 2011) would contribute to a more connected and functional conservation landscape by helping minimize habitat fragmentation, protecting and restoring riparian habitats, and protecting large tracts of forest. Several government agencies, non-governmental organizations, and landowners are working in this landscape to protect and restore its water resources, through forest and wetland easements, stream protection/restoration projects, etc. This proposed refuge would further protect and enhance water quality and quantity within the watershed, benefiting both humans and wildlife.

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

International:

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

National:

- America's Great Outdoors (AGO) Initiative (AGO 2011)
- Forest Stewardship Program (USFS 2011)
- Partners for Fish and Wildlife (USFWS 2012)
- Strategic Plan for Responding to Accelerating Climate Change (USFWS 2009a)
- Wetlands Reserve Program (WRP) of the Natural Resources Conservation Service (NRCS 2011)

Regional:

- Appalachian Landscape Conservation Cooperative (USFWS 2011)
- Appalachian Mountains Bird Conservation Initiative Concept Plan (Appalachian Mountains Joint Venture 2005)
- Cumberland Voices: A Conservation Vision for the South Cumberland Region (Land Trust for Tennessee and Sewanee Environmental Institute 2011)
- Threatened and Endangered Species Recovery Plans (USFWS 2012)
- Southeast Aquatic Habitat Plan (Southeast Aquatic Resources Partnership 2008)

State:

- Climate Change and Potential Impacts to Wildlife in Tennessee (TWRA 2009)
- Conserving Alabama's Wildlife: A Comprehensive Strategy. (ADWFF 2005)
- The Forever Wild Land Trust Report (ADCNR 2009)
- Tennessee's Comprehensive Wildlife Conservation Strategy (TWRA 2005)
- Statewide Storm Water Management Plan (Tennessee Department of Transportation 2012)

PARTNERSHIP EFFORTS/RELATED RESOURCES

Partnerships are integral to the conservation of this landscape. The protection and conservation of wildlife habitats and working landscapes are issues of concern in the region. During public scoping and conversations with landowners and other conservation partners for this proposal, the Service recognized that all interested parties would have an enhanced ability to protect and manage wildlife and habitats in the Paint Rock River watershed. Partners often assist with activities including environmental education and interpretive programs, land acquisition, public relations, habitat evaluations, species inventories, nest site and wildlife monitoring, and habitat restoration. For that reason, the Service recognizes the need to collaborate with other conservation organizations in the region.

Through this initiative, the Service would work to combine conservation efforts with those of many partners, including partners yet to be identified. Several federal and state agencies serve as key partners in this landscape, including Alabama Department of Environmental Management, Alabama Division of Wildlife and Freshwater Fisheries, USDA Natural Resources Conservation Service, Tennessee Division of Natural Areas, Tennessee Valley Authority, and Tennessee Wildlife Resources Agency. In addition, there are several non-governmental conservation partners active in the watershed. Figure 1 depicts current conservation lands and waters within the area. Many of our partners already own or have future plans to protect lands in the project area through conservation easements. Still others have completed on-the-ground habitat restoration projects throughout the watershed. It is the combined efforts of the Service and its partners that would provide substantial and long-term protection of federal and state listed threatened and endangered species, rare habitats, and recreational areas that have been identified through the scoping process as being important to the long-term ecological health, economy, and way of life of the region.

III. Land Protection Strategy

ACTION AND OBJECTIVES

AUTHORITIES FOR ESTABLISHING THE REFUGE

We anticipate that the Service would continue to acquire lands under the same authorities that have been used to acquire lands in the past. Based on the refuge purposes, lands could be acquired under several statutory authorities, including, but not limited to:

- National Wildlife Refuge System Administration Act of 1966; (16 U.S.C. 668dd(b))
- Endangered Species Act of 1973 (16 U.S.C. 1534)
- Emergency Wetlands Resources Act of 1986 (16 U.S.C. 3921-3923)
- Migratory Bird Conservation Act of 1929 (16 U.S.C. 715)
- Fish and Wildlife Act of 1956 (16 U.S.C. 742a)
- Refuge Recreation Act (16 U.S.C. 460k-1)

CONSERVATION PARTNERSHIP AREA

A CPA approach was used to provide a more flexible tool for acquiring or otherwise protecting land. The CPA includes lands with conservation value, within which the Service would work with other conservation partners and willing landowners to protect resources. For this project, the CPA boundary was delimited by three sub-watersheds within the Tennessee portion of the Paint Rock River watershed. These three sub-watersheds (12 digit hydrologic units) were Estill Fork, Hurricane Creek, and Larkin Fork. The Land Protection Priorities' section below further describes the process by which these three sub-watersheds were targeted for conservation.

LAND USE

For the purposes of this Draft LPP/EA, the National Land Cover Dataset (NLCD) was used to portray land use. The majority of the lands in the CPA are considered to be in "open" or undeveloped land use and most parcels are in private ownership (Fry et al. 2011). Deciduous forest is the dominant land cover type, comprising more than 90 percent of the total acreage, followed by pasture/hay. All other land use classes each contributed less than 5 percent of the total cover. More details, including a table and map of land use, can be found in Chapter II of this Draft EA.

LAND PROTECTION PRIORITIES

The Service's proposed action (Alternative B) would result in the acquisition of up to 25,120 acres of wildlife habitat with the establishment of Paint Rock River NWR, 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 sellers. The Service believes these are the minimum interests necessary to conserve and protect the fish and wildlife resources in the proposed area.

The prioritization process for this proposed project was applied at two scales; the sub-watershed (12 digit hydrologic unit), followed by a parcel-level value assignment.

SELECTION OF PRIORITY SUB-WATERSHEDS

The Paint Rock River watershed contains eleven sub-watersheds. In order to select the sub-watersheds that have the highest conservation value, the Service applied a ranking system to each sub-watershed, based on the following criteria, listed in order of relative importance:

- Number of federally listed species per hydrologic unit
- Percent forest cover
- Number of known caves per hydrologic unit

Based on this methodology, the following four hydrologic units ranked as the "highest" priority for conservation: Cole Spring Branch (located in Alabama only), Estill Fork, Hurricane Creek, and Larkin Fork. Guess Creek, Tremble Creek, and Williams Cove-Paint Rock River were scored as "medium" priority hydrologic units. The remaining sub-watersheds, Lick Fork, Little Dry Creek-Clear Creek, Little Paint Creek, and Williams Creek-Dry Creek were ranked as "low" priority.

PARCEL-LEVEL PRIORITIZATION

Following raking at the sub-watershed (hydrologic unit) scale, parcels that have the majority of their extent located within one or more of the three priority sub-watersheds, Estill Fork, Hurricane Creek, and Larkin Fork, were ranked in terms of their conservation value, using the criteria and weighted scale shown in Table 2.

Table 2. Paint Rock River parcel-level conservation priority ranking criteria

Criteria	Weighted Scale (multiplier)	Ranking Value		
		Low (1)	Medium (2)	High (3)
River Frontage1	5	absent		present
Distance to River	4	≥ 0.75 miles	≥ 0.5 miles < 0.75 miles	≤ 0.5 miles
Percent Forest Cover2	3	<80%		≥80%
Proximity to State Lands3	2	>1 mile	>0.1 mile and ≤1 mile	≤ 0.1 mile
Size4	1	<17 acres	≥17 acres and <800 acres	≥ 800 acres

1 = Shared boundaries or containment of named streams and creeks in the watershed
2 = 2009 Land Cover (Landscape Analysis Lab, University of the South) Category 1 (Native Hardwood Forest)
3 = State Lands (Bear Hollow Mountain WMA, Walls of Jericho SNA)
4 = Parcel size categories were based on average territories or home ranges of forest interior birds

Using the ranking criteria, each parcel was assigned a value, and was placed in one of three priority categories (I, II, and III) as follows:

- 36 – 45 points = Priority I
- 26 – 35 points = Priority II
- 15 – 25 points = Priority III

A “non-priority” category was developed, in which small (<17 acres) parcels with structures were placed. In addition, parcels with low scores (<25 points) located within municipal boundaries were also placed in this category. Chapter III shows the parcel-level priority maps as generated during the development of this document.

The parcel-level maps are a “snap-shot in time,” and identify where the relative priorities were during the development of this Draft LPP/EA. Resource values change over time, and acquiring lands for protection would take years, depending on willingness of sellers, funding, and other factors. For instance, some parcels may be sub-divided in the future, resulting in a change in their cumulative scores. A heavily forested parcel may be logged, reducing the cumulative number of points. Therefore, these rankings could serve as a decision support tool, to be used by future refuge management and Service realty staff, were this project to be approved. Hence, for the purposes of this Draft LPP/EA, all “non-priority” parcels were assigned a priority I, II, and III simultaneously (Table 3).

LAND PROTECTION OPTIONS

The Service acquires lands and interests in lands, such as easements, and management rights in lands, such as 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.

If approved, we would use the following options to implement the Final LPP.

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

Several lands adjacent to or in the vicinity of the proposed project are already owned by our partners or otherwise conserved through easements. It should also be emphasized that the protection of this area fits well into a landscape-scale network of conservation lands that is being pieced together in the area. This proposed project would serve as an important keystone in this conservation effort.

The following conservation partners own lands or otherwise protect (e.g., though easements) tracts in the watershed:

- Alabama Division of Wildlife and Freshwater Fisheries
- Alabama State Parks
- USDA Natural Resources Conservation Service
- Tennessee Division of Natural Areas
- Tennessee Valley Authority
- Tennessee Wildlife Resources Agency
- The Nature Conservancy

Within the watershed, the Service manages Fern Cave NWR. This 199-acre refuge is part of the Wheeler National Wildlife Refuge Complex, and lies just east of the Paint Rock River, off of Highway 72. It has the Nation's largest colony of overwintering gray bats.

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 from willing sellers, typically in the form of a conservation easement. This option leaves the parcel in private ownership, while allowing us management authority 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 for 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 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 would continue 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;
- 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 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, such as a conservation easement.

In some cases, it may become appropriate 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 could 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 such as a conservation easement); (2) leases and cooperative agreements; and (3) donations.

PURCHASE

For most of the tracts in the boundary, the proposed method is listed as *Fee* or *Easement*; however, the method we would ultimately use depends partly on the landowner's wishes.

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 purchase 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 or outdoor recreational activities, and any other qualities that recommend them for addition to the National Wildlife Refuge System. Land uses that are normally restricted under the terms of a conservation easement include:

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

LEASES AND COOPERATIVE AGREEMENTS

Potentially, the Service could protect and manage habitat through leases and cooperative agreements. Management control on privately owned lands could be obtained by entering into long-term renewable leases or cooperative agreements with the landowners. Short-term leases could be used to protect or manage habitat until more secure land protection could be negotiated.

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 boundary to determine whether any are interested in selling. If a landowner expresses an interest and gives us permission, a real estate appraiser will 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 key habitats. The establishment of this boundary gives 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 only as funds become available; we continue to operate under this policy. Lands within this CPA boundary would not become part of the proposed 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 acquisition of fee-title and conservation easements once the project is approved. Establishment of a Service presence in this ecosystem, with a national wildlife refuge base, would enable the Service to implement a landscape-level conservation program centered on protecting imperiled resources of the Paint Rock River watershed.

OWNERSHIP, ACQUISITION METHOD AND ACQUISITION COSTS

During planning for this proposed refuge, the Service identified a 40,505-acre CPA in Franklin County, Tennessee. Of these 40,505 acres, the Service would seek authority to acquire, from willing sellers, up to 25,120 acres by fee title, conservation easement, lease, cooperative agreement, or donation. Because the method of acquisition would be determined on a case-by-case basis, for each landowner, it would be impossible to predetermine how many acres would be acquired in fee title and how many would be in a conservation easement, so we have provided a range of values. Generally, Service easements are about 75 percent of the cost of fee-title acquisition. Hence, the lower estimate would be based on all 25,120 acres being easements, while the higher estimate would reflect acquisition of all 25,120 acres in full fee title. Based on 2010 sales data, the average cost per acre in the watershed was about $1,900. Therefore, the estimated cost to protect the entire 25,120 acres ranges between $34,923,900 (all easement) and $46,565,200 (all fee title).

It is important to note that these costs are only provided as an approximation based on recent market value. Donations, mitigation and conservation banks, and land value fluctuations over time are among several factors that would likely influence the costs associated with the establishment of the proposed Paint Rock River NWR.

ANNUAL OPERATING AND MAINTENANCE COSTS

Once acquired, there would be costs associated with various short-term and on-going projects and maintenance associated with operating and managing a refuge, as further detailed below.

Our plan assumes the Service would acquire some structures, most of which would not support the refuge or Service mission and be slated for demolition. Structures we would likely obtain include single-family homes and farm buildings. Some buildings that are in excellent condition could be used for refuge quarters, equipment storage, or potentially a future visitor contact facility. A detailed facilities survey was not conducted for this Draft LPP/EA, and we would address parcels we obtain on a case-by-case basis. The most cost-effective way to remove a structure is usually for the staff or a contractor to demolish it, although other methods would be used, where available and appropriate (i.e., local fire department burning for training). There would also be costs associated with posting signs for boundaries and repairing/maintaining refuge roads and other infrastructure.

Acquiring new lands for a refuge would also result in additional public use opportunities and costs incurred by the Service. These could include providing fishing access points, building some trails and observation areas, and opening lands for hunting. The exact number and location of these public use improvements and opportunities are currently unknown. These details would be further defined and announced to the public as new lands were acquired.

Funds would also be needed for habitat restoration, including riparian reforestation, stream restoration, barrier removal, prescribed burning, removal of exotic plants, etc.

Most of the work described above would be conducted by temporary or permanent Service staff, although we actively recruit volunteers and work with other partners, where possible, to reduce costs. Furthermore, the Service often shares staff between refuges for specific projects (e.g.,

prescribed burning) as a means of reducing long-term costs. Based on the Service's National Staffing Model, a fully realized refuge of 25,120 acres would require approximately ten staff members. In the Service's Southeast Region, refuges of this size generally have an annual staffing and management budget of $1.5 million.

IV. Coordination

FEDERAL/STATE/LOCAL GOVERNMENTS

During the summer of 2012, meetings with representatives of the TWRA and the Department of Environment and Conservation were held to brief them on the Service's intentions.

CONGRESSIONAL CONTACTS

Contact was first made with congressional staffs through e-mails and letters, providing an overview of the project and offering an opportunity to brief the staff in person. On January 16, 2013, in a meeting held in Chattanooga, Tennessee, the Region 4 Chief of Refuges and other Service staff briefed staffers of Senators' Lamar Alexander and Bob Corker on the proposal. On January 23, 2013, in Winchester, Tennessee, the field representative for Congressman Scott DesJarlais (4th District, Tennessee) was briefed by Service staff on the proposal.

PUBLIC OUTREACH

Methods of outreach to private landowners, state and federal 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 (i.e., a dedicated project website), and press releases to local media.

One open house, lasting four hours, provided the public with an opportunity to interact individually with Service experts in fish and wildlife management, recreational opportunities, real estate, aquatic biology, private land stewardship, and refuge creation. The open house was announced in a press release about the project, as well as in letters and e-mails sent to CPA landowners, state and local elected officials, and other state and federal natural resource agencies. The open house was held on February 5, 2013, at the Franklin County Library in Winchester, Tennessee. It is estimated that 80 people attended the open house. A public meeting was held at the request of the Keith Springs community and other interested individuals. The meeting was held on February 19, 2013, at the Winchester National Guard Amory, with approximately 150 people in attendance.

The purpose of public scoping was to seek input regarding the establishment of Paint Rock River NWR and to identify the issues that needed to be addressed in the planning process. More than 200 comments were received during the period January 17 through February 28, 2013. These issues/comments are documented in Appendix E.

Table 3. Proposed Paint Rock River NWR parcel list

Parcel #	Parcel ID	Acres	Priority
1	145 002.00	134	I, II, III
2	145 007.00	114	I, II, III
3	155 004.00	57	I, II, III
4	155 006.00	114	I, II, III

Parcel #	Parcel ID	Acres	Priority
5a	155 006.02	20	I, II, III
5b	155 006.01	47	I, II, III
6	118 001.00	207	I, II, III
7	135 005.00	149	I, II, III
8	135 008.00	128	I, II, III
9a	135 004.01	30	I, II, III
9b	117 002.00	418	I, II, III
9c	138 001.01	1,705	I, II, III
9d	127 001.00	12,276	I, II, III
10	118 001.02	280	I, II, III
11	135 006.00	80	I, II, III
12	137 003.00	47	I, II, III
13	155 003.00	94	I, II, III
14	128 001.00	29	I, II, III
15	155 001.00	119	I, II, III
16	146 001.01	22	I, II, III
17	135 007.00	153	I, II, III
18	136 013.01	161	I, II, III
19	125 008.00	861	I, II, III
20a	136 001.00	28	I, II, III
20b	125 002.00	1,301	I, II, III
20c	126 001.00	2,449	I, II, III
20d	154 004.00	2,968	I, II, III
21	136 006.00	113	I, II, III
22	135 004.00	233	I, II, III
23	156 001.00	151	I, II, III
24	155 002.00	458	I, II, III
25	126 003.00	68	I, II, III
26	147 001.00	4	I, II, III
27	147 002.00	102	I, II, III
Total		**25,120**	

Figure 2a. Proposed Paint Rock River NWR parcel map

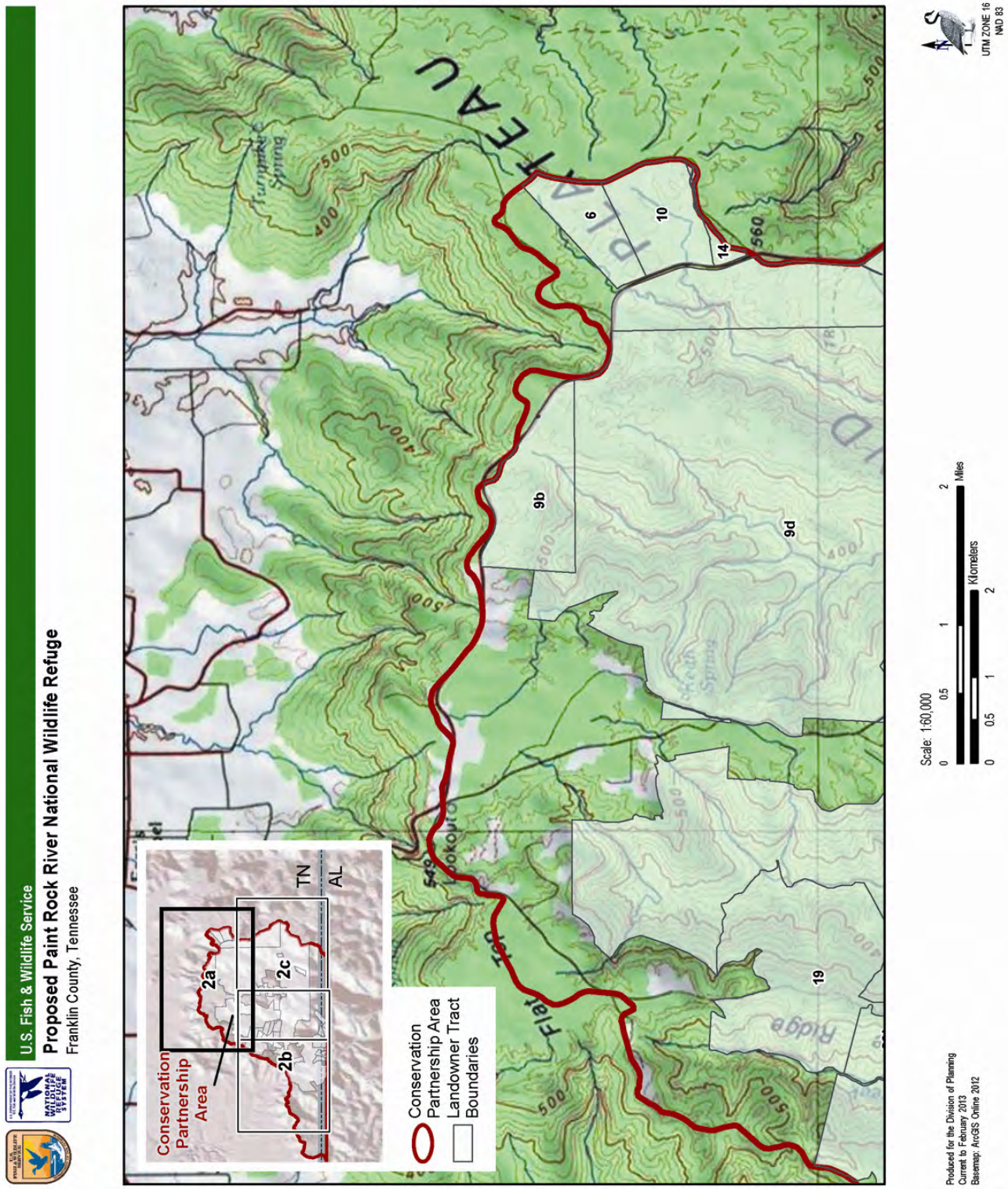


Figure 2b. Proposed Paint Rock River NWR parcel map

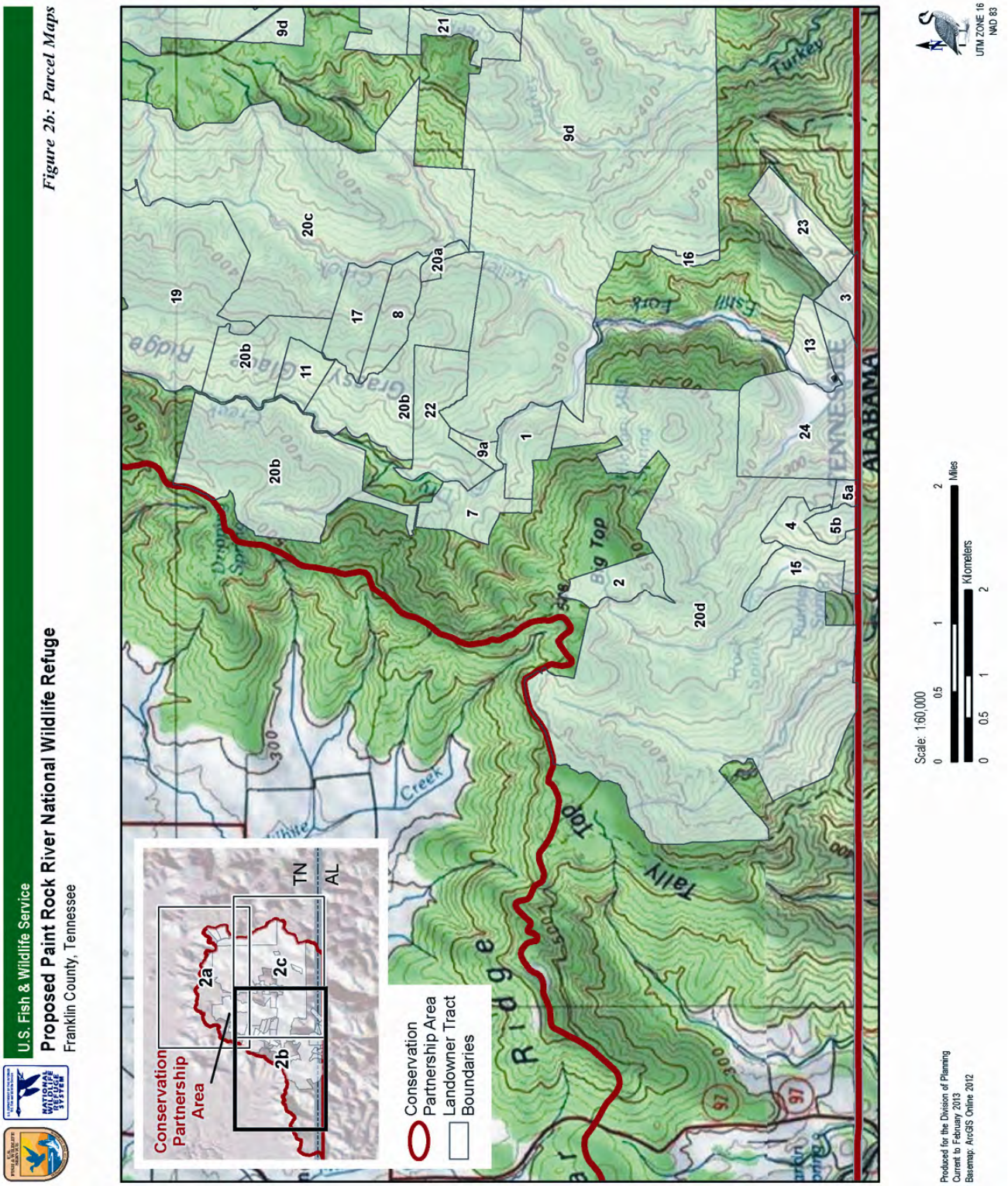
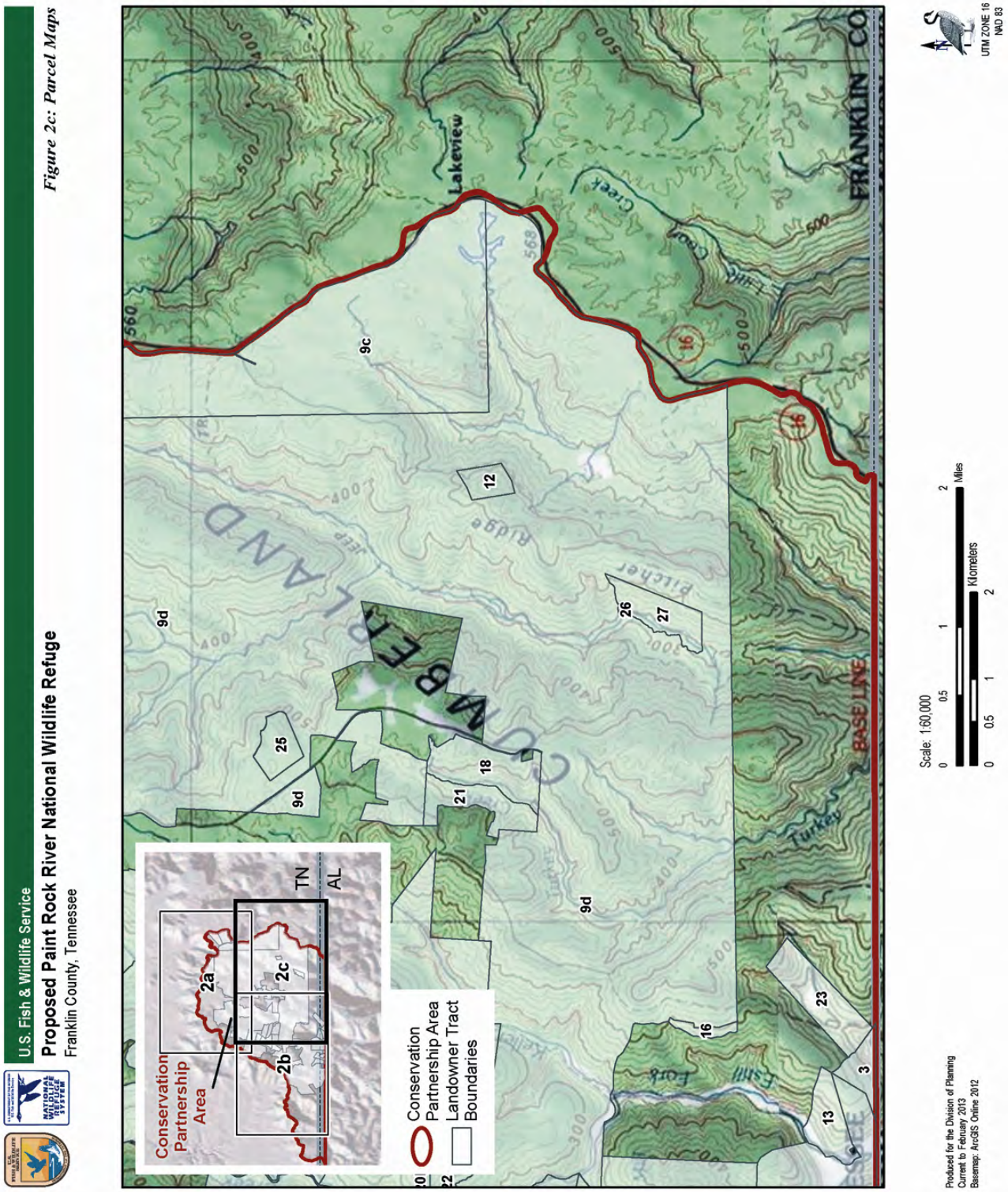


Figure 2c. Proposed Paint Rock River NWR parcel map



I. Purpose and Need for Action

INTRODUCTION

The Fish and Wildlife Service (Service) proposes to protect and manage the Paint Rock River watershed and associated habitats, including expanses of upland hardwoods, in Franklin County, Tennessee, through the establishment of the Paint Rock River National Wildlife Refuge (NWR, refuge). The proposed Conservation Partnership Area (CPA) boundary encompasses 40,505 acres and is depicted in Figure 1. Within this CPA boundary, the Service seeks to protect up to 25,120 acres in fee title or conservation easements. This boundary would also be used to demark the area of influence for this Draft Environmental Assessment (Draft EA), within which physical, biological, and cultural resource impacts would be analyzed. This proposal seeks to protect and restore one of the largest hardwood forest expanses remaining in the eastern United States, conserving one of the Nation's prime areas of biological diversity. Key biological resources of concern for this area include aquatic habitats supporting numerous imperiled freshwater mussels and a variety of stream fish, bottomland hardwood forests, canebrake, upland hardwoods, and extensive cave and karst systems inhabited by numerous endemic species. Further, the proposal aims to address habitat fragmentation and declines in water quality and quantity. The proposal also aims to increase refuge-compatible outdoor public use opportunities.

The mission of the National Wildlife Refuge System is:

> "to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Improvement Act of 1997).

National wildlife refuges provide important habitat for native plants and many species of mammals, birds, fish, insects, amphibians, and reptiles. They also play a vital role in conserving threatened and endangered species. Refuges offer a wide variety of wildlife-dependent recreational opportunities and many have visitor centers, wildlife trails, and environmental education programs. Nationwide, about 25 million visitors annually hunt, fish, observe and photograph wildlife, or participate in educational and interpretive activities on refuges.

Current Service policy allows this proposed federal action through various types of legislation authorizing our agency to acquire land in fee-title or less-than-fee-title purchases (USFWS 1996). Examples of legislation authorizing the Service to purchase land include, but are not limited to: Refuge Recreation Act of September 28, 1962 (16 U.S.C. 460k-460k-4), as amended; Land and Water Conservation Fund (16 U.S.C. 4601-4601-11), as amended; Pub. Law 88-578, approved September 3, 1964 (78 Stat. 897); and Endangered Species Act of December 28, 1973 (16 U.S.C. 1531-1543) (USFWS 1996).

The scope of this Draft EA is limited to the proposed acquisition, in fee-title and in less-than-fee-title purchase, of lands in Tennessee for the establishment of the Paint Rock River NWR. This Draft EA is not intended to cover the development and/or implementation of detailed, specific programs for the administration and management of those lands. A conceptual management plan and interim compatibility determinations (Appendices A & B) are included to provide general outlines on how the

proposed lands would be managed. If the refuge is established and the needed lands or interests in lands are acquired, the Service would develop a comprehensive conservation plan, a 15-year management plan, and needed step-down management plans, such as a hunt plan. These plans would be developed and reviewed in accordance with Departmental requirements of the National Environmental Policy Act.

The vision for the refuge, if approved, is as follows:

> The Paint Rock River National Wildlife Refuge will protect important wildlife and habitats of the Paint Rock River watershed, a unique ecosystem that supports a high diversity of aquatic, terrestrial, and karst habitats. Together with partners, the Fish and Wildlife Service will help protect and improve the water quality, water quantity, and hydrology of the Paint Rock River, benefitting numerous imperiled freshwater species and human communities utilizing the area's water resources. The refuge will conserve, protect, and manage one of the largest contiguous tracts of hardwoods remaining in eastern North America for current and future generations. As part of a system of public and private conservation lands, the refuge will expand outdoor recreational opportunities, helping maintain a way of life and supporting local economies.

PURPOSE AND NEED

The land, water, and wildlife resources of the Paint Rock River watershed are at risk; therefore, we propose a conservation effort focused on expanding and connecting a matrix of natural lands. This Draft EA presents a proposal for protection of additional wildlife habitat in Franklin County, Tennessee, through the establishment of the Paint Rock River NWR.

The CPA boundary is shown in Figure 1 and encompasses 40,505 acres. Within the CPA delineation, the Service may consider negotiations with willing owners for acquisition of an interest in land. The Service would work with interested landowners to establish a legal interest, such as a management agreement, easement, lease, donation, or purchase. Lands are not subject to any refuge regulations or jurisdiction unless and until an interest is acquired. Land interests are acquired from willing landowners only. Any landowner that is within the CPA boundary, even though the surrounding parcels may have been purchased by the Service, retains all the rights, privileges, and responsibilities of private land ownership. This includes, but is not limited to, the right to access, hunting, vehicle use, control of trespass; the right to sell the property to any other party; and the responsibility to pay local real estate or property taxes. It is the Service's policy to work with willing sellers to acquire fee-title or less-than-fee-title interest in property.

Within the CPA boundary, the Service would be able to enter into negotiations for the protection of environmentally sensitive lands. The purpose of the proposed refuge would be to contribute to the mission and goals of the National Wildlife Refuge System through the following actions:

- Protecting and restoring large tracts of hardwood forests to benefit forest interior birds and other species.
- Protecting the headwaters, groundwater recharge, and watershed of the Paint Rock River.
- Conducting landscape-scale strategic habitat conservation necessary to conserve the important resources found within the area through partnerships and responsible stewardship, with the support of agricultural interests of this working rural landscape.

- Protecting and enhancing habitats for federal trust species and species of management concern, with special emphasis on species listed under the Endangered Species Act, along with the protection of state listed species; biological diversity; and canebrake, bottomland hardwood, upland forest, and cave/karst habitats.
- Providing opportunities for hunting, fishing, wildlife observation and photography, and environmental education and interpretation, while promoting activities that complement the purposes of the refuge and other protected lands in the region.
- Protecting historical properties; facilitating archaeological and historical investigations regarding human occupation, land use, and paleoecology; and interpreting the region's history and culture.

There is a need for increased resource protection in this part of Tennessee, as various growing threats are likely to continue to put natural resources at risk. These threats include, but are not limited to, the following:

COMMERCIAL TIMBER OPERATIONS

Tennessee forests cover approximately 13.78 million acres or 52 percent of the state (Tennessee Department of Agriculture 2004). Although 74 percent of the state's forests are oak-hickory hardwoods and increasing, in some areas of the state hardwoods are being lost. McGrath et al. (2004) analyzed changes in forest cover in the southern Tennessee area between 1981 and 2000. They found that 14 percent of native forest cover had been lost since 1981, 74 percent of which resulted from hardwood-to-pine conversion. It was also found that the rate of conversion to pine doubled from 1997 to 2000.

More than 90 percent of the project area is forested, with approximately 40 percent of that total actively or passively managed for timber production. Widespread harvesting during settlement, followed by selective harvest, combined with fire suppression, has reduced the extent of old-growth as well as early successional habitat. Structure of the expanse of middle-aged forest may not be optimal for some mid-story and under-story breeding birds.

HABITAT LOSS AND FRAGMENTATION ASSOCIATED WITH URBAN DEVELOPMENT

The Southern Cumberlands Conservation Area remains predominantly rural in nature. As such, the area has escaped much of the habitat alteration/degradation associated with urban sprawl. However, with an expanding population of approximately 8 million within 150 miles of the Paint Rock River watershed and the increasing attraction of residing in a scenic rural area, residential development/ urban sprawl can be expected to impact the watershed in the near future. In fact, there have been several recent instances where large, single landowner tracts have been sub-divided and offered for sale.

Development within the watershed can be expected to lead to water quality degradation, sedimentation, and hydrologic modification of stream flows. These conditions would place stress on populations of aquatic species and negatively impact the Service's ability to recover the many trust resources found within the watershed. This expected population growth within the watershed would have direct negative effects on its natural resources, impacting the system's hydrologic regime, water quality, and water quantity. Modifications within the watershed that would be expected to support a growing population include increases to the region's water storage capacity, direct water diversions from the Paint Rock River, increases in treated wastewater, and increased storm runoff, leading to the degradation of its aquatic habitats.

WATER QUALITY

The majority of the water quality problems can be attributed to agriculture, unpaved roads, inadequate or malfunctioning septic tank systems, and channelization of streams. Continued threats to the watershed include siltation and erosion due primarily to poor farming practices along with commercial and residential development. Settling of a heavy layer of silt can suffocate entire mussel beds and has contributed to extirpations of mussels in several rivers (Anderson et al. 1991). Specific practices that increase siltation and erosion include clearing of riparian vegetation, cattle access/grazing, timber clear-cutting, head cutting, gravel mining, in stream all-terrain vehicle traffic, and runoff from poor farming and construction actions (Vaughn and Taylor 1999, Barbour 2003).

Nonpoint source agricultural runoff and chemical spills are also a threat. Recent studies have begun to investigate the effects of agricultural chemicals and their impact to juvenile and adult mussels (Milam et al. 2005, Cope et al. 2008). There appear to be direct and inadvertent impacts from some of the widely used pesticides, herbicides, and fertilizers, but many are still not fully understood (Augspurger et al. 2007, Bringolf et al. 2007, Cope et al. 2008).

WATER QUANTITY

Many impacts associated with water quantity directly affect water quality. While given separate subheadings within this document, both water quantity and water quality need to be considered together when analyzing impacts to aquatic systems. Parameters such as dissolved oxygen, water temperature and even pH and conductivity will be directly influenced by instream flow, while many other water quality impairments may be exacerbated by low instream flows. During periods of low flow, any addition of a contaminant will take longer to dilute, increasing its negative effects. Aquatic organisms are particularly vulnerable to low water conditions. Low stream flow has been known to cause freshwater mussel adult and larval mortality due to emersion and low oxygen conditions (Holland 1991, Byrne and McMahon 1994, Bartsch et al. 2000, Johnson et al. 2001).

The historic instream flow regime of the Paint Rock River will likely never be precisely known. Based upon data from other streams and rivers, downstream of urban development, it is likely that hardening of extensive areas of the upper watershed will lead to increased run-off and less absorption. This, in turn, will increase the rate at which the river peaks, the rate at which the river falls after reaching peak discharge and the magnitude of the discharge of water during the peak flow periods.

Climate change is expected to alter hydrological regimes which will impact both water quality and quantity. Any change in hydrological regimes that moves the river system further from a “natural” instream flow will likely have negative impacts on federally listed aquatic species’ distributions. Any additional stressor, such as drought or increases in water temperature, could have a severe and negative impact on the aquatic and terrestrial species within and along the Paint Rock River and throughout the aquatic and terrestrial systems of the southeast.

AQUATIC MIGRATION BARRIERS

Construction of dams in the Tennessee River basin resulted in the loss or degradation of suitable fish and mollusk habitat. While there are no dams in the Paint Rock River basin, impounding of the main stem of the Tennessee River did affect the lower reaches of the Paint Rock River. It is well-documented that the loss of habitat and fragmentation created by impoundments is the leading cause for the decline and extinction of North American mollusk species (Vaughn and Taylor 1999).

Efforts to identify aquatic migration barriers in this watershed have been conducted. However, to date, there have been no watershed-wide, comprehensive survey efforts to determine the total number of migration barriers within the Paint Rock River and its tributary streams. So, an effort to address migration barriers was set into motion in the fall of 2009, when Service biologists representing the Partners for Fish and Wildlife Program and Fisheries Program, in partnership with several state and federal agencies, The Nature Conservancy, and other stakeholders in the Paint Rock River watershed met to discuss funding opportunities through the Southeastern Aquatic Resource Partnership Program (SARP). A regional collaboration of natural resource and science agencies, conservation organizations, and private interests, SARP was developed to strengthen the management and conservation of aquatic resources in the southeastern United States; and whose mission is to protect, conserve, and restore aquatic resources, including habitats throughout the southeast for the continuing benefit, use, and enjoyment of the American people. The result of the 2009 stakeholder meeting was unanimous support to request funding from SARP for a watershed-wide aquatic migration barrier survey.

Currently, The Nature Conservancy estimates no less than six aquatic migration barriers within this watershed. These six barriers are similar in nature, in that they are in the form of concrete-hardened low-water, low-head dams. These structures usually have multiple culverts laid side-by-side to pass low, base flows while during high water events stream flows pass over the top of the structure, producing a spillway effect. These fords provide access for vehicular traffic, and in some cases, are public (county-maintained) roadways, providing local residents with ingress/egress to locations or destinations on either side of the river or creek. Privately owned fords can be found throughout the watershed, many of which however, are free of any concrete structure and are effectively only utilized during low, base flow conditions by landowners and likely do not create a barrier to aquatic species migration.

Another major influence occurred with the channelization and removal of snags and riverbank timber in the upper Paint Rock River and the lower reaches of Larkin Fork, Estill Fork, and Hurricane Creek, by the U.S. Army Corps of Engineers during the 1960s. This direct headwater habitat manipulation was probably a large contributor to freshwater mussel loss in the watershed.

INVASIVE SPECIES

The spread of nonnative or exotic species represents one of the most serious threats to biodiversity nationwide, undermining the ecological integrity of native habitats and pushing rare species to the edge of extinction. Often, introduced species lack predators for control or simply out-compete native species. Once established, many exotic species are virtually impossible to eradicate. They have been implicated in the decline of nearly half the imperiled species in the United States (Defenders of Wildlife 2006).

While there are numerous exotic or nonnative invasive species within the proposed project area, serious environmental harm is usually associated with a select few. The following species represent some of the more ecologically harmful exotic plants and animals that are found within the proposed project area. When possible or feasible, eradication or control would concentrate on these species. Additional species, particularly invasive plants, are found within the proposed project area and may also require control efforts in the future to meet restoration goals.

CLIMATE CHANGE

The concern over climate change has increased significantly over the past 10 years, resulting in an international effort to provide decision-makers with information on its effects on global systems

(International Panel on Climate Change 2007). The effects of climate change on the southeastern United States and the Southern Cumberlands Conservation Area, in particular, are still unclear at present, although climate change is likely to magnify the influences of other identified threats and challenges (Scott et al. 2008). Current predictive models are focused more on state-level analyses. In the long-term, for Tennessee and Alabama, it is expected that precipitation may increase slightly, but drought and other weather events will be more frequent and severe. Similarly, average temperatures are expected to continue rising by 2 to 3 degrees Fahrenheit over the next century (U.S. Environmental Protection Agency 1999).

Continued changes in temperature and precipitation will likely affect forest composition and lead to changes in habitat. Overall, forests are expected to become drier with xeric tree species becoming more prevalent. As well, the ranges of many trees are expected to shift northward, with some trees disappearing from the region altogether (Gonzalez et al. 2005). Mesic “cove” forests may decline dramatically as a result, along with species dependent on this habitat type. Increases in exotic plant species taking advantage of the turnover in forests are another possible consequence of climate change. Oak-hickory forests, the dominant plant community in the area, are predicted to gradually convert to oak-pine (TWRA 2009).

The ranges of many bird species and their habitats are associated with various climatic variables (i.e., temperature). Many bird species respond to changing climatic conditions and because their ranges are limited by vegetation that can also be expected to change, they would probably not be able to shift their ranges with the changing climate until the vegetation shifts. Consequently, natural communities of birds may change dramatically in the future as changes in climate and vegetation favor some species and harm others (Raphael 2008, North American Bird Conservation Initiative 2010). TWRA (2009) predicts that several groups of birds will be affected by climate change to varying degrees, based on their habitat needs. Birds that are expected to decline state-wide include long-distance, nongame migratory birds (i.e., neotropical songbirds) and resident and migratory waterfowl (TWRA 2009).

From a hydrologic standpoint, stream flows are expected to be more sporadic with greater fluctuation between high and low flows on a seasonal basis. The effects of such a scenario can be presumed to be stressful to many species and habitats, particularly those adapted to more stable environments. Mussels and smaller fish species with narrow habitat preferences may suffer disproportionately. Excessive nutrient loading and sedimentation are also possible consequences of greater stream-flow fluctuation. Other declines in water quality and thermal changes to streams could possibly affect habitat conditions and the reproductive capacity of aquatic species.

The potential effects of climate change on subterranean systems are unknown. However, it is presumed that changes to surface water and forest composition could affect water flow, humidity levels, and inputs of detritus into caves. As well, preliminary discussions among cave experts have hinted that changes to the microclimate of caves could negatively impact bat species dependent on narrow temperature and humidity ranges. Effects on cave-obligate species are unclear but may possibly be dramatic as changes occur within the complex food web within cave systems. In Tennessee, Indiana bats and cave crickets, species with narrow thermal tolerances, are likely to decline. In addition, increased drought cycles would affect a host of aquatic cave species (TWRA 2009).

MINING OPERATIONS

The history of mining in the project area is not well known. Coal mining operations have occurred in Franklin County, Tennessee. Prior to 1975, there were two coal mining operations in the area, in the Pottsville Formation. This formation, with at least four coal seams varying in thickness up to 48 inches, extends north of the Tennessee River into the Cumberland Plateau. From time-to-time, there

have been small underground workings, but to date, there have been no strong efforts to study these seams. There has been at least one oil and gas exploration effort in the watershed since 2000. Limited limestone rock mining is ongoing. Because coal and limestone rock resources are present in the watershed, these could be exploited in the future under favorable economic conditions, ultimately resulting in landscape changes.

BACKGROUND

The proposed CPA boundary is located in Franklin County, Tennessee (Figure 1). This area supports one of the largest expanses of hardwood forests in the eastern United States. Still largely rural, this area of ridges and valleys sustains one of the most important assemblages of imperiled freshwater mussels and stream fish in the southeast, and a large portion of the unprotected natural habitat remaining in the southern United States. This proposal would protect and restore hardwood forest habitat; protect, improve, and restore water quality; and expand and connect a matrix of existing conservation lands.

Within this landscape, the Service proposes to focus conservation efforts on protecting important habitats such as canebrake, bottomland hardwoods, upland hardwoods, and karst systems. Conservation of these habitats would benefit species such as Alabama Lampmussel, fine-rayed pigtoe, pale lilliput, pink mucket, rough pigtoe, shiny pigtoe, slabside pearlymussel, Anthony's riversnail, Hine's emerald dragonfly, Palezone shiner, snail darter, gray bat, Indiana bat, American Hart's-tongue fern, Morefield's Leather-flower, and Price's Potato-bean. Currently, a large percentage of the land cover is composed of intact hardwood forests, and this proposal would help minimize habitat fragmentation. Additionally, several state and private conservation lands already exist in the area, and this project would help to enlarge the protected landscape and assist in maintaining a more functional ecosystem.

PROPOSED ACTION

The Service proposes to acquire, protect, and manage these lands and waters through fee-title purchases, leases, donations, conservation easements, mitigation and conservation banks, and/or cooperative agreements from willing sellers. All lands and waters acquired would be managed by the Service as the Paint Rock River NWR. The overall objectives of the proposed refuge would be to protect and restore large tracts of hardwood forest, protect and improve water quality of the Paint Rock River, increase connectivity of habitat between existing natural areas, and provide opportunities for wildlife-dependent outdoor interpretation, education, and recreation.

It is anticipated that funding for this proposal would be provided primarily through the Land and Water Conservation Fund. The authorities for the use of these funds for land acquisition include the National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997; Endangered Species Act of 1973; Emergency Wetlands Resources Act of 1986; Migratory Bird Conservation Act of 1929; Fish and Wildlife Act of 1956; and Refuge Recreation Act (16 U.S.C. 460k-460k-4), as amended.

COORDINATION AND CONSULTATION

During the planning process, the Service coordinated and consulted with a mix of governmental entities with interest in the region. Several federal and state agencies serve as key partners in this landscape, including the TWRA, TVA, NRCS, and non-governmental conservation organizations.

These partners were keys in the development of the proposal. Native American tribes are also important partners in the watershed. The Service works with the tribes to ensure timely and effective cooperation and collaboration. The following federally recognized tribes have an interest in this landscape:

- Eastern Band of Cherokee Indians
- Muscogee (Creek) Nation
- Poarch Band of Creek Indians
- Seminole Tribe of Florida

PUBLIC PARTICIPATION

PUBLIC SCOPING

Public scoping can help the Service identify issues and concerns, potential alternatives, and scientific information regarding the need to increase conservation efforts aimed at protecting aquatic and riparian habitats, as well as large tracts of deciduous forest.

As part of its outreach efforts, the Service used a variety of tools, including direct mailings to landowners, elected officials, and natural resource non-governmental organizations; digital media; press releases; an open house; and a public meeting. Furthermore, at least 10 media outlets are known to have reported on the Service's intentions. A summary of the public comments was made available on the project website in early March 2013, and hard-copies were sent to individuals on the mailing lists that did not provide e-mail addresses. Additional details regarding the public scoping effort can be found in Appendix E.
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More than 200 public scoping comments were submitted through various means. At least 75 comments were submitted in writing at the open houses listed above. The remaining comments were submitted via e-mail, U.S. postal mail, and via telephone.

Public scoping comments were categorized as follows:

- Habitat and Wildlife
- Biodiversity
- Public Use
- Access
- Litter/Damage
- Economics and Taxes
- Partnerships
- Environmental Education
- Water Quality
- Project Boundary/Other Conservation Lands
- History and Traditions
- Eminent Domain (Condemnation)

SPECIAL CONSIDERATIONS

The Service initially reviewed the designation of Wilderness in July 2011, finding that no areas met the criteria or intent of the Wilderness Act. The proposed CPA is part of a landscape that is largely rural, with agriculture, forestry, and outdoor recreation/tourism. Most tracts in the proposed acquisition boundary are impacted by human use throughout the region. The extensive network of roadways, altered landscapes, increasing population, and development would make a wilderness experience improbable.

The proposed refuge acquisition focus area boundary has been reviewed by the Service for inclusion in the National Wilderness Preservation System according to criteria set forth in the Wilderness Act of 1964. Based on the Service's assessment, the proposed refuge was found to be unsuitable for wilderness designation since:

- No areas meet the Wilderness minimum size requirement of 5,000 contiguous roadless acres (2,023 ha);
- No areas contain any units of sufficient size for preservation as Wilderness;
- Areas under consideration have been altered by historic and ongoing human activities; and/or
- No areas include outstanding opportunities for solitude or for primitive recreation.

Therefore, no potential units of the proposed Paint Rock River NWR are suitable for designation as Wilderness at this time.

II. Affected Environment

This section describes the environment that would be affected by the implementation of the alternatives. It is organized under the following four major topics: physical resources (i.e., topography, soils, climate, air, and water quality); biological resources (i.e., habitats, fish and wildlife species); socioeconomic conditions; and cultural resources. The affected area, which could potentially be impacted by the proposed action, is designated as the "area of influence" (AOI), which includes the Tennessee portion of the Paint Rock River watershed. For this Draft EA, the AOI was chosen to be the same area as the CPA and is located in Franklin County, Tennessee.

PHYSICAL ENVIRONMENT

This section describes the following physical resources in the 40,505-acre AOI: topography, geology, soils, climate, air quality, water quality, hydrology, and water quantity.

TOPOGRAPHY AND GEOLOGY

The AOI lies in the Cumberland Plateau, which is the westernmost of three divisions of the Appalachian Mountains, extending southwestward for 450 miles from southern West Virginia to northern Alabama. The plateau is 40 to 50 miles wide and lies between the Appalachian Ridge and Valley region to the east and the rolling plains to the west. It merges with the Allegheny Plateau on the north and with the Gulf coastal plain on the south. The region is dissected mainly by headstreams of the Cumberland and Kentucky Rivers and by tributaries of the Tennessee River, the valley of which in northern Alabama holds TVA reservoirs.

The roughest and highest portion of the plateau is a narrow linear ridge about 140 miles long that forms its eastern margin in eastern Kentucky and northeastern Tennessee; the name Cumberland Mountains is generally applied to this area. These mountains vary in elevation from 2,000 feet to 4,145 feet at Big Black Mountain, the highest point in Kentucky. The plateau is underlain by large deposits of coal, limestone, and sandstone, which are mined in some areas (Encyclopedia Britannica 2011).

SOILS

Soils in the AOI are dominated by upland types that are generally well-drained or not hydric. These include soil series such as: Baxter, Bodine, Bruno, Capshaw, Cumberland, Dellrose, Dickson, Hartsells, and Jefferson. Partially hydric soils include Lawrence, Taft, and Tyler. A small percentage of soils are hydric, such as Dunning, Emory, Guthrie, and Robertsville series.

CLIMATE AND CLIMATE CHANGE

The AOI has a land climate, with weather influenced primarily by air masses moving from the west and north, especially during the fall and spring. Summer weather may be influenced by low pressure systems coming off the Gulf of Mexico.

Area Climatology

Huntsville, Alabama, data (1981-2010) was used to represent general climate conditions of the AOI (NOAA 2011). The AOI has a humid subtropical climate and experiences hot, humid summers and generally mild winters. January is typically the coldest month, with lows averaging

about 31°F. A record low of -11°F was recorded in Huntsville on January 1985. July is generally the warmest month, with an average high of almost 90°F. The highest temperature measured (111°F) in Huntsville was in July 1930.

Precipitation averages 57.5 inches annually. Overall, rainfall ranges from an average of 3.3 inches (August) to 6.7 inches (March), with most months generally averaging about 5 inches. Extreme rainfall years include 1989, which totaled over 73 inches. The lowest reported annual rainfall was in 2007, which totaled only 28.7 inches. Precipitation is generally in the form of rain, although some snowfall is typically recorded during the period between December and March, but generally averages less than three inches annually. Some rare snowfall events have been reported, with over two feet accumulating in December 1963. More recently, over eight inches fell in January 2011.

Severe weather usually occurs during the spring and fall, with an increased chance for tornadoes. Notable years during which several tornadoes occurred include 1974, 1989, and 1995. During April 2011, Tennessee experienced a large outbreak of tornadoes. Occasionally, remnant tropical systems reach the area, producing high winds and heavy rain. Although flashfloods in localized valleys can occur in the AOI, widespread flooding is rare in this part of Tennessee. The drought of 2007 was one of the most extreme on record, with approximately half of the normal total amount of rainfall being reported that year.

Climate Change

Secretarial Order 3226 (Amendment 1) requires that climate change impacts be considered and analyzed when planning or making decisions within the Department of the Interior (U.S. Secretary of the Interior 2009). This order serves as an opportunity for the Service to incorporate climate change impacts into its conservation planning activities. Additionally, this proposal would contribute to the climate adaptation goals and objectives laid out in the Service's Strategic Plan for Responding to Accelerated Climate Change, "Rising to the Urgent Challenge" (USFWS 2009a).

Greenhouse gases absorb radiative energy from the sun, a process which has maintained temperatures on Earth within the tolerance limits for life to exist. However, human land use changes, energy use, and other activities contribute greenhouse gases to the atmosphere, with the potential to alter the global climate. In fact, "…warming of the earth's climate is unequivocal, as is now evident from observations of increases in average global air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level," according to the Intergovernmental Panel on Climate Change (IPCC) Report (IPCC 2007). Climate change will lead to significant impacts across the United States (Wigley 2004). These may include increasing temperatures, altered rainfall patterns, and sea-level rise. The effect of climate change on wildlife and habitats is expected to be variable and species-specific, with a predicted general trend of ranges shifting northward and to higher elevations (Shugart et al. 2003). Nonnative species will likely increase (Walther et al. 2002). Figure 3 shows the projected changes in temperature for the AOI over the next 40 years (The Nature Conservancy, University of Washington, and University of Southern Mississippi 2012).

The AOI lies in a region that has seen a decline in precipitation over the years. Although the United States' annual average precipitation has increased by about 7 percent over the past 30 years, there has been pronounced drying over the southeast and the southwest. The trends in precipitation show that rainfall in parts of the southeast has substantially declined from 1901 to 2006 (Backlund et al. 2008). At the same time, the U.S. Global Change Research Program reports that extreme precipitation events are on the rise (Kunkel et al. 2008). Data collected between 1958 and 2008 show that even in drier regions, heavy precipitation events have increased, with the amount of precipitation falling in the heaviest 1 percent of rain events increasing nearly 20 percent during the

past 30 years. Meanwhile, there has been little change or a decrease in the frequency of light and moderate precipitation during that timeframe (Kunkel et al. 2008). The result is that some area will be more prone to flooding rains, followed by longer periods of drought. Warmer temperatures will only serve to compound these trends, as warmer air can hold more moisture, increasing the likelihood of heavy downpours. In between these extreme rainfall events, drought-like conditions will likely increase in frequency, as increasing temperatures will accelerate soil-moisture evaporation rates, reducing the amount of water available to plants. It is expected that water needed to recharge groundwater and surface waters will also diminish. Figure 4 shows the projected changes in precipitation for the AOI over the next 40 years (The Nature Conservancy, University of Washington, and University of Southern Mississippi 2012).

AIR QUALITY

The Clean Air Act of 1970 (as amended in 1990 and 1997), required the U.S. Environmental Protection Agency (EPA) to implement air quality standards to protect public health and welfare. National Ambient Air Quality Standards (NAAQS) were established based on protecting health (primary standards) and preventing environmental and property damage (secondary standards) (EPA 2011x). Criteria air pollutants in Tennessee include carbon monoxide (CO), lead, nitrogen dioxide (NO_2), ozone (O_3), particulate pollution (PM: $PM_{2.5}$ and PM_{10} ug/m3), and sulfur dioxide (SO_2). Primary sources of air pollutants are vehicle emissions, power plants, and industrial activities. These pollutants are monitored by a network of monitoring stations throughout each state and analyzed in order to better understand general air quality trends and to locate exceedances. The nearest air quality monitoring stations to the AOI are located in Huntsville, Alabama. Overall, air quality in Huntsville is good, and the city is designated as an attainment area for all pollutants with EPA-established NAAQS. One exception is ground-level ozone, for which Madison County has non-attainment status (ADEM 2009, City of Huntsville 2009). Nitrogen oxides (NO and NO_2 , collectively referred to as NOx), and volatile organic compounds (VOCs) are the primary sources of ozone (EPA 2011x). Motor vehicle sources were the largest emitters of NOx and VOCs in Madison County (ADEM 2009). Generally, air quality in the AOI likely exceeds that of Huntsville, given the lower number of emitters (traffic, industry). However, even in this sparsely populated region, certain pollutants may occasionally approach or reach non-attainment levels due to stagnant weather conditions, wildfires, etc.

WATER QUALITY

The Clean Water Act (CWA) of 1972 (as amended) authorizes the EPA, in partnership with the states, to regulate discharges of pollutants into the waters of the United States and set quality standards for surface waters. Since it implementation almost 40 years ago, CWA has significantly improved water quality in the United States, primarily as a result of controlling municipal and industrial point-source pollution (Andreen 2004). Point source pollution includes specific discharges from a factory or sewage treatment plant. Non-point source pollution (NPSP) comes from many sources and typically makes its way into waterbodies via surface runoff. It includes a range of materials, including fertilizers, oil, bacteria, road salt, sediment, and pesticides (EPA 2011x). NPSP is currently the largest cause of water quality degradation in the United States. NPSP is also present in the Paint Rock River watershed. Godwin (1995) documented 100 sources of NPSP at 85 sites throughout the watershed. There were 12 NPSP types recorded throughout the watershed, with the most prevalent being the lack of riparian vegetation. Other common NPSP types were livestock access to streams, vehicle fording sites, and sedimentation from a variety of sources. The most widespread apparent threat to continued water quality of the watershed was identified as siltation, with the most common cause being the erosion of stream banks lacking riparian vegetation (Godwin 1995). Ongoing voluntary

Figure 3. Changes in average annual temperatures in the AOI during the next 40 years

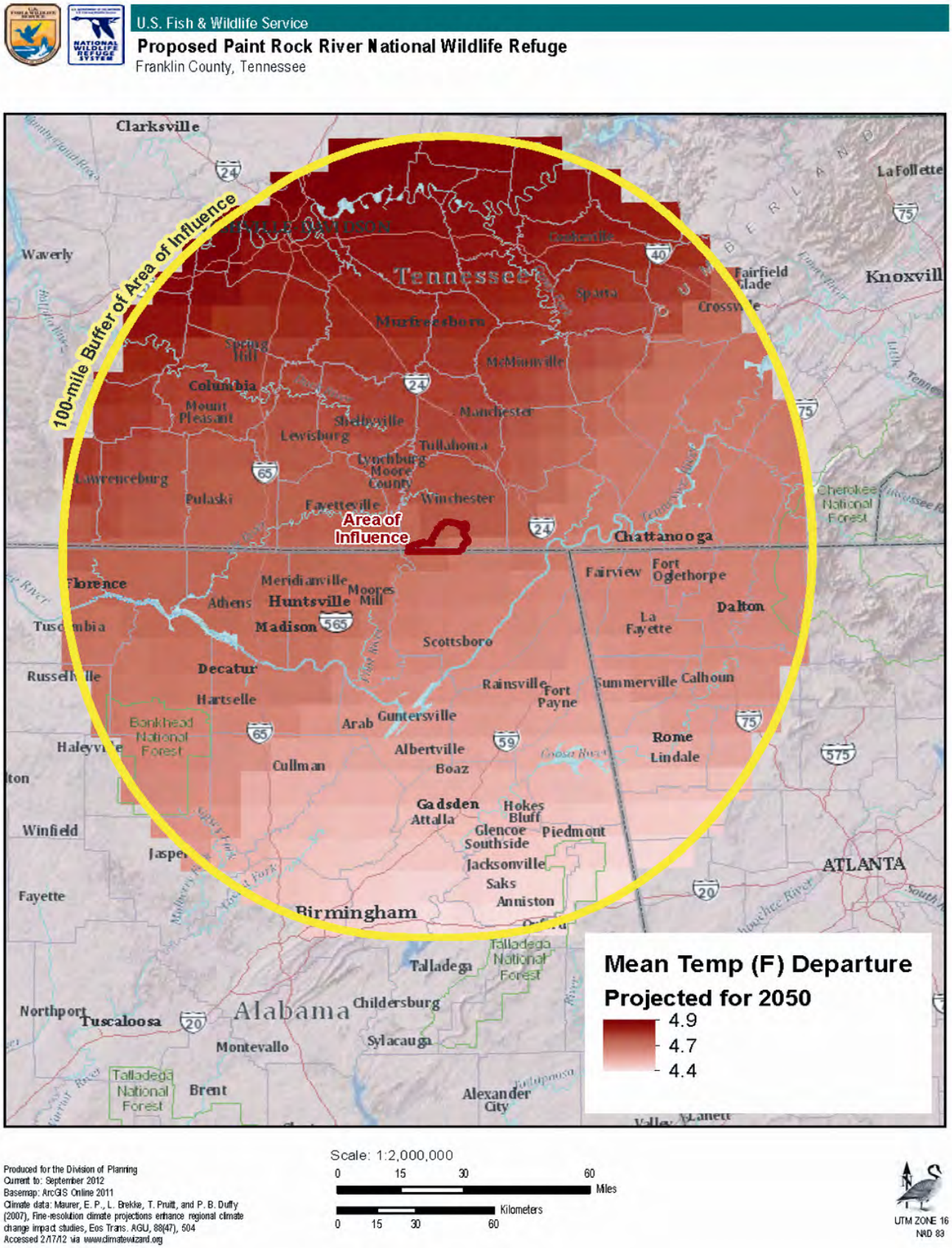
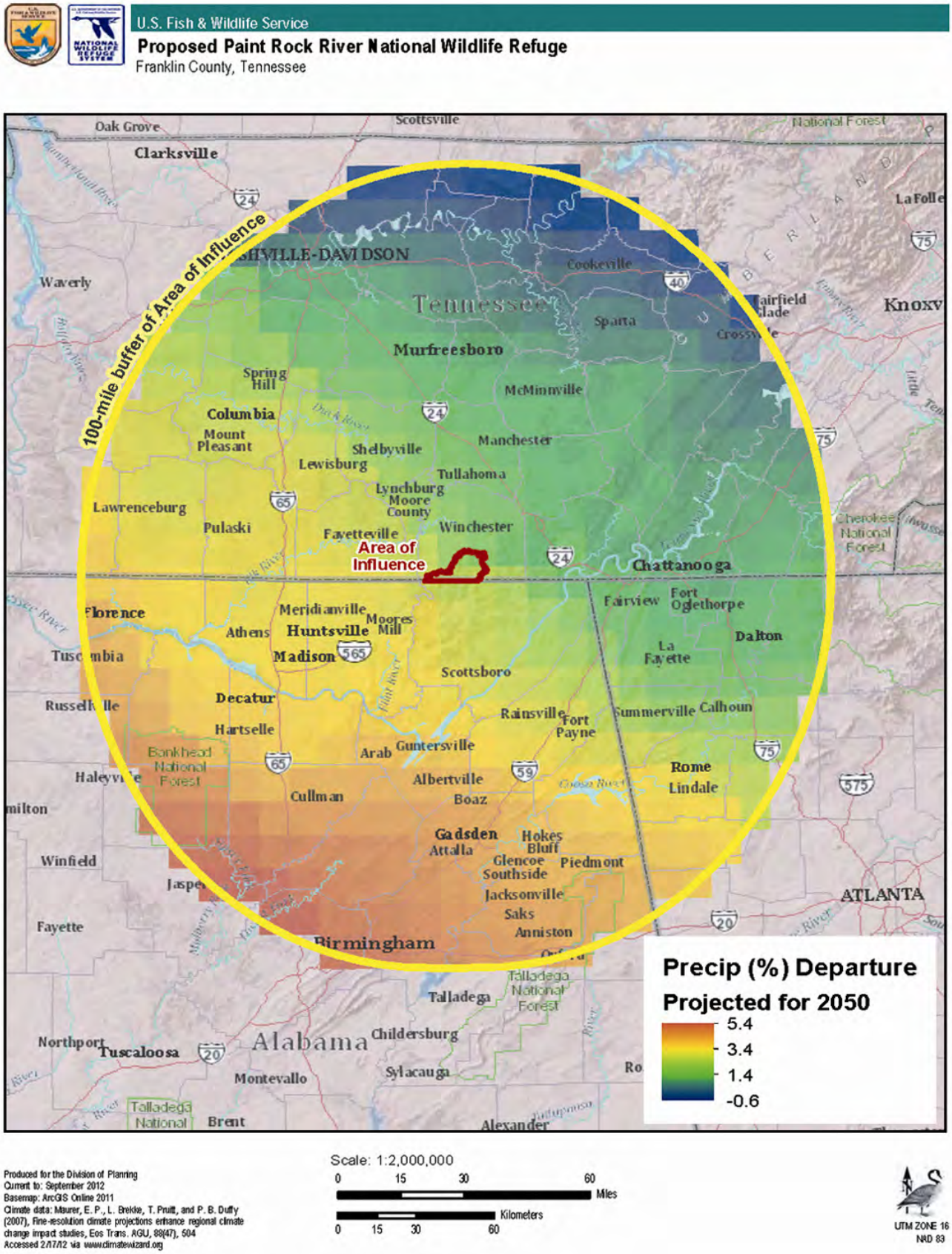


Figure 4. Changes in average annual precipitation in the AOI during the next 40 years



landowner incentive programs in Paint Rock River watershed aimed at protecting and improving water quality include the Wetlands Reserve Program (WRP), Landowner Incentive Program (LIP), and others that have helped stabilize stream banks, fenced cattle out of streams, and reforested riparian areas (R. Hurt, Wheeler NWR, pers. comm., November 2011).

The most comprehensive water quality, stream habitat, and macroinvertebrate data collected to date in the Paint Rock River watershed show some of the streams to be impacted by nutrients, sediment, fecal coliforms, and pesticides (ADEM 2000). Between July 1997 and January 2000, ADEM collected physical, chemical, and biological water quality data across the watershed. In addition, habitat and macroinvertebrate assessments were conducted. Data was collected in the following waterbodies: Clear Creek, Cole Springs Branch, Dry Creek, Estill Fork, Guess Creek, Hurricane Creek, Larkin Fork, Lick Fork, Little Paint Creek, Little Paint Rock, Creek, and Paint Rock River. Table 4 provides summaries of 15 physical, chemical, and biological water quality parameters monitored during the 2.5-year program (ADEM 2000). Elevated concentrations of nutrients were found throughout the lower Paint Rock River subwatersheds and included ammonia (>0.05mg/L; Cole Springs Creek and Lick Fork), nitrite/ nitrate (>1.5 mg/L, Cole Springs), and total phosphorus (>0.1 mg/L; Cole Springs Creek, Little Paint Creek, Little Paint Rock Creek, and Paint Rock River). These lower subwatersheds also have the highest percentage of agricultural land uses. Nutrients were also shown to be periodically elevated in the upper and mid-Paint Rock River subwatersheds (ammonia: Estill Fork, Guess Creek, Little Paint Rock, and Paint Rock; total phosphorus: Clear Creek, Dry Creek, Estill Fork, Guess Creek, Larkin Fork, and Lick Fork). Although the percentage of forest cover is higher, these subwatersheds may still be susceptible to water quality impairment from non-point source runoff. Biological oxygen demand was elevated at Little Paint Rock Creek, Cole Springs Creek, and Paint Rock River (ADEM 2000).

The presence of fecal coliform in waterbodies generally indicates that the water has been contaminated with the fecal material of human or animal origin. Fecal coliform bacteria can enter rivers through direct discharge of waste from mammals and birds, from agricultural and storm runoff, and from human sewage. Fecal coliform bacteria can cause disease in human and some animals through direct contact or via ingestion of water or shellfish (EPA 2011x). Average fecal coliform bacteria counts exceeded 1000 colonies/100mL over the 2.5-year study at Little Paint Rock. The report indicated that additional monitoring could be warranted to determine if bacterial counts exceed the limits established for the Fish and Wildlife Use Classification (monthly geometric mean of >1000 colonies/ 100mL water). Samples with >1,000 colonies of fecal coliform bacteria/ 100mL water were collected at Clear Creek, Cole Springs Creek, Dry Creek, Guess Creek, Larkin Fork, and Paint Rock River (ADEM 2000).

Several pesticides and other petroleum-based chemicals were found throughout the watershed. Atrazine and metolachlor, both used as herbicides, were detected at Dry Creek, Cole Springs Creek, and Lick Fork. Atrazine was detected at Paint Rock River. Di (2-ethylhexyl) phthalate (DEHP), a plasticizer used in the manufacture of poly vinyl chloride (PVC) materials, was detected at all stations. Di (2-ethylhexyl) adipate (DEHA), used as a hydraulic fluid and some PVC-based materials, was detected at Estill Fork, Clear Creek, and Little Paint Rock Creek (ADEM 2000).

Biological monitoring can also be used to determine environmental conditions, including water quality. One such method is to survey populations of aquatic insect larvae, crayfish, clams, snails, and worms that can be seen without a microscope and collectively known as “marcoinvertebrates.” Many macroinvertebrates are sensitive to water pollution, which means they can be used as indicator species of stream health (EPA 2011x). Macroinvertebrate assessments conducted as part of the 1997-2000 Paint Rock River water quality survey generally indicated Hurricane Creek, Dry Creek, Larkin Fork, and

Table 4. Select Paint Rock River tributaries water quality data (averages) collected between July 1997 and January 2000

Water body	DO	pH	Cond	Turb	Flow	Coli	BOD	TDS	TSS	NH_3	NO_3 & NO_2	TKN	PO_4	Alk	Hard
Estill Fork	9.0	7.8	298	3	25	107	1.1	188	1.5	0.017	0.120	0.209	0.017	139	170
Hurricane Creek	8.7	7.6	245	25	36	143	1.1	149	3.8	0.011	0.123	0.207	0.017	109	137
Larkin Fork	8.5	7.6	310	4	39	291	1.1	190	2.7	0.013	0.311	0.231	0.028	144	175

Key: Alk=alkalinity (mg/L), BOD-5= 5-day biochemical oxygen demand (mg/L), Coli=fecal coliform colonies/100mL, Cond=conductance, DO=dissolved oxygen (mg/L), Flow=stream flow (cubic feet per second/cfs), Hard = hardness (mg/L), NH3=ammonia (mg/L), NO2+ NO3=nitrite & nitrate (mg/L), pH=acidity level, TDS=total dissolved solids (mg/L), TKN=total Kjedahl nitrogen (mg/L), TP=total phosphate (mg/L), TSS=total suspended solids (mg/L), Turb=turbidity (Nephelometric Turbidity Units/NTU)
Source: ADEM 2000

Lick Fork to be in excellent condition. Estill Fork, Guess Creek, and Clear Creek were assessed as good to excellent. The macroinvertebrate communities of Little Paint and Little Paint Rock Creeks were in good condition. Cole Springs Creek was in fair to poor condition (ADEM 2000).

HYDROLOGY AND WATER QUANTITY

Hydrology

The Paint Rock River watershed is located within the Cumberland Plateau section of the Appalachian Highlands physiographic region and encompasses approximately 478 mi^2 in northern Alabama and southern Tennessee. The watershed originates in Franklin County, Tennessee, and drains portions of several counties in Alabama before entering the Tennessee River at Wheeler Reservoir. The three major tributaries to the main stem river are Estill Fork, Hurricane Creek, and Larkin Fork, which all originate in Tennessee.

The Paint Rock River valley seldom exceeds one mile in width and meanders through a smooth alluvial plain throughout its length, with the valley bordered by high forested ridges of the Cumberland Plateau. The highest elevations in the watershed occur on the plateaus along the tributaries in the upper watershed, and differences in elevation between the streams and the ridge-tops can reach 1,000 feet. The river drops approximately 200 feet from the headwaters to its confluence with the Tennessee River. The river and its tributaries are generally shallow and relatively narrow, generally about 30 feet wide, with depths ranging from a few inches to over three feet deep. Maximum widths are up to 90 feet. Upper watershed tributaries are typically high gradient while the main channel near the mouth is slow-moving and controlled by pool-level fluctuations in the reservoir. Streams in the upper portion of the watershed are characterized by high gradients with a medium, occasionally swift, flow draining relatively steep, forested mountainsides. Stream substrates are coarse sand, gravel, cobble, and bedrock. The lower watershed is characterized more by flat to gently rolling hills and irregular plains. Streams are low to moderate gradient with substrates of gravel and bedrock, and stream flow is low and fairly sluggish, particularly for the main stem. The flow is greatly diminished several miles upstream of the Paint Rock River mouth, and at times may move upstream due to differential in water levels between the reservoir and the river. Lower gradient streams in the southern third of the watershed have sand-silt-cobble substrates, are generally turbid year-round, and have occasional flooding problems (Barbour 2003).

Water Quantity

Stream flow patterns for waterbodies in the AOI are typical of streams in the humid temperate region, with peak flows in late winter and early spring and lows occurring in late summer and early fall. Peak flows are relatively short-lived, as would be expected for a stream with mountain origins and substantial amounts of rock substrate Shaw (2002).

There is one active gauging station near Woodville on the Paint Rock River that is operated by the U.S. Geological Survey (USGS) and its partners. Parameters collected at the Woodville station (USGS site number: 03574500) include stream-flow (discharge) and gage height. River discharge (flow rate) data have been collected at the Woodville station since 1936, which has been summarized in Table 5 (USGS 2011). Since recordkeeping began, the annual average discharge rate at this site has been approximately 676 cubic feet per second (cfs). Mean monthly discharge rates range from 107 to 1,451 cfs. Minimum flows tend to be during the months of August through September, while maximum flow rates are generally recorded January through March. During the drought of 2007, the USGS station near Woodville had the lowest average annual flow rate (180 cfs) since 1936. Discharge rates dropped to 19 cfs in June and remained in

the double digits through the remainder of the year. Typically, average monthly flow rates in the summer range between about 100 and 200 cfs. Other years with low average flow rates include 1941 and 2006, when average monthly flow rates dropped to single digits in the summer. Conversely, years of exceptionally high water include 1975, 1977, 1990, 1991, and 2004, when average annual flow rates ranged between 1,004 and 1,106 cfs (USGS 2011).

Statistical analysis indicates no major changes in ecologically important flow parameters over the period of record, except for a possible decrease in the frequency of flows greater than 20,000 cfs beginning in the mid-1970s or early 1980s. At around this same time, annual peak flows began occurring earlier (as early as September or October) and later (as late as April or May) than had typically occurred prior to the mid-1970s. Similar patterns of change beginning in the late 1970s or early 1980s are evident in stream, spring, lake, and wetland data throughout the southeast and are likely the result of climate change (Shaw 2001); given the nature of the Paint Rock watershed, it is unlikely that these changes are the result of local changes in land use or water management. Geology of the watershed suggests that groundwater originating in extensive limestone formations provides the vast majority of baseflow to the river. Field observations suggest that sources of groundwater input to the river are still largely intact.

Table 5. Monthly Paint Rock River discharge data for 1936 – 2009

Month	Mean Discharge Rate (cfs)	Minimum Discharge Rate (cfs)	Maximum Discharge Rate (cfs)
January	1,295	160	3,519
February	1,451	246	3,941
March	1,448	300	4,185
April	1,008	218	3,018
May	586	69	2,538
June	245	24	1,263
July	208	14	1,465
August	107	10	746
September	140	4	1,136
October	176	3	2,597
November	444	10	3,056
December	997	35	3,849

cfs- cubic feet per second
Data from stream station 03574500 located on the Paint Rock River near Woodville, AL.
Source: USGS 2011

NOISE

Although noise studies are not known to have been conducted in the region, it is expected that the soundscape is relatively undisturbed. The rural nature and low density population are unlikely to cause significant noise levels in the area. Primary sources of noise are likely from highway traffic.

BIOLOGICAL ENVIRONMENT

The Paint Rock River is one of the most biologically diverse watersheds in North America for freshwater mussels with 48 species recorded between 1990 and 2008 (Fobian et al. 2008, Williams et al. 2008). The exceptional mussel diversity is likely due to the river's limited amount of habitat alteration, extensive habitat diversity, abundant nutrients, and calcium-enriched waters. Rare species can be found throughout the river, ranging from the shallow shorelines in the headwaters region downstream to the embayed region near the confluence of the Tennessee River (Wheeler Reservoir). Rare species can also be found in a variety of substrates ranging from coarse gravel and cobble to fine silt. Seven species of mussels occurring here are either protected under the Endangered Species Act or are candidates for protection. The pale lilliput (*Toxolasma cylindrellus*) occur nowhere else except for the upper Paint Rock River and its headwaters. The watershed is also home to the very rare Alabama lampmussel (*Lampsilis virescens*), once believed to occur nowhere else. However, during the spring of 2011, two leading malacologists found the lampmussel in the upper Emory River (Morgan County, Tennessee) when they were surveying for the purple bean (*Villosa perpurpurea*), another rare mussel species.

LAND COVER

For the purposes of this Draft LPP/EA, Southeast GAP (USGS and North Carolina State University 2010) land cover was used to broadly describe vegetative communities within the AOI. Table 6 shows the relative acres of the different land cover types in the AOI, in both the protected (i.e., state lands) and unprotected areas. See Figures 5a – 5c for the land cover maps. The three dominant types of upland forests (further described below), comprise over 90 percent of the total area. Within currently protected areas, these land cover types represents over 97 percent. The next largest land cover type in the AOI is cultivated/planted, which includes pasture, hay, and row crops. For more details of the lesser land cover types, please refer to USGS and North Carolina State University (2010).

Southern Ridge and Valley Dry Calcareous Forest

Natural vegetation consists of forests (or woodlands) dominated most typically by several oaks (*Quercus alba, Q. muehlenbergii*, and *Q. shumardii*), with varying amounts of hickories (*Carya* spp.), maples (*Acer saccharum, A. barbatum, A. leucoderme, A. rubrum*), and other species. This category also includes successional communities that have been impacted by logging or agriculture, including upland forest types dominated by tulip tree (*Liriodendron tulipifer*), pines (*Pinus* spp.), juniper (*Juniperus virginiana*), and black locust (*Robinia pseudoacacia*).

South-Central Interior Mesophytic Forest

Dominant tree species include sugar maple, American beech (*Fagus grandifolia*), tulip tree, *Tilia americana*, red oak, *Magnolia acuminata*, and eastern black walnut (*Juglans nigra*). Eastern hemlock (*Tsuga Canadensis*) may be a component of some stands. This forest type has a rich herb layer, often with abundant spring ephemerals.

Allegheny-Cumberland Dry Oak Forest and Woodland
These forests are typically dominated by various oaks (*Q. alba, Q. falcata, Q. prinus, Q. coccinea*), red maple, pignut hickory (*Carya glabra*), and mockernut hickory (*C. alba*). Sprouts of American chestnut (*Castanea dentata*) can often be found where it was historically a common tree. Shortleaf pine (*Pinus echinata*) and/or Viriginia pine (*P. virginiana*) may occur, particularly adjacent to escarpments or following fire. In addition, eastern white pine (*P. strobus*) may be prominent in some stands in the absence of fire.

Within the more broadly defined land cover types exist various habitats that are important to wildlife, which are further detailed in Table 6.

Table 6. Land cover types within the AOI

Land Cover Type	Unprotected Acres	Protected Acres	Total Acres
Southern Ridge and Valley Dry Calcareous Forest	20,445.80	2,002.10	22,447.90
South-Central Interior Mesophytic Forest	8,024.70	908.3	8,933.00
Allegheny-Cumberland Dry Oak Forest and Woodland	5,187.20	898.2	6,085.40
Cultivated/Planted[1]	1,652.20	38.0	1,690.20
Scrub/Shrub	499.9	12.0	511.90
Developed[2]	423.4	6.5	429.90
Southern Appalachian Low Mountain Pine Forest	205.3	5.8	211.10
Pine Plantations	59.2	0.0	59.20
Grassland/Herbaceous	49.6	20.3	69.90
South-Central Interior Small Stream and Riparian	21.6	3.6	25.20
Southern Interior Acid Cliff	14.2	0.0	14.20
Southern Interior Calcareous Cliff	10.5	6.0	16.50
Cumberland Riverscour	5.3	0.2	5.50
Open Water	5.1	0.0	5.10
Total	***36,604.00***	***3,901.00***	**40,505.00**

1 - combined pasture/hay and row crop
2 - combined developed open space and low intensity developed
Source: USGS and North Carolina State University 2010

Figure 5a. Land cover in the Paint Rock River watershed

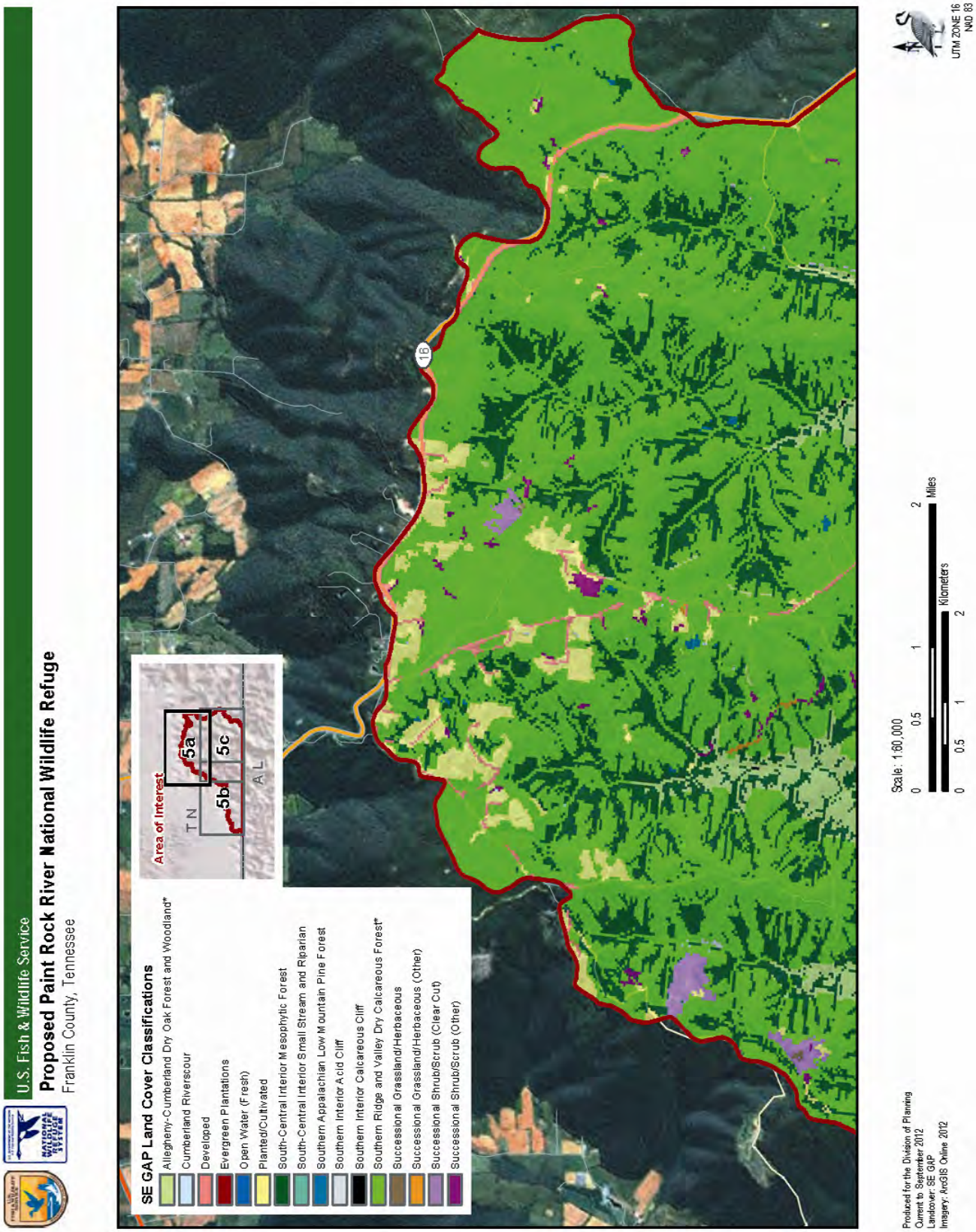


Figure 5b. Land cover in the Paint Rock River watershed

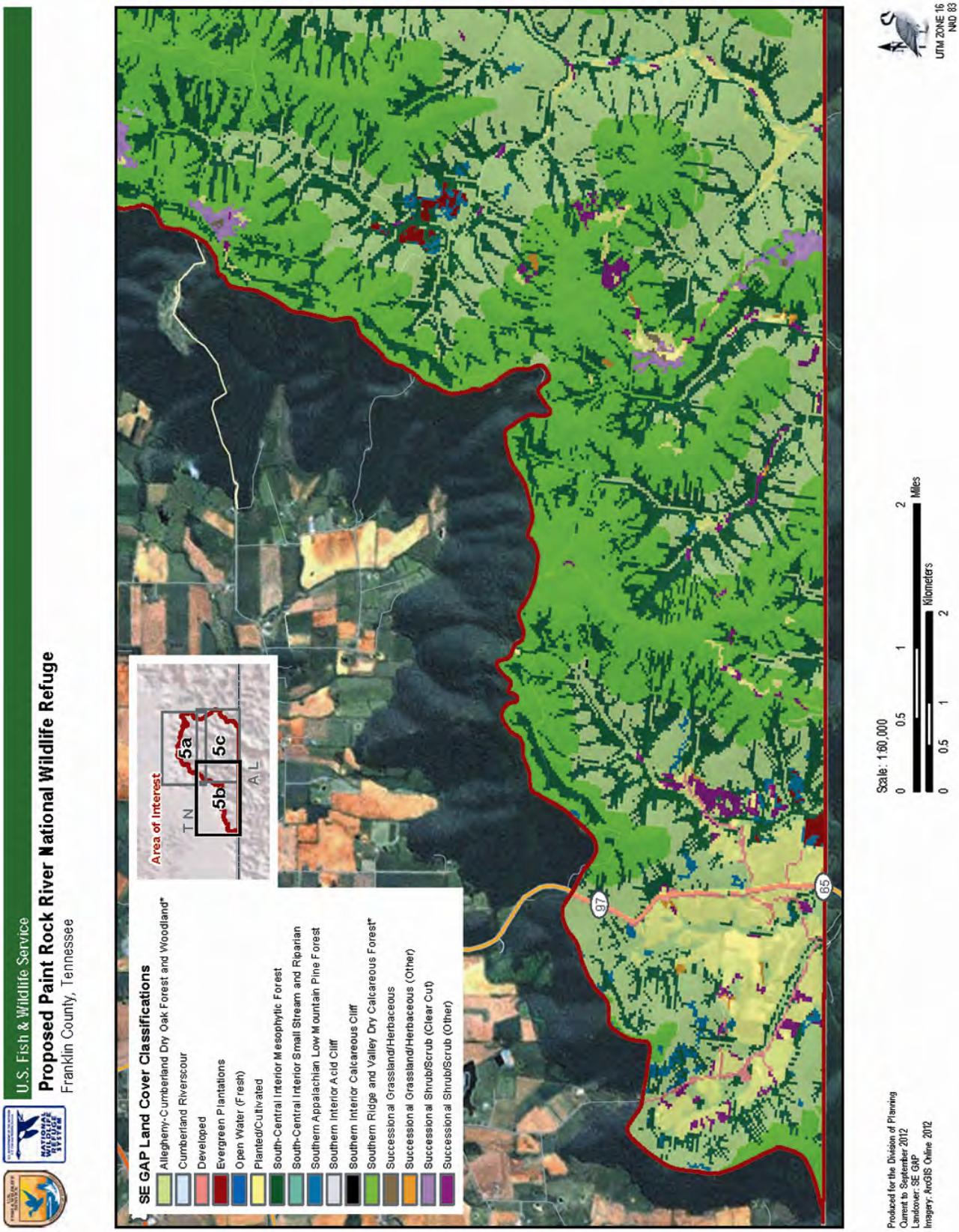
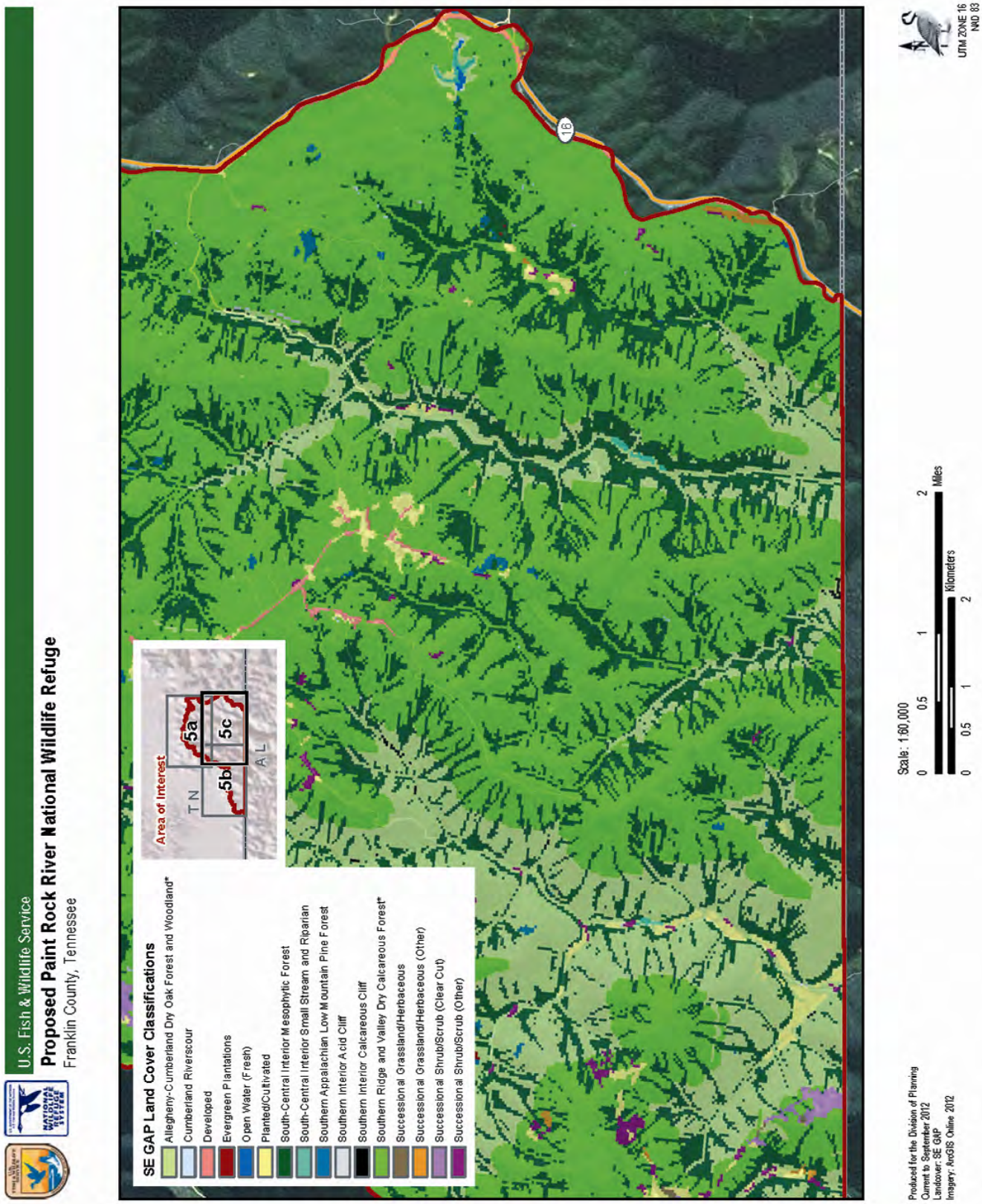


Figure 5c. Land cover in the Paint Rock River watershed



HABITAT

As previously mentioned, land cover type provides a general overview of the natural vegetative communities found in the AOI. More specific descriptions of habitats or environmental areas that are inhabited by a particular species within the AOI are discussed in this section. Within the AOI, there is currently no geospatial data available for some of the habitats described in this section. Aquatic habitats vary from headwater springs and small gravelly creeks to larger river bodies. In general, terrestrial habitats are composed of mixed oak-hickory-pine associations, with greater pine influences in forest types further south. Caves are a prominent feature due to the prevalence of limestone geology underlying the landscape. The western escarpment of the Cumberland Plateau, which constitutes a sizeable portion of the project area, has one of the densest concentrations of caves in the United States (Culver et al. 2000, Moss 1998). Primary habitats in the project area include: streams and rivers, riparian/bottomland hardwood forests, upland forests, canebrake, and cave/karst systems. Further descriptions of each habitat category are provided in the following sections:

Streams and Rivers

The streams flowing through the proposed project area contain some of the most biologically significant waters in the United States. Major streams in the AOI include the Tennessee portions of Estill Fork, Larkin Fork, and Hurricane Creek, three of the primary tributaries to the Paint Rock River. The streams vary in size, temperature, gradient, and percentage of groundwater contribution from spring-fed headwater streams to the Paint Rock River.

The headwater tributaries and streams are approximately 15 to 60 feet wide and shallow, seldom more than 6 feet in depth. Waters of the streams have a medium to swift flow and water quality is generally good; clarity tends to be excellent except after rain events. Substrate types in these streams vary widely from limestone bedrock to sandstone cobbles, and include a mixture of gravels, chert, sands, and silt. Streamside zones are well to moderately forested. Where the floodplain is narrow, forests continue from the stream up the nearby slopes, which may rise as much as 1,000 feet above the stream.

Cumulatively, these streams once harbored over 100 species of fish, over 60 mussel species and more than a dozen types of freshwater snails, and still support populations of rare animals with national and global significance. Two fish and seven mollusk species currently listed as federally endangered, threatened, or candidate are recorded as occurring in the Paint Rock River watershed.

Riparian/Bottomland Hardwood Forests

As mentioned earlier, the Southern Cumberlands Conservation Area is dominated by hardwood forests, which comprise 80 percent of land cover, the bulk of which are found on the slopes and mountain tops. As is the case throughout much of the south, bottomland hardwood forests have been extensively altered or eliminated in much of the southern Cumberlands, and likely represent one of the region's most endangered habitat types.

Several remnants of bottomland broadleaf communities remain evident in the Paint Rock River Valley, however. Noteworthy components of a remnant mature (late successional) forest include overcup oak (*Quercus lyrata*), swamp chestnut oak (*Q. michauxii*), water oak (*Q. nigra*), American elm (*Ulmus americana*), sweetgum (*Liquidambar styraciflua*), and shellbark hickory (*Carya lacinosa*). Other species, including swamp pin oak (*Q. palustris*) or swamp white oak (*Q. bicolor*), may have been more common in the original forests. The understory varies greatly depending on hydroperiod and soils, and may be dominated in places by giant cane (*Arundinaria gigantea*) or small trees and

shrubs (e.g., hollies, spicebush) or even by grass and sedge “meadows” mixed with such herbaceous species as eastern camas lily (*Camassia scilloides*).

Forests along the streams themselves may have somewhat higher diversity of species, both woody and herbaceous. Old stands show evidence that cottonwood (*Populus deltoides*) was once an important component of these streamside forests. Along and within the river channels, scour plains develop that may support a wide variety of grass and herbaceous species, including the rare Cumberland sandreed (*Calamovilfa arcuata*) (NatureServe 2006). These forest types have been dramatically reduced by agriculture nearly throughout the southern Cumberlands, and in the Paint Rock River watershed, have been largely replaced by pastures or field row agriculture.

Upland Forests

Due to the strongly dissected plateau surface in the southern Cumberlands, approximately 75 percent of the landscape is composed of gorges and associated “cove” areas. The forest matrix contains a large assortment of mixed-mesophytic tree species. The long growing season, high annual rainfall, and the abundance of microhabitats created by exposed limestone in the region provide favorable conditions for a diverse forest community structure. Depending on slope, aspect, and soil depth, dominant canopy tree species include: white oak (*Q. alba*), northern red oak (*Q. rubra*), white ash (*Fraxinus americana*), yellow poplar (*Liriodendron tulipifera*), hickories (*Carya* spp.), black oak (*Q. velutina*), maple (*Acer* spp.), and chestnut oak (*Q. prinus*). Lower slopes and rock outcroppings often contain basswood (*Tilia* spp.), American beech (*Fagus grandifolia*), magnolia (*Magnolia* spp.), walnut (*Juglans nigra*), chinkapin oak (*Q. muehlenbergii*), and buckeye (*Aesculus* spp.) (Smalley 1982).

A number of distinctive species of limited or sporadic distribution are associated with the limestone cove forests, including yellowwood (*Cladrastis kentuckea*), American smoketree (*Cotinus americanus*), blue ash (*Fraxinus quadrangulata*), and numerous shrubs (e.g., *Viburnum rafinesqueianum*, *V. bracteatum* and others). A number of species seem to be restricted almost entirely to the upland limestone forests of the southern Cumberlands, including Morefield’s leather flower (*Clematis morefieldii*) and Cumberland Pagoda (*Blephilia subnuda*), which appear to have their stronghold on limestone outcrops surrounding the Paint Rock River. These forests are also characterized by a diversity of herbaceous ephemerals of restricted occurrence, including Southern red trillium (*Trillium sulcatum*) and twinleaf (*Jeffersonia diphylla*). Embedded within these forests are poorly identified and described glade-like grasslands, with such species as American columbo (*Frasera caroliniana*)

The plateau tableland forest communities comprise approximately 15 percent of the land cover in the Southern Cumberlands Conservation Area. Due to the geology, the amount of tableland forest habitat decreases considerably towards the southernmost extent of the Cumberland Plateau. Tableland forest types are positioned atop a relatively thin sandstone cap with shallow, infertile soils. Forests in this zone share little in common with the limestone cove forests, and may be dominated by species that occur seldom, if at all, on the lower slopes. These species included scarlet oak (*Quercus coccinea*), shortleaf pine (*Pinus echinata*), Cumberland rhododendron (*Rhododenron cumberlandense*), mountain laurel (*Kalmia latifolia*), and numerous grasses. Distinctive communities include shortleaf pine-dominated grasslands, which structurally resemble longleaf pine grasslands farther south, with some of the same species and genera, and a number of rare or declining species. The newly described “hill cane” (*Arundinaria appalachiana*) makes up a surprisingly extensive portion of the understory here. Fire likely played a key role in the maintenance of habitat and diversity within these forests (Smalley 1982, NatureServe 2006, Gagnon 2009).

Canebrake

Canebrakes existed within forest openings, as an understory component of floodplain forest, and as broad cane thickets without forest overstory. Canebrakes are successional communities and may have originated following abandonment of aboriginal agricultural fields or following catastrophic natural disturbances (NatureServe 2006). They are believed to have been maintained in part by fires set by Native Americans. Giant cane is a common species within floodplain forests along the Paint Rock River and tributary streams. The absence of fire and the spread of exotic plants within temporarily flooded forests have reduced the distribution and abundance of cane.

Two species of cane dominate the southern Cumberlands, the larger (to 35 feet) giant cane and the newly described and much smaller (2 to 6 feet) hill cane. The first is widespread on many sites within the southern Cumberlands; the latter is restricted almost entirely to sandstone caps on the plateaus and ridgetops (Triplett et al. 2006).

The original extent of canebrakes in Alabama is poorly understood, as are the processes that maintained them. Some texts indicate that many hundreds of thousands of acres of the state were dominated by canebrakes in the late 18th century, but most of these areas were eradicated by overgrazing, conversion to agriculture or changes in fire regimes or hydrology by the late 19th century.

Since several bird species, such as Bachman's warbler (*Vermivora bachmanii*), Swainson's warbler (*Limnothlypis swainsonii*), hooded warbler (*Wilsonia citrina*), and Kentucky warbler (*Oporornis formosus*), seem to have been highly dependent on extensive areas of canebrake habitat for nesting success, it is likely that canebrakes were a more or less permanent feature of some landscapes. Other species, such as black bear (*Ursus americanus*) and Florida panther (*Puma concolor*), were often associated with canebrakes, and the high protein content of cane may have provided important seasonal forage to deer, bison, elk, and other species (Brantley and Platt 2001, Platt et al. 2001).

Giant cane is still a common species within floodplain forests and on mesic slopes along the Paint Rock River and tributary streams, and persists even in dense shade, though it rarely forms extensive canebrakes or provides much wildlife habitat under such conditions. The absence of fire, grazing by elk and bison followed by cattle and hogs, changes in hydroperiod within floodplain forests, and the spread of exotic species may all have contributed to a reduction in the abundance of cane. Both fire and flooding apparently play a distinctive role in maintaining canebrake communities. On upper floodplain terraces, canebrake communities thrive and spread with periodic fire, with return intervals of 2 to 25 or more years. Many large canebrakes may have become established through stand-replacement fires, though annual burning can eliminate cane entirely (Brantley and Platt 2001). Even in the absence of fire, certain hydroperiods appear to favor the development of a thick cane understory on lower terraces, sometimes nearly to the exclusion of trees.

The smaller and more restricted hill cane is now largely an understory species, but may be the dominant vegetation along the floodplains of headwater streams on sandstone plateaus of the southern Cumberlands. Little research has been done to identify the ecological role of this newly described and distinctive taxon.

The southeastern canebrake ecosystem is now considered to be critically endangered with over 98 percent of this habitat lost (Noss et al. 1995). Historically, cane was a prominent feature of the southern Cumberlands. These expansive canebrakes were described as being an almost impenetrable wilderness and always in view by Bartram (1791) during his wanderings in the southeastern United States, including areas just south of the CA. By 1901 (Mohr 1901), it was

described as a rapidly declining habitat type due to conversion of the fertile, alluvial bottomlands to agriculture and the conversion of uplands for grazing. By 1928 (Harper 1928), the vast canebrakes had all but disappeared. Today, there are remnant populations of cane as understory plants within forested areas and in small pockets along isolated portions of the banks of streams and rivers within the project area.

Cave and Karst Systems

Over 11,000 caves have been documented in Alabama, Georgia, and Tennessee. Most of these are concentrated in the Cumberland Plateau and Highland Rim physiographic provinces, which contain some of the highest densities of caves in the country (Culver et al. 2000). Caves in the area support one of the richest assemblages of cave-obligate species known in the country. However, due to large gaps in biological and hydrological data for the region, it is difficult to develop a comprehensive model for describing and delineating these intricate subterranean ecosystems.

WILDLIFE

General Wildlife Diversity and Abundance

A variety of species use the diverse habitats within the AOI. Common game species are described in the socioeconomic section.

In terms of biodiversity, the AOI is best known for its aquatic species richness, particularly mussels, snails, and fish. The existence of groundwater springs located throughout the upper reaches of the watershed that provide a year-round flow of clear, cool water to its tributaries, coupled with the fact that the watershed has had a lack of significant development along its tributary streams and the river, has served to sustain populations of native, endemic aquatic fauna there.

The AOI supports numerous snail species, including the federally endangered Anthony's riversnail (*Athearnia anthonyi*), the globally rare moss pyrg (*Pyrgulopsis scalariformis*), engraved Elimia (*Elimia perstriata*), and corpulent hornsnail (*Pleurocera corpulenta*). Of these species, only the engraved Elimia is currently known to occur in Cole Spring Branch and possibly a few other tributaries in the Paint Rock River watershed. Other snail species extant in the watershed and considered of high conservation concern at the state level are angled Marstonia (*Marstonia angulobasis*), described in 2004, and apparently an endemic to the Paint Rock River; and the rugged hornsnail (*Pleurocera alveare*), found in the middle and lower reaches of the Paint Rock River proper. The sooty Elimia (*Elimia paupercula*), found in the Paint Rock River proper and many tributaries, is a snail species considered of moderate conservation concern, primarily due to its taxonomic uncertainty.

Approximately 100 fish species are known to exist in the Paint Rock River (Boschung and Mayden 2004). Similar to the mussel assemblage in the Paint Rock River, rare fish can be found across a wide range of habitats from the headwaters to its terminus at the Tennessee River. Aquatic biologists speculate that fish populations throughout most of the watershed are thriving due to the abundance and quality of stream channel microhabitats (e.g., silt free gravel substrates, slab rock), befittingly spaced pools and riffles, and a mostly intact riparian corridor.

The forest-dominated cover characterized by the AOI provides habitat for at least 234 species of breeding, migrating, and wintering birds. Bird biodiversity is high in the area, particularly forest interior species, which rely on large tracts of intact forest. Surveys in the Estill Fork drainage found more than 50 different species within study areas of 1.6 acres (D. Haskell, University of the South, pers. comm. February 2013). North American populations for many of these species have

experienced steep population declines. Several are listed as threatened, endangered, or of special concern by TWRA. Many of these land birds are of continental conservation concern, some being extirpated from the region, or in dire need of conservation action (Appalachian Mountains Joint Venture 2005, Sauer et al. 2005).

Mammal species include many of those commonly found in the eastern United States and includes white-tailed deer, black bear, raccoon, opossum, river otter, cottontail rabbit, and beaver. Smaller species include a variety of rodents, ground-dwelling insectivores, and bats. Several imperiled bat species are found in the AOI, as further discussed in the section on listed species below.

Almost 50 species of reptiles and amphibians have been documented in the AOI. A 2008 survey on the Walls of Jericho and James D Martin Skyline WMAs found 21 reptiles and 26 amphibians. Several of these have been ranked as high conservation concern species by Alabama and Tennessee, including the green salamander (*Aneides aeneus*), Tennessee cave salamander (*Gyrinophilus palleucus*), southern five-lined skink (*Eumeces inexpectatus*), prairie king snake (*Lampropeltis calligaster*), and northern pine snake (*Pituophis melanoleucus*) (Wang and Chan 2008).

Nonnative Plants and Animals

The spread of nonnative or exotic species represents one of the most serious threats to biodiversity nationwide, undermining the ecological integrity of native habitats and pushing rare species to the edge of extinction. Once established, many exotic species are virtually impossible to eradicate. Exotic species rank only second to habitat loss in terms of threat level and they have been implicated in the decline of nearly half the imperiled species in the United States (Wilcove et al. 1998). Furthermore, economic losses associated with exotic weeds, forest and crop pests, human and livestock diseases, infrastructure damage, etc., has been estimated at 138 billion annually in the United States (Pimentel et al. 1999). The following exotic plant species are among others found in the AOI.

- Chinese privet (Ligustrum sinense)
- Kudzu (Pueraria montana)
- Mimosa (Albizia julibrissin)
- Japanese honeysuckle (Lonicera japonica)

Threatened, Endangered, and Other Imperiled Species

Federally Listed Species

Franklin County, Tennessee, and the Paint Rock River watershed contain at least 23 threatened, endangered, and candidate species (Table 7). Some of these occurred in the AOI historically, and have not been recently documented. Freshwater mussels make up a large portion of all the listed species.

Table 7. Federally listed and candidate species known from the Paint Rock River watershed and Franklin County, Tennessee

Common Name	Scientific Name	Status
Mammals		
Gray Bat	*Myotis grisescens*	E
Indiana Bat	*Myotis sodalis*	E
Fish		
Palezone Shiner	*Notropis albizonatus*	E
Snail Darter	*Percina tanasi*	T
Invertebrates		
Cumberland Monkeyface	*Quadrula intermedia*	E
Fluted Kidneyshell	*Ptychobranchus subtentum*	C
Littlewing Pearlymussel	*Pegias fabula*	E
Painted Tigersnail	*Anguispira picta*	T
Alabama Lampmussel	*Lampsilis virescens*	E
Fine-rayed Pigtoe	*Fusconaia cuneolus*	E
Pale Lilliput	*Toxolasma cylindrellus*	E
Pink Mucket	*Lampsilis abrupta*	E
Rough Pigtoe	*Pleurobema plenum*	E
Shiny Pigtoe	*Fusconaia cor*	E
Slabside Pearlymussel	*Pleuronaia dolabelloides*	C
Snuffbox	*Epioblasma triquetra*	E
Rabbitsfoot	*Quadrula cylindrica cylindrica*	C
Anthony's Riversnail	*Athearnia anthonyi*	E
Plants		
American Hart's-tongue Fern	*Phyllitis scolopendrium var. americana*	T
Morefield's Leather-flower	*Clematis morefieldii*	E
Price's Potato-bean	*Apios priceana*	T
White Fringeless Orchid	*Platanthera intergrilabia*	C

C = Species for which the Service has sufficient information to support proposals to list the species as threatened or endangered and for which the Service anticipates a listing proposal.
E = Endangered – a species at risk of becoming extinct.
T = Threatened – a species likely to become an endangered species in the foreseeable future.
Source: TDEC 2009

Mammals

Currently, the only federally listed mammals in the AOI are two bat species, gray and Indiana bats, further described below. As a group, bats are imperiled world-wide due to threats such as habitat loss and pesticide poisoning. These factors have also contributed to a decline in several North American bat species, but a disease that is new to the continent, white-nose syndrome (WNS), is accelerating the decline of some populations. The result of a fungus *(Geomyces destructans*), WNS primarily affects hibernating bats. First reported in the northeast, WNS has steadily spread westward, and was first reported in 2011-2012 in Alabama and Tennessee. Indiana bats are known to die from WNS. Gray bats are reported to have the fungus (White-nose Syndrome.org 2012).

Gray Bat

The endangered gray bat (*Myotis grisescens*) occurs throughout the Paint Rock River Watershed with the largest known hibernaculum of approximately 850,000 bats in Fern Cave. The Recovery Plan (USFWS 1982) states that the criteria for reclassification to threatened status is documentation of permanent protection of 90 percent of Priority 1 hibernacula and documentation of stable or increasing populations at 75 percent of Priority 1 maternity caves during a period of 5 years. Once the status of the gray bat has been changed from "endangered" to "threatened," it will be possible to delist this species by the documentation of permanent protection as well as stable or increasing populations during 5 years at 25 percent of Priority 2 caves. The most important feature of this plan would be the protection of roosting habitat. This would require gaining control of important hibernacula and maternity caves and protecting them from human disturbance. This can be done by direct purchase, cooperative agreements, easement, etc. We also believe that as much as practicable, foraging habitat consisting of bodies of water ranging from small streams to large reservoirs with accompanying riparian vegetation, must be maintained, protected, and restored. Finally, in order to ensure the success of recovery efforts, a monitoring program should be established to ensure that gray bat populations are responding positively. Establishment of this refuge would help protect these essential foraging habitats, protect known hibernacula within its boundaries, and contribute to down-listing and eventual delisting of the gray bat.

Indiana Bat

The endangered Indiana bat (*Myotis sodalis*) occurs in the AOI. The Recovery Plan (USFWS 2007) states that the Indiana bat can be downlisted from endangered to threatened when the following objectives are achieved: (1) Permanent protection of 80 percent of Priority 1 hibernacula; (2) a minimum overall population number equal to the 2005 estimate (457,000); and (3) documentation of a positive population growth rate over five sequential survey periods. The Indiana bat will be considered for delisting when the Reclassification Criteria have been met, and the following additional criteria have been achieved: (1) Permanent protection of 50 percent of Priority 2 hibernacula; (2) a minimum overall population number equal to the 2005 estimate; and (3) continued documentation of a positive population growth rate over an additional five sequential survey periods. If research on summer habitat requirements indicates the quality and quantity of maternity habitat is threatening recovery of the species, the Service will amend these objectives. As with the gray bat, establishment of this refuge could benefit the Indiana bat.

Fish

The region is known for its high freshwater fish biodiversity, and Alabama's fish species represent 38 percent of all North American freshwater fish (Lydeard and Mayden 1995). Although the area's biodiversity remains relatively high, it has declined since the early arrival of peoples from Europe, due to factors such as habitat loss and alteration, water pollution and diversion, among others. Even with conservation efforts, the rate of extinction among freshwater fish is accelerating. According to a

recent study, North America lost 39 species and 18 subspecies between 1898 and 2006. Based on current trends in threatened and endangered fish species, it is estimated that an additional 53 to 86 species of freshwater fish may be extinct by the year 2050. Furthermore, since the first assessment of extinct North American freshwater fishes in 1989, the number of extinct fishes increased by 25 percent (USGS 2012). At least two federally listed species, the palezone shiner and snail darter, (further described below) are found in the Paint Rock River watershed.

Palezone Shiner

The endangered palezone shiner (*Notropis albizonatus*) usually occurs in moderately large, high-gradient, clear streams flowing over bedrock, cobble, or gravel mixed with clean sand; it prefers pools and pool runs below riffles. It is highly restricted in distribution, found only in the Tennessee River drainage in Alabama and Tennessee and to the north in the Cumberland River drainage in Kentucky. It is uncommon and localized throughout its range. In Alabama, it occurs only in the upper Paint Rock River system. This species was historically known from only four rivers and/or creeks. Because much of the species' presumed historic habitat has been impounded or altered by other factors, it is unlikely that the species can be recovered to the point of delisting. However, the Recovery Plan (USFWS 1997a) states that the palezone shiner would be considered for reclassification from endangered to threatened and eventual removal from the federal list when the likelihood of the species becoming extinct in the foreseeable future has been eliminated by achievement of: (1) Protection and enhancement of the existing populations in the Paint Rock River and the Little South Fork of the Cumberland River (LSFCR); (2) studies of the biological and ecological requirements have been completed, and the implementation of management strategies developed from these studies have been successful in increasing the number and range of the palezone shiner in the Paint Rock River and LSFCR, and; (3) no foreseeable threats exist that would likely threaten the survival of a significant portion of the species' range in either the Paint Rock River or LSFCR. Establishment of this refuge could aid in protection and enhancement of the existing Paint Rock River population, and ultimately contribute to the downlisting and eventual delisting of the palezone shiner.

Snail Darter

The threatened snail darter (*Percina tanasi*) is found over gravel and sand shoals with moderate current in large tributaries and free-flowing rivers. Snail darters were originally thought to occur only in the lower Little Tennessee River and adjacent Tennessee River. However, sampling confirmed their presence in the lower Paint Rock River. Introduction and subsequent sampling expanded their range into Chickamauga Creek, a downstream segment of the Tennessee River, and the Sequatchie, Hiwassee, Holston, and Elk Rivers' systems. The ultimate goal of the Recovery Plan (USFWS 1983b) is to protect and recover this species to the point where it can be removed from the federal list. The species would be considered recovered when one of three alternatives is met and no present or foreseeable threats exist which could cause the species to become in danger of extinction. These three alternatives are: (1) Suitable habitat areas are inhabited by snail darter populations which can survive and reproduce independently of tributary rivers; (2) more populations are discovered and existing populations are not lost, and; (3) through maintenance of existing populations and/or expansion of these populations, there exist viable populations of snail darters in five separate streams such as Sewee Creek, Hiwassee River, South Chickamauga Creek, Sequatchie River, and Paint Rock River. The area that this refuge would encompass contains essential habitat for recovery of the snail darter. As mentioned in the Recovery Plan, adequate protection of populations in this watershed meets a portion of the criteria for ultimate delisting.

Invertebrates

The region's mussel and aquatic snail diversity is likely the highest in the world, and is the highest in North America. Alabama has over 60 percent of all mussel species and 43 percent of aquatic snails of all North American species (Lydeard and Mayden 1995). As a group, mussels are among the most imperiled in the nation. At least 6 percent have already become extinct within the United States, and over 25 percent are listed as threatened or endangered, the majority of which are located in the southeast (Williams et al. 2008). The AOI provides habitat for at least seven listed mussel species, as further described below.

Alabama Lampmussel

The endangered Alabama lampmussel (Lampsilis virescens) typically inhabits sand and gravel substrates in small- to medium-sized streams. A viable population of Alabama lampmussel exists in the Paint Rock River above the impounded portion in Wheeler Reservoir up to and including Larkin Fork, Estill Fork, Hurricane Creek and their tributaries, and is found in only one other watershed, the Emory River, located in north-central Tennessee. The Recovery Plan (USFWS 1985a) provides that this population should be distributed within the upper reaches of these streams that occur in Tennessee, such that it is unlikely a single adverse event would result in the total loss of the population. Establishment of this refuge could aid in protection of essential habitat, set aside areas for future propagation efforts and reintroduction, and ultimately contribute to the delisting of the Alabama lampmussel.

Fine-rayed Pigtoe

The endangered fine-rayed pigtoe (Fusconaia cuneolus) has been collected in 16 different river systems including the Paint Rock River. The ultimate goal of the Recovery Plan (USFWS 1984a) is to maintain and restore viable populations of this species to a significant portion of its historic range and remove it from the federal list. This would be accomplished when: (1) Populations, with evidence of recent recruitment (specimens age 5 or younger), exists in portions of six river systems in four southeastern states. These populations are distributed widely enough within their rivers such that a single adverse event in a river would be unlikely to result in the loss of that population; and (2) through reestablishment and/or discoveries of new populations, a viable population exists in one additional stream or river reach that historically maintained the species. The viable population would contain at least two locations which are dispersed to the extent that a single adverse event would be unlikely to eliminate the fine-rayed pigtoe from these locations. Mussel surveys would document that three year-classes, including one year-class of age 10 or older, has been naturally produced within each of the locations. All of the populations and their habitats should be protected from present and foreseeable human-related and natural threats that may interfere with the survival of any of the populations. Establishment of this refuge would protect essential habitats, provide for the discovery of new populations, and allow opportunities for reintroduction that could contribute to downlisting and eventual delisting of the fine-rayed pigtoe.

Pale Lilliput

The endangered pale lilliput (Toxolasma cylindrellus) is typically found in small rivers and streams in shallow fast-flowing water with stable, clean substrate. A viable population of pale lilliput exists in the Paint Rock River, Estill Fork and Hurricane Creek, and is found nowhere else in the world. A survey of the upper 40 miles of the Paint Rock River above Walker Mill Ford is needed to determine the extent of the populations discovered by TVA biologists in 1980. Only two live specimens were found. The Recovery Plan (USFWS 1984b) recommends intensive freshwater mussel surveys for Hurricane Creek and Estill Fork and their tributaries where freshly dead specimens were found in 1978. Additional freshwater mussel surveys should be conducted in Larkin Fork where 26 dead specimens of pale lilliput were collected from a muskrat midden in 1966. The greatest known concentrations of

this species occur in the Paint Rock River, Estill Fork, and Hurricane Creek. Establishment of this refuge would help to conserve these mussel populations and their habitat.

Pink Mucket

The endangered pink mucket (Lampsilis abrupta) is found in mud and sand and in shallow riffles and shoals swept free of silt in major rivers and tributaries. This mussel buries itself in sand or gravel, with only the edge of its shell and its feeding siphons exposed. The ultimate goal of the Recovery Plan (USFWS 1985b) is to maintain and restore viable populations of this species to a significant portion of its historic range and remove it from the federal list. This would be accomplished when: (1) Two additional viable populations are found in any two rivers except the Tennessee, Cumberland, and Mermec Rivers. Both of these rivers would contain viable populations that are distributed such that a single event would unlikely eliminate the pink mucket from the river system. Survey data must show at least five viable populations with each population having a minimum of two year-classes between four and 10 years of age as evidence of reproduction; (2) additional mussel sanctuaries are established or expanded in river systems which contain known concentrations of the species; and (3) the species and its habitat are protected from present and foreseeable human-related and natural threats that may interfere with the survival of any of the populations. The biodiversity of the Paint Rock River system would lead to the belief that habitat exists for this species and the establishment of this refuge along with surveys could verify its existence. Repatriation could be accomplished if suitable habitat is discovered, and could therefore lead to the downlisting and eventual delisting of the pink mucket.

Rough Pigtoe

The endangered rough pigtoe (Pleurobema plenum) is found in medium to large rivers in sand and gravel substrates. Historically, this species was widely distributed in 22 major rivers. Decline of this species, as with most mussels, is due to impoundment, siltation, and pollution. The ultimate goal of the Recovery Plan (USFWS 1984c) is to maintain and restore viable populations of this species to a significant portion of its historic range and remove it from the federal list. This can be accomplished by protecting and enhancing habitat containing the species' populations, establishing populations in rivers and river corridors that historically contained the species, and its habitat is protected from present and foreseeable human-related and natural threats that may interfere with the survival of any of the populations. If suitable habitat is found in the proposed refuge, discovery and/or repatriation of this species could be a feasible way of reaching the recovery goal and contributing to downlisting and eventual delisting of the rough pigtoe.

Shiny Pigtoe

The endangered shiny pigtoe (Fusconaia cor) was discovered in the mid-1960s in the Paint Rock River and historically occurred in five other river systems. The present range includes the Paint Rock, North Fork Holston, Clinch, Powell, and Elk Rivers. In 1980, this species was observed at seven sites in Alabama along the Paint Rock River between Paint Rock River Miles 44.8 and 58.5. The ultimate goal of the Recovery Plan (USFWS 1983a) is to maintain and restore viable populations of this species to a significant portion of its historic range and remove it from the federal list. This can be accomplished by protecting and enhancing habitat containing the species' populations, establishing populations in rivers and river corridors that historically contained the species and its habitat, and protecting the shiny pigtoe from present and foreseeable human-related and natural threats that may interfere with the survival of any of the populations. Establishment of this refuge would afford the opportunity to locate suitable sites for habitation, and develop successful methods for repatriation and monitoring of the reintroductions. This could contribute to downlisting and eventual delisting of the shiny pigtoe.

Slabside Pearlymussel
The slabside pearlymussel (Lexingtonia dolabelloides) is a candidate species that primarily inhabits sand, fine gravel, and cobble substrates in relatively shallow riffles and shoals with moderate current (Parmalee and Bogan 1998). Currently, it is limited to 10 populations in the Tennessee River system, having been extirpated (eliminated) from the Cumberland River system and from the Tennessee River main stem. The Paint Rock River system (including Larkin Fork, Estill Fork, and Hurricane Creek) is considered a single population segment, but it occurs only in the lower mile or so of the three tributary streams. The slabside pearlymussel has been eliminated from about three-fifths of the total number of streams from which it was historically known. Only two populations are recruiting as evidenced by finding juveniles (i.e., Duck and Paint Rock Rivers). The slabside pearlymussel is found at numerous sites in the Duck River within a 40-mile reach, and is found at numerous sites within a 45-mile reach of the Paint Rock River (Fobian et al. 2008).

Snuffbox
The endangered snuffbox (Epioblasma triquetra) is a small- to medium-sized freshwater mussel found in areas with a swift current, although it is also found in Lake Erie and some larger rivers. Adults often burrow deep in sand, gravel, or cobble substrates, except when they are spawning or the females are attempting to attract host fish. It once occurred in the Tennessee River and some of its tributaries; however, the snuffbox is now known only to persist in approximately 30 miles of the Paint Rock River and its tributaries. The Paint Rock River is considered a stronghold for the snuffbox with documented recruitment occurring, population trends improving, and its potential viability considered high. Establishment of this refuge would help to conserve these mussel populations and their habitats.

Rabbitsfoot
The rabbitsfoot (*Quadrula cylindrica cylindrica*) is a candidate species and described as a medium- to large-sized mussel that reaches about 6 inches in length, primarily inhabiting small- to medium-sized streams and some larger rivers. It usually occurs in shallow areas along the bank and adjacent runs and shoals where the water velocity is reduced. Specimens may also occupy deep water runs, having been reported in 9 to 12 feet of water. Bottom substrates generally include sand and gravel. Within the Paint Rock River, the rabbitsfoot is extant in approximately 56 river miles. Establishment of this refuge would help protect habitat for this imperiled mussel.

Anthony's Riversnail
Anthony's riversnail (*Athearnia anthonyi*) is an endangered species known from only three disjunct populations in the Tennessee River system: the Tennessee River, Sequatchie River, and Limestone Creek. Although much of its life history remains unknown, this species prefers medium to large river habitats with cobble/boulder substrates in the vicinity of riffles with strong current. Population demographics are only available for the Limestone Creek population, which appears to be a viable population (USFWS 1997b). This species has not been recently found in the Paint Rock River.

<u>Plants</u>

American Hart's-tongue Fern
The threatened American Hart's-tongue Fern (*Asplenium scolopendrium* var. *americanum*) occurs in the Paint Rock River Watershed at Fern Cave NWR. The ultimate goals of the Recovery Plan (USFWS 1993a) are to protect and recover this species to the point where it can be removed from the federal list. The first step toward recovery would be protection and management of all extant populations to ensure their continued survival. Little is known about the specific biological and habitat requirements of this species. Therefore, it would be necessary to conduct detailed genetic and demographic studies and ecological research to gain understanding needed to develop appropriate

protection and management strategies. The ultimate effects of various kinds of habitat disruption must be determined and, if necessary, prevented. Active management may be required to ensure continued survival and vigor. American Hart's-tongue fern would be considered for removal from the federal list when the following criteria are met: (1) At least 15 populations in the United States (two in Alabama, two in Tennessee, four in Michigan, and seven in New York) are self sustaining and occur on sufficiently large tracts to ensure their perpetuation with a minimal amount of active management; and (2) all of the populations and their habitat are protected from present and foreseeable human-related and natural threats that may interfere with the survival of any of the populations. Although this plant is found over a very wide area, from Alabama to Canada, its populations tend to be very small and isolated due to its unique habitat. Many activities threaten the American Hart's-tongue fern, and because of its natural rarity, it is particularly vulnerable to disturbance. Additional surveys for this plant on this refuge could provide valuable information regarding presence of suitable habitat for protection and possible propagation of the American Hart's-tongue fern.

Morefield's Leather-flower

The Morefield's Leather-flower Recovery Plan (USFWS 1994) states that the endangered Morefield's leather-flower (*Clematis morefieldii*) will be reclassified to threatened, when at least 10 viable populations are protected from any foreseeable threats. Limited surveys have been conducted for this plant. A thorough systematic survey for new populations is needed. Suitable habitat should be identified through an analysis of supporting habitat. Particular attention should be focused on sites with the American smoke tree (*Cotinus obovatus*), which appears to be a principal indicator species for Morefield's leather-flower. The location of other populations will perhaps yield important information on this species' habitat requirements. In addition, documentation of apparently suitable habitat, which lacks the plants, will be important to any future plans to establish additional populations. Establishment of this refuge would allow further exploration for the existence of this species within the proposed refuge boundaries, and expand the limited and dwindling populations known on Huntsville, Keel, and Monte Sano Mountains in Alabama.

Price's Potato-bean

The threatened Price's potato-bean (*Apios priceana)* is known from Alabama, Kentucky, Mississippi, and Tennessee. It thrives in open, wooded areas, often in forest gaps or along forest edges. It seems to prefer mesic sites and is often found in open, low areas near a stream or along the banks of streams and rivers. The species does not flower every year and is difficult to identify without flowers. Consequently, it may be over-looked during surveys, when not flowering. It has been documented in the lower Paint Rock River watershed and may occur elsewhere along the Paint Rock River. The Recovery Plan (USFWS 1993b) provides that Price's potato-bean would be considered for delisting when 25 geographically distinct, self-sustaining populations are adequately protected and maintained for 10 years. A population will be considered to be self-sustaining if it successfully reproduces and the size is stable or increasing. Additional surveys for this plant on this proposed refuge could provide valuable information regarding presence of the species and its suitable habitat and could contribute to delisting of the species.

White Fringeless Orchid

The white fringeless orchid (*Platanthera integrilabia*) is a candidate species that grows in wet, boggy areas at the heads of streams and on seepage slopes. It is often associated with Sphagnum in partially, but not fully shaded areas. This species was originally known from Alabama, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, and Virginia. It has been extirpated from North Carolina (Henderson and Cherokee Counties) and Virginia (Lee County) (NatureServe 2009).

State-listed Species

Tennessee Department of Environment and Conservation's (TDEC) Natural Heritage Division has identified numerous rare and imperiled species in Franklin County, many of which are likely to be found in the AOI. Over 50 state-listed threatened and endangered species are found in the county (Table 8). These are species that are likely to become extirpated in the state in the foreseeable future. For the purposes of this Draft LPP/EA, only state-listed species that have a legal ranking are reported.

Table 8. Tennessee-listed species likely found in the AOI

Common Name	Scientific Name	Status
Mammals		
Gray Bat	*Myotis grisescens*	E
Indiana Bat	*Myotis sodalis*	E
Birds		
Bachman's Sparrow	*Aimophila aestivalis*	E
Amphibians and Reptiles		
Northern Pinesnake	*Pituophis melanoleucus melanoleucus*	T
Tennessee Cave Salamander	*Gyrinophilus palleucus*	T
Fish		
Palezone Shiner	*Notropis albizonatus*	E
Snail Darter	*Percina tanasi*	T
Invertebrates		
Alabama Lampmussel	*Lampsilis virescens*	E
Fine-rayed Pigtoe	*Fusconaia cuneolus*	E
Pale Lilliput	*Toxolasma cylindrellus*	E
Pink Mucket	*Lampsilis abrupta*	E
Rough Pigtoe	*Pleurobema plenum*	E
Shiny Pigtoe	*Fusconaia cor*	E
Anthony's Riversnail	*Athearnia anthonyi*	E
Plants		
Sharp's Lejeunea	*Lejeunea sharpii*	E
Ridge-stem False-foxglove	*Agalinis oligophylla*	E
White-leaved Leatherflower	*Clematis glaucophylla*	E
Southern Lady's-slipper	*Cypripedium kentuckiense*	E
Small's Stonecrop	*Diamorpha smallii*	E

Common Name	Scientific Name	Status
Short-leaved Panic Grass	*Dichanthelium ensifolium ssp. curtifolium*	E
Dwarf Sundew	*Drosera brevifolia*	T
Horse-tail Spike-rush	*Eleocharis equisetoides*	E
Wolf Spike-rush	*Eleocharis wolfii*	E
Tawny Cotton-grass	*Eriophorum virginicum*	E
Harper's Fimbristylis	*Fimbristylis perpusilla*	E
Dwarf Huckleberry	*Gaylussacia dumosa*	T
Florida Hedge-hyssop	*Gratiola floridana*	T
Slender Blue Flag	*Iris prismatica*	T
Butternut	*Juglans cinerea*	T
Slender Blazing-star	*Liatris cylindracea*	T
Canada Lily	*Lilium canadense*	T
Canby's Lobelia	*Lobelia canbyi*	T
Yellow Honeysuckle	*Lonicera flava*	T
Globe-fruited False-loosestrife	*Ludwigia sphaerocarpa*	T
Broad-leaved Barbara's-buttons	*Marshallia trinervia*	T
Ozark Bunchflower	*Melanthium woodii*	E
Cutleaf Water-milfoil	*Myriophyllum pinnatum*	T
Alabama Snow-wreath	*Neviusia alabamensis*	T
Smooth False Gromwell	*Onosmodium molle ssp.subsetosum*	E
Heart-leaved Plantain	*Plantago cordata*	E
Shadow-witch	*Ponthieva racemosa*	E
Rough Rattlesnake-root	*Prenanthes aspera*	E
Sand Cherry	*Prunus pumila*	E
Yellow Water-crowfoot	*Ranunculus flabellaris*	T
Obscure Beak-rush	*Rhynchospora perplexa*	T
Cumberland Rosinweed	*Silphium brachiatum*	E
Southern Prairie-dock	*Silphium pinnatifidum*	T
Eared Goldenrod	*Solidago auriculata*	T
Prairie Goldenrod	*Solidago ptarmicoides*	E
Shining Ladies'-tresses	*Spiranthes lucida*	T
Roundleaf Fameflower	*Talinum teretifolium*	T

Common Name	Scientific Name	Status
Bristle-fern	*Trichomanes boschianum*	T
Dwarf Filmy-fern	*Trichomanes petersii*	T
Least Trillium	*Trillium pusillum*	E
Limerock Arrowwood	*Viburnum bracteatum*	E
Wide-leaved Yellow-eyed Grass	*Xyris laxifolia var. iridifolia*	T
Death-camas	*Zigadenus leimanthoides*	T

E = Endangered – a species whose prospects of survival or recruitment within the state are in jeopardy or are likely to become so within the foreseeable future.
T = Threatened – a species that is likely to become endangered within the foreseeable future.

Source: Tennessee Department of Environment and Conservation 2009

State and Globally Ranked Species

TDEC also uses a non-legal ranking system indicating rarity and vulnerability at the state level. The AOI likely includes over 100 species that are ranked either S1 - Extremely rare and critically imperiled, S2 - Very rare and imperiled, or S3 - Rare and uncommon (TDEC 2009).

Global conservation rankings are primarily developed by NatureServe and describe species' conservation status world-wide. Within the AOI, at least 17 species are found with rankings of G1 (critically imperiled – at high risk of extinction due to extreme rarity) to G3 (vulnerable – at moderate risk of extinction due to small population size and ongoing threats). These include endemic species, meaning they are found nowhere else on Earth. Examples include several cave-dwelling invertebrates: roundworm (*Eremidrilus allegheniensis*), beetle (*Ptomaphagus chromolithus*), and pseudoscorpion (*Tyrannochthonius fiskei*) (Tennessee Department of Environment and Conservation 2009).

RELATED RESOURCES

Sections B and C of Chapter II in the Draft LPP provide an overview of related resources in this landscape, including landscape conservation goals and objectives, as well as partner efforts. The proposed refuge would contribute to many of these, including the Appalachian Landscape Conservation Cooperative (USFWS 2011x); conservation easements (e.g., Wetlands Reserve Program lands); non-governmental conservation lands; and international, national, and regional conservation plans and initiatives. Several of these are listed below.

International

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

National

- America's Great Outdoors Initiative (AGO 2011)
- Wetlands Reserve Program (WRP) of the Natural Resources Conservation Service (NRCS) of the U.S. Department of Agriculture (USDA) (USDA 2011)
- Partners for Fish and Wildlife (USFWS 2012x)
- Forest Stewardship Program (USDA 2011)

Regional

- PIF Southern Ridge and Valley conservation recommendations (PIF 2011)
- South Cumberland Conservation Action Plan/Jackson Mountains Conservation Area (Land Trust for Tennessee and Sewanee Environmental Institute 2011)
- Threatened and Endangered Species Recovery Plans (USFWS 2011)
- Tennessee River Basin Watershed Management Plan (TVA

State-level

- Tennessee Wildlife Resources Agency (TWRA) Farm Wildlife Habitat Program (TWRA 2011)
- Tennessee Stream Mitigation Program (TWRA 2011)
- Tennessee's Comprehensive Wildlife Conservation Strategy (TWRA 2005)

Several state and federal agencies serve as key partners in this landscape, including state wildlife agencies and USDA's Natural Resources Conservation Service. The Service also works closely with various non-profit conservation organizations

Currently, TSNA and TWRA have protected over 3,901 acres (about 10 percent) of the AOI (Figure 1). These sites include Bear Hollow Wildlife Management Area and Walls of Jericho State Natural Area. These land conservation efforts have aided the protection of imperiled species, hardwood forests, and recreational areas that contribute to the long-term ecological health, economy, and way of life of the region.

SOCIOECONOMIC ENVIRONMENT

This section summarizes population, employment, income, tourism, and wildlife-oriented recreation data and trends for counties in the AOI and, where applicable, state and national levels. As stated earlier, the affected area within which socioeconomic impacts would be analyzed is the AOI and comprises Franklin County, Tennessee.

REGIONAL ECONOMIC SETTING

The AOI comprises a landscape that is largely rural, with agriculture, forestry, and outdoor recreation/tourism being among the more important economic drivers of the area of interest. Over 2 million people are located within a 1- to 2-hour drive of the AOI (U.S. Census Bureau 2012). For the purposes of this Draft LPP/EA, selected demographic and economic data for Franklin County, Tennessee, were summarized.

POPULATION

Recent Population Trends: 2000-2010

Human population characteristics for the AOI are shown in Table 9. Data from 2000 are compared to 2010, and the general trend is that population has continued to rise. The population of Tennessee grew by over 11 percent during the past 10 years. Franklin County's population growth rate was less than half of that, at 4.5 percent.

The population densities (persons' per-square-mile) increased in by 11.5 percent between 2000 and 2010 (Table 9). Franklin County's growth rate was slightly less than half that rate during the same timeframe (U.S. Census Bureau 2012).

Table 9. State and county population estimates, characteristics, and trends (2000 - 2010)

Demographic Unit	Population Characteristics in 2000		Population Characteristics in 2010		Population Change (2000 to 2010)
	Residents	Persons per Square Mile	Residents	Persons per Square Mile	
Tennessee	5,689,283	135	6,346,105	151	+11.5%
Franklin County	39,270	68	41,052	71	+4.5%

Source: U.S. Census Bureau 2012

Projected Population Trends: 2000-2030

As was discussed above, the population of Tennessee rose between 2000 and 2010 and is expected to do so for the next 20 years. With a growth rate similar to the national rate or change, it is estimated that Tennessee's population will reach over 7.3 million by 2030, a rise of almost 30 percent compared to 2000 (Table 10; U.S. Census Bureau 2004). However, the projections for Tennessee may underestimate future growth. Data from 2004 projected Tennessee's population to rise to 5,965,317 by 2010, but actual data from the Census that year estimated 6,346,105 individuals in the state, a 6 percent difference. The future growth rate for Franklin County is substantially less, and is projected to be almost 8 percent, with a county-wide population of 42,363 by 2030 (University of Tennessee 2012) (Table 10).

Table 10. National and state population trends (2000–2030)

Demographic Unit	2000[1]	2010[1]	2020[2, 3]	2030[2, 3]	Percent Population Change (2000 to 2030)
United States	281,421,906	308,745,538	335,804,546	363,584,435	29.1%
Tennessee	5,689,283	6,346,105	6,887,930	7,380,634	29.7%
Franklin County	39,270	41,052	41,522	42,363	7.8%

Sources: [1] U.S. Census Bureau 2012; [2] US Census Bureau 2004; [3] University of Tennessee

EMPLOYMENT AND INCOME

Employment and income data was summarized for Tennessee and Franklin County (Tables 11 and 12).

Franklin County employment data for various industry categories were summarized for 2000 and 2009 in Table 11. In 2000, land-based jobs associated with agriculture, forestry, and others comprised a small part of the total number of jobs. Manufacturing and retail, both relatively large

component of the overall job pool, grew slightly. Also a major employment category, educational services and health/social care, declined. Professional/scientific/management services also dropped (U.S. Census Bureau 2000 and 2009).

Table 11. Percent full-time and part-time employment for Franklin County (2000-2009)

Industry	2000	2009
Agriculture, forestry, fishing and hunting, and mining	2.2	ND
Construction	7.6	ND
Manufacturing	25.9	31.7
Wholesale trade	2.8	ND
Retail trade	11.9	14.1
Transportation and warehousing, and utilities	4.0	ND
Information	0.9	ND
Finance and insurance, real estate, and rental and leasing	3.9	3.1
Professional, scientific, and management, and administrative and waste management services	7.2	1.6
Educational services, and health care and social assistance	20.1	14.6
Arts, entertainment, and recreation, and accommodation and food services	4.9	7.8
Other services, except public administration	5.0	3.2
Public administration	3.6	ND

ND – no data

Source: U.S. Census Bureau 2000 and 2009

National, state, and county income, unemployment and poverty estimates for 2000 and more recent data are shown in Table 12. Average annual incomes rose in all four counties included in the area of interest, following patterns seen at state and national levels. The effects of the economic downturn in recent years can be seen in the comparison between 2000 and 2010 unemployment and poverty data. In all counties, unemployment levels approximately tripled between 2000 and 2010. As can be expected, county poverty rates also increased during the 2000-2010 period, as a result of rising unemployment levels. Generally, poverty rates increased several percentage points during the 2000-2010 timeframe.

Table 12. Income, unemployment, and poverty estimates

Demographic Unit	Average Annual Pay (US Dollars)		Percent* Unemployment		Percent of Persons Below Poverty Line	
	2001	2010	2000	2010	2000	2010
United States	$41,994	$51,425	3.7	9.0	12.4	15.3
Tennessee	$31,520	$41,572	3.5	9.7	13.5	17.8
Franklin County	$23,605	$30,117	4.0	10.2	13.2	14.8

**Annual averages*
Sources: U.S. Census Bureau 2010, U.S. Department of Labor 2012x and 2012X

TOURISM

Tourism is an important part of Tennessee's economy, contributing $23.1 billion in revenue in 2010. State-wide domestic and international traveler expenditures supported 278,400 jobs that year. In 2010, tourism expenditures for Franklin County totaled approximately $17.8 million and supported 110 jobs (Tennessee Department of Tourism Development 2011).

WILDLIFE-DEPENDENT RECREATION

Fish and wildlife are economically important nationwide. According to the report, "Banking on Nature 2006: The Economic Benefits to Local Communities of National Wildlife Refuge Visitation," approximately 34.8 million people visited national wildlife refuges in Fiscal Year 2006, generating almost $1.7 billion in total economic activity and creating almost 27,000 private sector jobs, producing about $542.8 million in employment income. Additionally, recreational spending on refuges generated nearly $185.3 million in tax revenue at the local, county, state, and federal levels (Carver and Caudill 2007). In 2006, nearly 71 million people 16 years and older spent $45.7 billion and generated $122.6 billion while fishing, hunting, or observing wildlife (Leonard 2008). Since then, Refuge System visitation has grown with over 45.7 million visitors in 2011. According to a Department of the Interior Economic Contributions 2011 report, in 2010 national wildlife refuges generated more than $3.98 billion in economic activity and created more than 32,000 private sector jobs nationwide (U.S. Department of the Interior 2011). As land development continues and the number of places left to enjoy wildlife decreases, refuge lands may become even more important to the local community. It can benefit the community directly by providing recreational and employment opportunities for the local population and indirectly by attracting tourists from outside the area to generate additional dollars for the local economy.

Throughout Tennessee, over 3.5 million participants engaged in one or more of three wildlife-related recreation activities (fishing, hunting, wildlife watching) during 2006, as shown Table 13 (USFWS and U.S. Census Bureau 2006). The majority of participants, over 2.3 million, engaged in wildlife watching, followed by fishing (about 871,000), and hunting (approximately 329,000). Expenditures were the highest for wildlife watchers (almost $1 billion), followed by anglers (approximately $600 million), and hunters (about $500 million). Together, participants engaged in wildlife-dependent recreation spent over $2 billion in Tennessee during 2006. The average expenditures per participant were the highest for hunting ($867), followed by fishing ($623), and wildlife watching ($400).

Table 13. Economics of wildlife-dependent recreation in Tennessee during 2006

Activity	Number of Participants	Expenditures			
		Trip-related	Equipment and Supplies	Total	Average Per Participant
Fishing	871,000	$290,424,000	$309,259,000	$599,683,000	$623
Hunting	329,000	$109,447,000	$378,973,000	$488,420,000	$867
Wildlife Watching	2,362,000	$327,240,000	$665,126,000	$992,365,000	$400
Total	3,562,000	$727,111,000	$1,353,358,000	$2,080,468,000	

Source: USFWS and U.S. Census Bureau 2006

RECREATIONAL ACTIVITIES AND TRENDS

Still largely rural, the AOI provides a variety of opportunities for outdoor recreation, including hunting, fishing, wildlife viewing, hiking, biking, horseback riding, camping, and off-roading. For the purposes of this Draft LPP/EA, the focus of our discussion on recreational opportunities will be on those that are wildlife-dependent.

In the AOI, currently only state (TSNA and TWRA) managed lands are accessible to the public for a variety of recreational activities. Combined, they cover about 3,901 acres, about one-tenth of the AOI. Refer to Figure 1 for a map of the TSNA and TWRA lands within the AOI.

- Bear Hollow Mountain WMA – North
- Bear Hollow Mountain WMA – South
- Walls of Jericho State Natural Area

Hunting

The variety of upland and wetland habitat found in the AOI support a diversity of game species, including bear, deer, wild hog, turkey, waterfowl, dove, quail, and a variety of small game. Bears are hunted in Tennessee, but currently only in several eastern counties. Many of these species attract sport and game enthusiasts to the area. Several of the game species hunted in the AOI are further discussed below. The TWRA wildlife management area systems have been highly instrumental in providing quality hunting opportunities to Tennessee. In Tennessee, there are nearly 100 WMAs managed by TWRA. They vary in size from 53 to 625,120 acres, and all WMAs are available to the public for hunting and trapping, although certain regulations do apply. Currently, WMAs in Tennessee total more than 1,250,000 acres.

Deer
White-tailed deer are the most popular game animal in Tennessee, and based on surveys collected in 2006, approximately 615,000 hunters (or 85 percent of all hunters) targeted this species (USFWS and U.S. Census Bureau 2006). In Tennessee, deer restoration activities between 1940 and 1985 resulted in the successful establishment of this game species statewide. In 2005, there were an estimated 900,000 deer in Tennessee. To date, the majority of the herd exists in middle and western Tennessee, while densities in the Mississippi River Counties, the Cumberland Plateau, and far eastern portions of the state remain below desired levels. The increasing deer population has been reflected in an increasing harvest, which was a record 179,542 deer during the 2004/05 season. Hunter success has grown with the increasing harvests, reaching a record in 2004, with 46 percent of deer hunters harvesting at least one deer. Although hunter numbers have declined slightly since their peak of 242,000 in 1999, they have remained relatively stable since the turn of the century, averaging 217,400 deer hunters per year (Tennessee Wildlife Resources Agency 2011a). Recent deer harvest data for two WMAs in the AOI are shown in Table 14.

Wild Hog
Wild or feral hogs are found in Tennessee. In just over a decade, the distribution of the state's wild hog population has spread at an accelerated rate. Although first confined to local areas in east Tennessee and the Cumberland Plateau, it is believed that viable hog populations can be found in close to a third of Tennessee's counties. On WMAs, wild hogs can be taken without limit during scheduled hunts. On private lands, the season is open year-round with no bag limits (Tennessee Wildlife Resources Agency 2011b).

Wild Turkey
Wild turkey is a highly popular game bird in Tennessee. Uncontrolled hunting and habitat loss, combined with several years of extreme weather during the poult rearing season resulted in the near-extirpation of the species in Tennessee. The State of Tennessee and partners have been actively restoring wild turkey populations. Due to the success of wild turkey management efforts, the state re-opened all portions of all 95 counties to turkey hunting in 2000. During the 2009-2010 hunting season, 33,263 birds were harvested state-wide, more than double than what was taken in 1998 (Tennessee Wildlife Resources Agency 2010). Recent turkey harvest data for two WMAs in the AOI are shown in Table 14.

Waterfowl
Waterfowl comprise an important part of migratory birds hunted in the United States, and according to national survey data, approximately 1.8 million hunters targeted ducks and geese in 2006 (USFWS and U.S. Census Bureau 2006). Preliminary state-wide waterfowl survey results estimated 1,521,010 ducks and 175,092 geese, with the vast majority being observed in Region 1 (TWRA 2012).

Quail
Northern bobwhite quail populations are declining in Tennessee, largely a result of changes in land use that cause declines in available habitat. This is a trend mirrored across the eastern United States. Quail utilize open, successional habitats, which are typically not found on intensively managed, highly mechanized farms that dominate the landscape. Quail surveys show annual reductions of approximately 4 percent (Tennessee Wildlife Resources Agency 2011). In general, the AOI contains large tracts of hardwoods, habitat not favored by quail and consequently opportunities for hunting this species in the area are likely limited.

Dove
The mourning dove (*Zenaida macroura*) is the leading migratory game bird in the United States and more doves are harvested annually than all other migratory game birds combined (Dolton et al. 2007). In 2008, over 17 million doves were harvested in the United States, with approximately 798,200 taken in Tennessee (Sanders and Parker 2010). This game species prefers open and edge habitat and opportunities for hunting this species are likely somewhat limited in the heavily forested portions of the AOI.

Other Small Game
In addition to quail and dove, other small game hunted in Tennessee include snipe, woodcock, rabbit, opossum, raccoon, fox, and squirrel. Of these, squirrels are among the most targeted, with over 78,000 hunters seeking this species in Tennessee during 2006. Rabbits were also a popular, with 66,000 hunters pursuing this species (USFWS and U.S. Census Bureau 2006).

Table 14. Game harvest data for Bear Hollow WMA between 2006 and 2011

Game Species	Bear Hollow WMA, Tennessee				
	2006-07	2007-08	2008-09	2009-10	2010-11
Deer	72	60	42	90	104
Turkey	1	2	2	4	4

Source: TWRA 2012

Fishing

The vast and varied water resources of Tennessee provide numerous opportunities for freshwater fishing. Water resources of Tennessee include 60,000 miles of rivers and streams and approximately 536,000 acres of ponds, lakes, and reservoirs. According to a 2006 survey, over 8.7 million resident and visiting freshwater anglers fished in Tennessee. Major species fished include crappie, sunfish, white/striped bass, black bass, walleye, northern pike, trout, and various catfish (USFWS and U.S. Census Bureau 2006).

Wildlife Viewing

Wildlife viewing comprises the largest group of people engaged in wildlife-dependent recreational activities. During 2006, over 2.3 million participants engaged in wildlife watching in Tennessee, more than hunters and anglers combined (USFWS and U.S. Census Bureau 2006). Although hunting and fishing have seen declines in participation rates in recent years (Aiken 2009), wildlife watching continued to grow in popularity nationally and in Tennessee between 1991 and 2006, based on survey data (Aiken 2009). In the AOI, opportunities for wildlife watching in the AOI are provided by trails on state lands.

VISUAL RESOURCES

The visual resources of the AOI have been relatively undisturbed. The area remains largely rural in character, with few large, tall structures or major highways affecting the landscape.

LAND USE

Understanding land use and ownership is important for assessing the social and economic impacts of conservation actions, including the potential establishment of a refuge. For the purposes of this Draft LPP/EA, the National Land Cover Dataset (NLCD) (Fry et al. 2011) was used to portray land use. The majority of the lands in the AOI is considered to be in "open" or undeveloped land uses and most parcels are in private ownership, including estates, land investment companies, commercial timber plantations, and family farms (Table 15). The AOI currently contains several large tracts (over 1,000 acres) of mostly forested land. Several of these tracts are owned by forestry investment companies, and some of the parcels are being used for commercial timber. Farmland is typically found along the floodplains, where the land is more level and water more accessible. About 10 percent of the AOI is in public ownership and consists of state lands, including Bear Hollow Wildlife Management Area and Walls of Jericho State Natural Area.

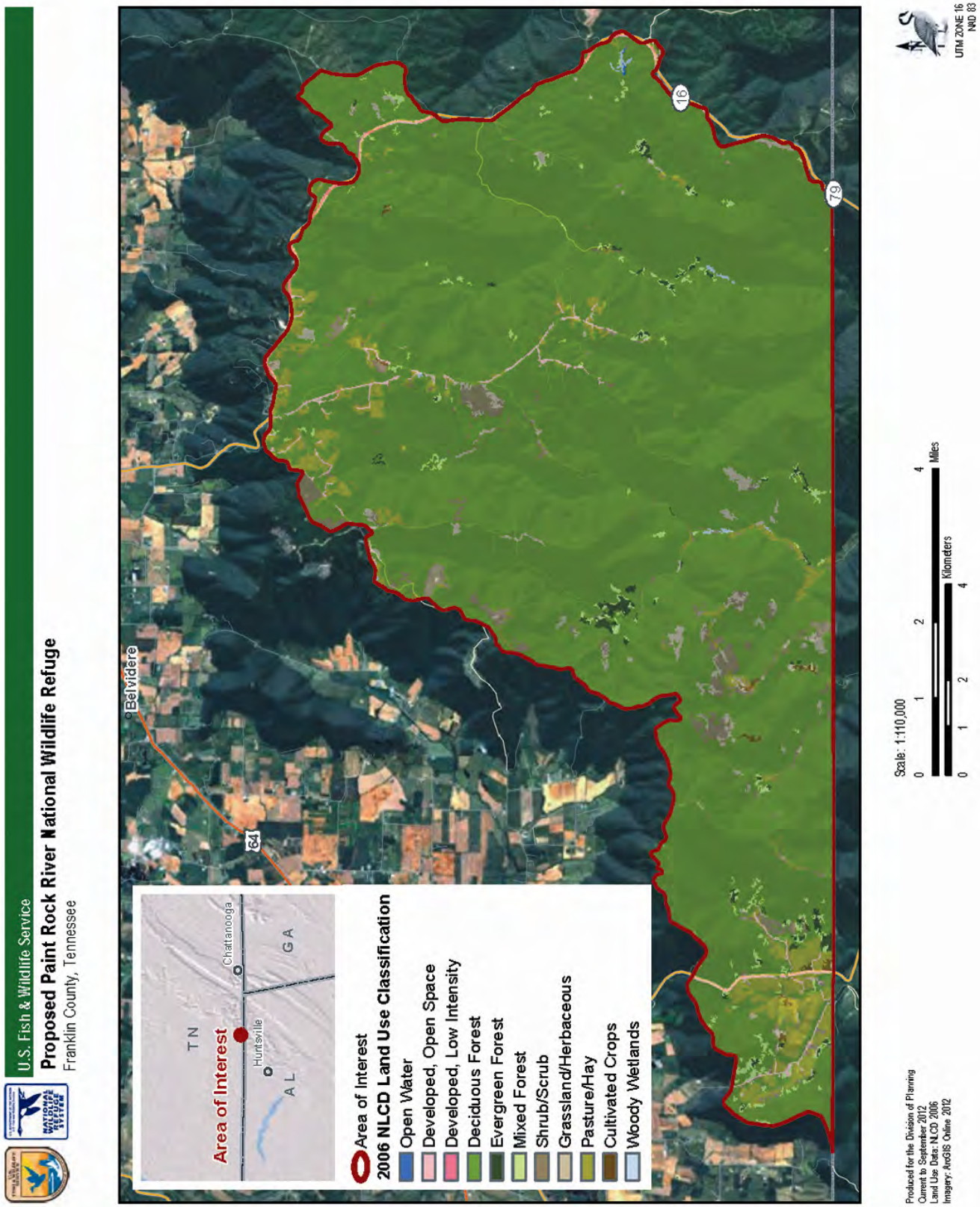
Table 15. Land use in the AOI

Land Use Class	Total Acres
Deciduous Forest	36,265
Planted/Cultivated	1,601
Scrub/Shrub	1,008
Grassland/Herbaceous	508
Mixed Forest	437
Developed	417
Evergreen Forest	229
Woody Wetlands	36
Open Water	4
Total	***40,505***

Source: Fry et al. 2011
[1]Includes "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. Scrub/Shrub - 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 gramanoid/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.*

Figure 6. Land use within the AOI based on 2006 National Land Cover Data **(Fry et al. 2011)**



CULTURAL RESOURCES

Section 106 of the National Historic Preservation Act of 1966, as amended, and Section 14 of the Archaeological Resources Protection Act require the Service to evaluate the effects of any of its actions on cultural resources (e.g., historical, architectural, and archaeological) that are listed or eligible for listing in the National Register of Historic Places (NRHP)). In accordance with these regulations, the Service has coordinated the review of this proposal with the Tennessee State Historic Preservation Office.

The body of federal historic preservation laws has grown dramatically since the enactment of the Antiquities Act of 1906. Several themes recur in these laws, their promulgating regulations, and more recent executive orders. They include: (1) Each agency is to systematically inventory the historic properties on their holdings and to scientifically assess each property's eligibility for the National Register of Historic Places; (2) federal agencies are to consider the impacts to cultural resources during the agencies' management activities and seek to avoid or mitigate adverse impacts; (3) the protection of cultural resources from looting and vandalism are to be accomplished through a mix of informed management, law enforcement efforts, and public education; and (4) the increasing role of consultation with groups, such as Native American tribes, in addressing how a project or management activity may impact specific archaeological sites and landscapes deemed important to those groups. The Service, like other federal agencies, is legally mandated to inventory, assess, and protect cultural resources located on those lands that the agency owns, manages, or controls. The Service's cultural resource policy is delineated in 614 FW 1-5 and 126 FW 1-3. In the Service's Southeast Region, the cultural resource review and compliance process is initiated by contacting the Regional Historic Preservation Officer/Regional Archaeologist (RHPO/RA). The RHPO/RA would determine whether the proposed undertaking has the potential to impact cultural resources, identify the "area of potential effect," determine the appropriate level of scientific investigation necessary to ensure legal compliance, and initiate consultation with the pertinent State Historic Preservation Office and federally recognized tribes. The Service believes that the proposed acquisition of lands would have no adverse effect on any known or yet-to-be identified NRHP-eligible cultural resources. However, in the future, if the Service plans or permits any actions that might affect eligible cultural resources, it would carry out appropriate site identifications, evaluations, and protection measures as specified in the regulations and in Service directives and manuals.

OVERVIEW OF CULTURAL RESOURCES

The following section summarizes the prehistoric (pre-European) time, which spans approximately 11,500 B.C. to 1600 A.D. and historic (1600 A.D. until present) cultural resources in the AOI.

Prehistory

Humans are believed to have inhabited the AOI as early as 11,500 B.C., having migrated from Asia via the Bering Strait during the last ice age, when sea levels were substantially lower than today. The region's prehistoric times have been separated into the following stages: Paleoindian, Archaic, Woodland, and Mississippian.

Paleoindian Stage (11,500 to 8,500 B.C.)

Paleoindians were highly mobile hunter-gatherers who utilized resources opportunistically during a time when the region had a much colder climate, with harsh winters and shorter summers. The landscape consisted of a mosaic of grasslands with patchy conifer stands, and deciduous tree species made up a relatively small component of the forest types. In addition to large game (mammoth, mastodon, ground sloth, bison, etc.), they hunted smaller wildlife, fished, and collected snails and clams. They gathered seasonally available fruits, nuts, tubers, and other plant materials.

They utilized a variety of implements, which they fashioned from various stones and rocks, and these tools were often used diagnostically and include Clovis, Cumberland, and Redstone type artifacts (Gage and Herrmann 2009).

Archaic Stage (8,500 to 900 B.C.)
The Archaic stage is marked by a shift in climate and forest types, with a transition from a boreal, more open landscape to mixed hardwood forests and a loss of most of the grasslands. The remaining North American megafauna became extinct. Humans adapted to the change in exploitable faunal and floral resources, and there was a shift in material culture and settlement patterns. During this stage, people became slightly more sedentary, as is evidenced in the archaeological record by larger, more densely occupied sites. Faunal remains from archaeological sites indicate that white-tailed deer, turkey, squirrel, raccoon, and box turtle became the most common sources of meat. Meanwhile, hickory and acorn nuts were common plant foods. Atlatl weights appeared for the first time and stone net sinkers have been found in the archaeological record and suggested new technologies for fishing. In addition, container technology included the advent of soapstone bowls. Other tool advances included grooved axes and limestone digging implements. Burial practices also became more elaborate. Evidence of long distance trade is seen in the archaeological record by the presence of non-local artifacts, such as marine shell, copper, and greenstone (Gage and Herrmann 2009).

Woodland Stage (900 B.C. to 600 A.D.)
Regionally, the Woodland Stage is marked by the advent of pottery. Temporal indicators throughout the Woodland Stage include tempering agents, surface treatments, and vessel forms. People became increasingly sedentary, as evidenced by larger, more permanent communities. Settlements were typically along rivers, with temporary sites found in upland areas, likely to take advantage of seasonal hunting opportunities. Horticulture became more important during this stage, but initially it remained on a smaller scale than hunting, fishing, and gathering. Woodland subsistence was largely based on white-tailed deer, elk, bear, turkey, raccoon, beaver, and squirrel, accompanied by turtles and fish. Shellfish procurement became increasingly important, as people utilized the diverse and abundant populations of freshwater snails, mussels, and crayfish. Nut crops such as acorn, hickory, and walnut were widely exploited. Towards the end of the Woodland Stage, cultivation of small grains contributed a major component of the diet. The move to a more agrarian way of life also led to the development of numerous new tools, including drills, scrapers, knife blades, pecked celts, grooved axes, hammerstones, whetstones, mortars, pestles, teatite bowls, and gorgets (Gage and Herrmann 2009).

Mississippian Stage (900 to 1600 A.D.)
The Mississippian stage is marked by a shift in political, social, and overall cultural conditions in the southeast. The foundation for Mississippian society was believed to have its source in the Mississippi Valley, but quickly spread east and incorporated local variations. Pottery with shell tempering appeared, with small, triangular points. (Hamilton and Madison types) were prevalent; and floodplain horticulture, focused on maize, beans, and squash, was practiced. The construction of massive ceremonial centers, such as Cahokia and Moundville, occurred and ceremonialism, incorporating aspects of horticulturalism, was practiced. Dwellings became more elaborate and building materials and designs improved, making structures more durable and offering better protection against the elements. Public buildings also became more common. Towards the end of this stage, economies were primarily maize-based, supplemented with several lesser crops, nuts, deer, turkey, turtle, and fish.

Historic (~1600 A.D to Present)
By 1600, dramatic shifts in the regional population marked the decline of the Mississippian occupations. Floodplain horticultural and earth mound construction continued among the Crow Creek phase and the Dallas cultures to the north. The Cherokee and Chickasaw Tribes followed this phase, with the first Europeans appearing with Desoto in 1539. About 23 years later, Spanish soldiers from the Alabama River area entered the area of the eastern portion of the middle Tennessee Valley. Tribes occupying this region at the time included the Chickasaw, Creek, Shawnee, Natchez, and the Cherokee. The Chickasaw aligned with the British during the French and Indian War, but remained neutral during the American Revolution. In 1786, the Treaty of Hopewell established the northern boundary of the Chickasaw lands as the divide between the Cumberland and Tennessee Rivers west to the Ohio. Pressure from American settlers produced another treaty in 1832, which resulted in the Chickasaw giving up all lands east of the Mississippi. Soon after, the majority of the tribe moved west to Indian Territory.

The Natchez may have occupied the Middle Tennessee Valley in small numbers having been given refuge by the Cherokee and Upper Creek. The Creek occupied the south side of the Tennessee River which formed their northern boundary.

The Cherokee occupied both sides of the Appalachians at the time Europeans arrived to the area. This interaction brought many changes to the Cherokee culture. The large amount of European trade goods found at archaeological sites indicates a high degree of trade between Euro-American and the Cherokee. A close alliance with the British continued through the beginning of the American Revolution. The Cherokee sued for peace with the Americans after several area towns were destroyed. Settlers soon moved into Cherokee Territory, forcing them south of the Little Tennessee River in 1794. By 1835, the tribes had migrated onto reservations to the west or into areas of the Appalachian Mountains.

Land use substantially changed with the arrival of the settlers. More of the floodplains began to be farmed, and larger tracts of forests were cleared. Forests in the AOI are likely to have been cut-over at least several times over the past few hundred years. Railroads, roads, and communities were built, mainly in the mid and lower portions of the watershed. Over the last decade, second homes and housing developments have been built. Additionally, commercial forestry interests are purchasing lands, and in some areas are converting hardwood stands to pine plantations. These changes in land use continue, and are accelerating in some parts of the AOI, as previously discussed under the section on socioeconomics.

III. Alternatives, Including the Proposed Action

INTRODUCTION

This chapter presents the alternatives for a proposed refuge within the Paint Rock River watershed, including the proposed action that the Service believes best meets the outlined purpose and need and best serves the purposes, vision, and goals for the proposed Paint Rock River NWR. The following vision was developed for the proposed refuge:

> The Paint Rock River National Wildlife Refuge will protect important wildlife and habitats of the Paint Rock River watershed, a unique ecosystem that supports a high diversity of aquatic, terrestrial, and karst habitats. Together with partners, the Fish and Wildlife Service will help protect and improve the water quality, water quantity, and hydrology of the Paint Rock River, benefitting numerous imperiled freshwater species and human communities utilizing the area's water resources. The refuge will conserve, protect, and manage one of the largest contiguous tracts of hardwoods remaining in eastern North America for current and future generations. As part of a system of public and private conservation lands, the refuge will expand outdoor recreational opportunities, helping maintain a way of life and supporting local economies.

Several purposes were identified to further the vision for the refuge as follows:

> *"conservation, management, and ... restoration of the fish, wildlife, and plant resources and their habitats ... for the benefit of present and future generations of Americans" 16 U.S.C. 668dd(a)(2) (National Wildlife Refuge System Administration Act), as amended by amended by Pub. Law 105-57(The National Wildlife Refuge System Improvement Act of 1997);*
>
> *"to conserve (A) fish or wildlife which are listed as endangered species or threatened species…or (B) plants" 16 U.S.C. 1534 (Endangered Species Act of 1973);*
>
> *"the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions" 16 U.S.C. 3901(b), 100 Stat. 3583 (Emergency Wetlands Resources Act of 1986);*
>
> *"for use as an inviolate sanctuary, or for any other management purpose, for migratory birds" 16 U.S.C. 715d (Migratory Bird Conservation Act);*
>
> *"for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude" 16 U.S.C. 742f(b)(1) "for the development, advancement, management, conservation, and protection of fish and wildlife resources" 16 U.S.C. 742f(a)(4)(Secretarial powers to implement laws related to fish and wildlife) (Fish and Wildlife Act of 1956);*
>
> *"suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species" 16 U.S.C. 460k-1 "the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors" 16 U.S.C. 460k-2 [Refuge Recreation Act (16 U.S.C. 460k-460k-4), as amended]*

Four overarching goals were then developed for the proposed refuge. The goals are intentionally broad, descriptive statements of the desired future conditions. They support the proposed refuge purposes and the proposed vision statement. Two alternatives are analyzed in this Draft LPP/EA: Alternative A (No Action – no new refuge) and Alternative B (Proposed Action - new refuge). The alternatives are described in terms of how they address the proposed refuge goals, outlined below. Additional details of how a potential new refuge would be operated and managed can be found in the Conceptual Management Plan and the interim compatibility determinations (Appendices A & B). These documents provide general, interim management direction for the proposed refuge until development and approval of a considerably more detailed comprehensive conservation plan. If the refuge is approved, the Service would develop a comprehensive conservation plan within 15 years of approval. The goals established for this proposed refuge are as follows:

Goal 1. **Functional Conservation Landscape**
The Paint Rock River NWR, as part of the Appalachian Landscape Conservation Cooperative (LCC), would contribute to a more connected and functional conservation landscape that would provide effective habitat connections between existing conservation areas, reducing fragmentation, and protecting and restoring large tracts of contiguous hardwood forests.

Goal 2. **Habitat for Fish and Wildlife**
The refuge would provide a wide range of quality Cumberland Plateau habitats to support native wildlife and plant diversity, including migratory birds, federal and state listed species, and other imperiled species.

Goal 3. **Enhanced Water Quality, Water Quantity, and Improved Hydrology**
The refuge would contribute to water quality, water quantity, and hydrology of the Paint Rock River watershed to benefit the area's high aquatic diversity and help protect the water supply for residents downstream.

Goal 4. **Wildlife-dependent Recreation and Education**
Refuge visitors of all abilities 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 the important landscape of the Paint Rock River watershed.

Under the National Environmental Policy Act (NEPA), the Service developed and evaluated a reasonable range of alternatives. The proposed action defines what the Service would do or recommend, but could not implement without considering other reasonable, environmentally sensitive alternatives. Other reasonable alternatives to the proposed action that could also be viewed as fulfilling the proposed purposes of the refuge are described in this Draft LPP/EA, thereby offering the Service and the reviewing public an opportunity to consider a range of reasonable alternatives for the proposed action, and thus fulfilling one of the key tenets of NEPA.

FORMULATING ALTERNATIVES

The Service developed and evaluated a reasonable range of alternatives based on the issues raised during internal and public scoping by the Service, other federal agencies, the public, Native American tribal governments, state and local governmental agencies, organizations, and local businesses. According to the Service, reasonable alternatives would include those that help achieve the missions of the Service and Refuge System; support the purposes for which the refuge might be established, and its vision and goals; and respond to issues and opportunities identified during the planning process.

As part of the planning process for this proposed action, a conservation prioritization tool was used. The entire Paint Rock River drainage basin, comprised of 11 sub-watersheds (i.e., hydrologic unit level 12 or HU-12), spans over 290,000 acres. The 11 sub-watersheds differ in their land cover and natural resources. To help focus our conservation planning efforts, a land prioritization model was developed to rank sub-watersheds in terms of their conservation value. Each sub-watershed was assigned a value of low, medium, or high conservation value based on three criteria: percent forest cover, number of globally ranked species (G1, G2, and G3), and the number of caves. Based on the model, the following four sub-watersheds were determined to have high conservation value: Cole Spring Branch, Estill Fork, Hurricane Creek, and Larkin Fork.

Within each high priority sub-watershed, a set of criteria was applied to rank individual parcels based on their conservation value. These criteria included river frontage, percent forest cover, size, and other factors.

Using the sub-watershed and parcel prioritization models, as well as other factors, the Service developed its proposed action. This “action alternative” is compared to the NEPA-required “No Action” alternative, which serves as the baseline.

This Draft LPP/EA describes and analyzes the following two alternatives:

- Alternative A: No Refuge (No Action Alternative)
- Alternative B: Proposed Action – establishment of a 40,505-acre Conservation Partnership Area (CPA) and 25,120-acre refuge in Tennessee portion of Paint Rock River Watershed

The two alternatives evaluated in detail are listed, followed by CPA maps for each of the action alternatives.

In addition to the No Action Alternative and Alternative B, two other alternatives were evaluated that included lands in Alabama, which were not further considered under this proposal. One of these preliminary alternatives included five CPAs totaling 146,700 acres in the following sub-watersheds: Cole Spring Branch, Estill Fork, Hurricane Creek, Larkin Fork, and Williams Cover-Paint Rock River. The other preliminary alternative consisted of three CPAs delineated by the following three sub-watersheds: Estill Fork, Hurricane Creek, and Larkin Fork, with a combined size of about 99,004 acres. These preliminary alternatives were not pursued in this proposal in order to allow efforts to focus on Alternative B, which directly supports one of Tennessee’s priorities for America’s Great Outdoors (AGO), namely to create a national wildlife refuge in the upper Paint Rock River watershed, as identified in the AGO’s Fifty State Report (AGO 2011).

DESCRIPTION OF ALTERNATIVES

Each of the action alternatives is based on a different configuration of a CPA, which is composed of sub-watersheds, as further detailed above. Within each CPA, the Service identified lands which would be of high conservation value, based on criteria such as river frontage, forest cover, etc. The methodology for determining priority sub-watersheds and lands within each sub-watershed is detailed in this Draft LPP/EA. The description for each alternative also includes the possible management activities that would help meet each of the four overarching goals of the proposed Paint Rock River NWR. Maps are used to illustrate lands that could be included under each alternative.

To help explain the alternatives, definitions for several terms are listed below.

Conservation Partnership Area: Defines the area within which the Service would have the authority to acquire (up to 25,120 acres) in fee title or easements from willing sellers. Under Alternative B, the proposed Conservation Partnership Area (CPA) would be 40,505 acres.

Area of Influence: Defines the Area of Influence (AOI) in which the Service would analyze the potential environmental effects in this Draft LPP/EA. The AOI for this project is limited to the Tennessee portion of the Paint Rock River watershed (including parts of the Estill Fork, Hurricane Creek, and Larkin Fork drainages) and totals approximately 40,505 acres.

Acquisition Cap: A specified number of acres within the Conservation Partnership Area which the Service would have authority to work with willing landowners to acquire fee title or less than fee title interest (e.g. management agreements, conservation easements). The Service would only be authorized to acquire up to this specified amount of acres.

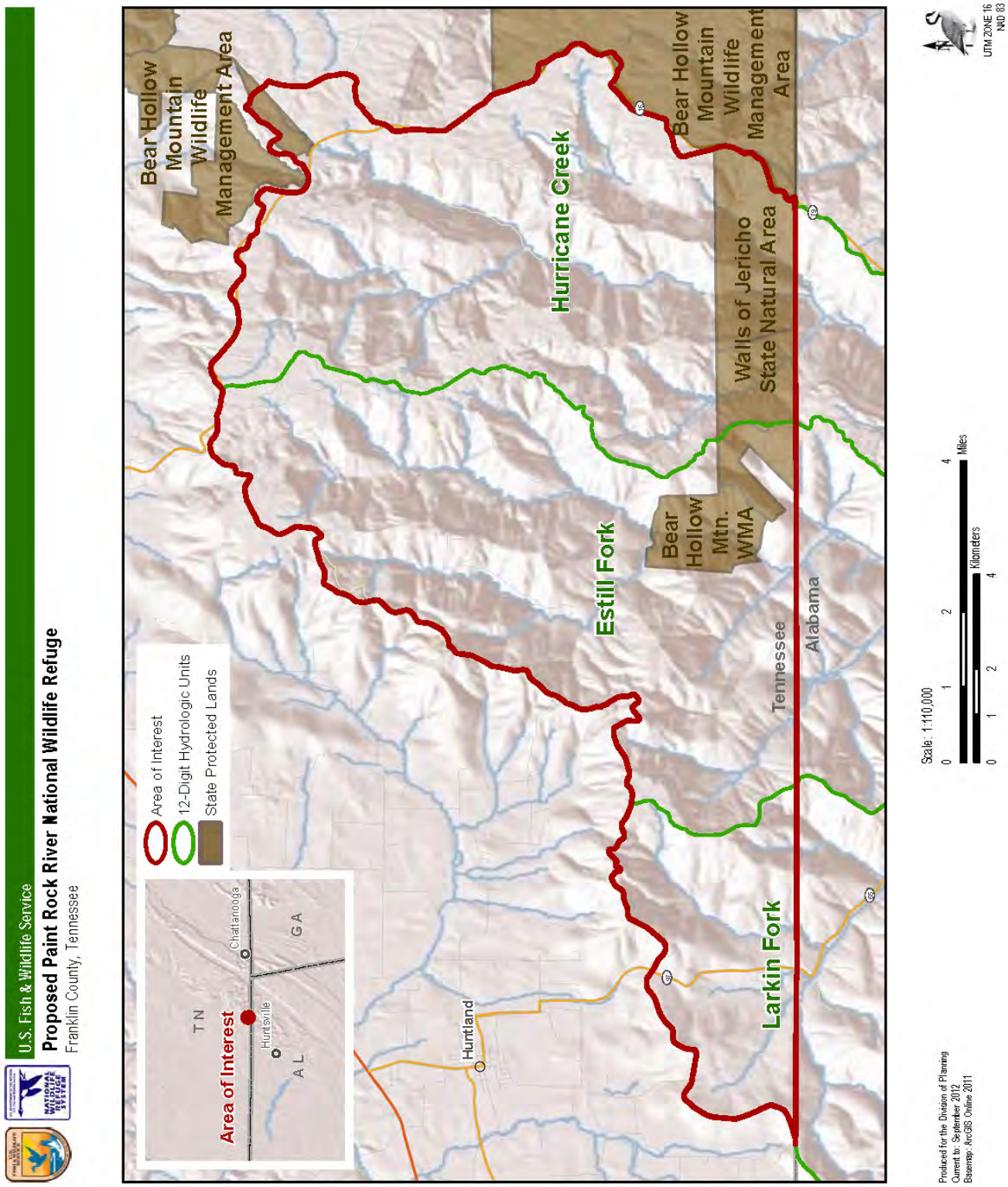
Under Alternative B, the proposed Acquisition Cap would be 25,120 acres.

Refuge Boundary: Defines the management boundary of an approved refuge. Generally comprised of Service-owned property, it can also include other properties through some sort of agreement with the landowner (e.g., management agreement, lease, and easement).

ALTERNATIVE A - NO ACTION ALTERNATIVE

Under the No Action alternative, the Service would not authorize a CPA and no new refuge would be established in the Tennessee portion of the Paint Rock River watershed. The Service would continue activities it has pursued over the last several years in the watershed, including partnership programs to protect/restore streambanks and remove fish barriers. Under this alternative, habitat protection and management would continue by existing organizations and government programs. Currently, the landscape within the AOI contains approximately 3,901 acres (or about 10 percent) of conservation lands, protected primarily through Tennessee Division of Natural Areas (TSNA) and Tennessee Wildlife Resources Agency (TWRA) ownerships and management (Figure 7). Within this alternative, the Service would pursue no new opportunities for refuge-based, wildlife-dependent public uses in the AOI.

Figure 7. Current conservation lands in the AOI (Alternative A)



The role of Alternative A in terms of its ability to meet each of the four overarching conservation goals is detailed below.

Goal 1. Functional Conservation Landscape

The existing conservation lands cover 3,901 acres (Table 6), which represents about 10 percent of the overall land base within the Tennessee portion of the Paint Rock River watershed. Conservation lands in this landscape would continue to be managed by their respective agencies and organizations under the No Action Alternative, but no further Service efforts to connect them would likely be forthcoming. Additional conservation lands managed by other agencies may be added to the conservation landscape through state and private programs, as well as other federal programs (i.e., WRP). However, recent economic conditions have hampered state land acquisition programs, and other conservation organizations are attempting to divest some of their current landholdings. Although state agencies and private organization provide an ability to assist in the protection of habitats of the area, they are unlikely to provide increased long-term protection from the anticipated changes in land use in the watershed. Current protection of about 3,901 acres of habitats protected by state ownerships would continue, with the possibility of some minor, opportunistic expansions in the future.

Forestry investments, row cropping, and cattle grazing are the predominant land uses outside of conservation lands. Although large-scale timber operations are currently not known to occur in the area, future demand for forest products could cause the conversion of large tracts of hardwood forests into pine plantations. In addition, ridge-top development is already occurring, albeit at a small scale. Future expansion of human settlements into the area is likely, and the expanded network of roads and utility corridors needed to support new communities would cause further forest fragmentation.

Goal 2. Habitat for Fish and Wildlife

Habitats found within the upper Paint Rock River watershed include upland hardwoods, riparian and bottomland hardwoods, cave and karst systems, and various river and stream habitats. For the purposes of this Draft LPP/EA, Southeast GAP Analysis Project (2008) land cover data were used as a proxy for habitat. Deciduous hardwoods are the largest land cover type in the CPA, comprising at least 37,490 acres or 93 percent of the AOI (Table 6). Hardwood forest is also the dominant habitat currently protected in TSNA and TWRA lands. Under the No Action Alternative, protection and management of all valuable wildlife habitats would be limited to existing conservation lands and programs, leaving remaining areas vulnerable to a variety of threats, including commercial forestry, agriculture, and development. In addition to forest loss, aquatic habitats are likely to be further degraded as adjacent areas are cleared of their protective forest cover.

Within this alternative, the Service would not restore or manage habitat in the Tennessee portion of the Paint Rock River watershed. Some of the riparian zones in the area have been altered for human use, resulting in deforested riparian zones and expansions of populations of invasive plants. Future efforts to restore habitat and manage invasive plants would have to come from state or non-profit programs.

Goal 3. Enhanced Water Quality, Water Quantity, and Improved Hydrology

Currently, much of the watershed is forested, which provides benefits to water quality and quantity. Forests act as a filter, removing excess nutrients and sediments from water before it enters streams and rivers. Water clarity is essential to many native stream fish species and the freshwater mussels

that depend on them for reproduction. Forested areas also store water, minimizing flooding and slowly releasing water to waterways. The water stored in forests can extend the water supply of area streams during times of drought. In some areas of the watershed, the local hydrology has been altered due to drainage ditches, low-water crossings, roads, and other structures. Hydrological alterations are likely to continue in unprotected areas as land uses change in the region. Under this alternative, federal (primarily NRCS), state, and private conservation agencies and organizations would continue to protect some of the water resources in the area.

Along some of the area's streams and creeks, streambanks are eroding due to the loss of riparian cover. In addition, low-water crossings exist, creating barriers to fish migration. Programs to strengthen and replant streambanks would have to be provided by the state and other entities. Instream barriers would also have to be removed through state and non-governmental organization efforts.

Goal 4. Wildlife-dependent Recreation and Education

The Service seeks opportunities to promote appropriate and compatible wildlife-dependent recreation on national wildlife refuges. There would be no refuge-based recreational opportunities under the No Action Alternative. A number of wildlife-dependent recreational activities exist within the landscape and would continue, including hunting, fishing, wildlife observation, and wildlife photography.

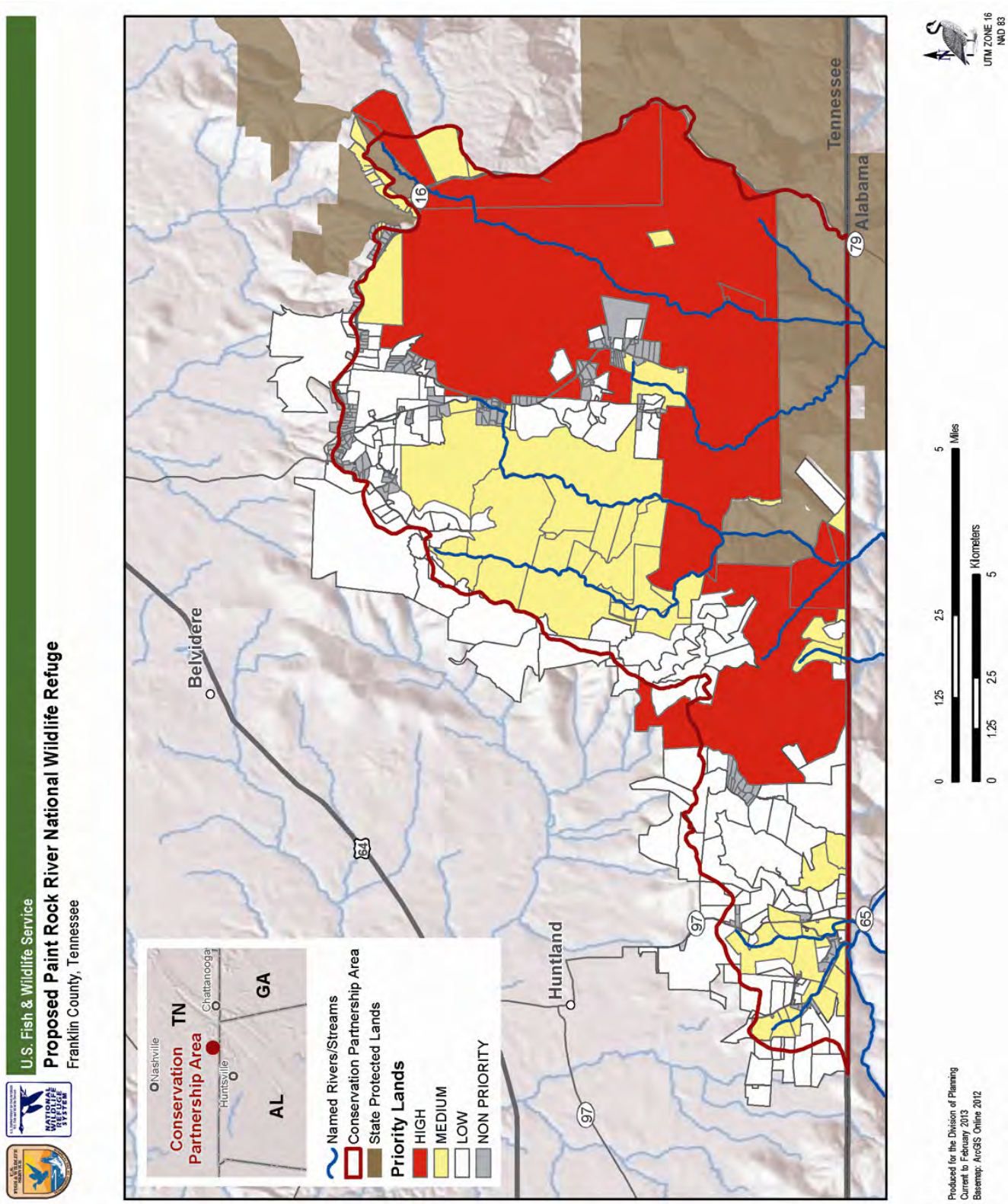
Fishing is recreationally important to the local population. The Tennessee Valley is renowned as a fishing destination for many types of freshwater fish. Areas throughout the watershed would continue to provide recreational fishing opportunities.

Other outdoor wildlife-dependent recreation and educational opportunities abound. State agencies and private organizations provide hiking and equestrian trails. Kayaking and canoeing occur on the water resources found in the area. State agencies sponsor fishing events, various workshops, youth camps, and other outdoor wildlife-dependent programs and activities. These wildlife-dependent activities would continue under the No Action Alternative.

ALTERNATIVE B - PROPOSED ACTION (ESTABLISHMENT OF NEW REFUGE)

Alternative B identifies a Conservation Partnership Area of 40,505 acres in the Tennessee portion of the Estill Fork, Hurricane Creek, and Larkin Fork sub-watersheds (Figure 8). These areas in Franklin County form the headwaters of the Paint Rock River and play an important role in the water quality and water quantity of the system. This area includes some of the largest, intact tracts of hardwood forest found in the basin. The focus of this alternative is to support one of Tennessee's priorities for America's Great Outdoors (AGO), namely to create a national wildlife refuge in the Paint Rock River watershed, as identified in the AGO's Fifty State Report (AGO 2011).

Figure 8. Priority lands within the CPA under Alternative B



The role of Alternative B in terms of its ability to meet each of the four overarching conservation goals is detailed below.

Goal 1. Functional Conservation Landscape

Compared to the No Action, Alternative B would substantially increase the amount of conservation lands in the upper Paint Rock River watershed. The portion of the Paint Rock River watershed that is located in Franklin County, Tennessee, currently includes approximately 3,901 acres of protected lands (Table 6). Most of existing conservation acreage consists of Bear Hollow Mountain WMA, with the remainder being in Walls of Jericho State Natural Area (Figure 7). Priority lands under this proposal include several parcels that are adjacent to or nearby existing TWRA lands. Combined, all priority lands that could potentially be protected by the Service total about 25,120 acres. This alternative would help connect current conservation lands, helping to reduce habitat fragmentation in the region. A larger, more contiguous block of protected lands would further minimize various conservation threats and further protect imperiled species, large hardwood tracts, water quality, and provide public use opportunities.

Goal 2. Habitat for Fish and Wildlife

Alternative B would increase habitat protection in the upper Paint Rock River watershed. A maximum of 25,120 acres of upland forests, primarily hardwoods, would be included in the proposed refuge. Three land cover types are the dominant forests in the CPA, comprising at least 36,344 acres (Table 16). Large tracts of contiguous hardwood forest are important to a host of rare and imperiled neotropical migratory birds. In addition, these forests help aquatic habitats by maintaining the water quality and quantity of downslope streams and rivers, benefitting numerous aquatic species, including imperiled fish, mussels, and snails. Other valuable habitats protected under this alternative include streams and riparian forests. About 7.8 miles of stream length would be offered protection within this alternative.

Compared to the No Action Alternative, this alternative would increase opportunities for repairing and replanting eroded streambanks. It would also allow more instream barriers (low-water crossings) to be replaced with bridges, improving aquatic habitats. Invasive plant management efforts would be implemented on a larger scale. Furthermore, upland reforestation projects would increase.

Table 16. Land cover types on priority lands under Alternative B

Habitat	Unprotected Acres		Protected Acres	Total Acres
	Priority Lands	Non-Priority Lands		
Southern Ridge and Valley Dry Calcareous Forest	20,370	73	2,002	22445
South-Central Interior Mesophytic Forest	8,023	0	913	8936
Allegheny-Cumberland Dry Oak Forest and Woodland	5,192	0	894	6086
Planted/Cultivated	1,608	45	38	1691

Habitat	Unprotected Acres		Protected Acres	Total Acres
	Priority Lands	Non-Priority Lands		
Developed	288	135	6	429
Shrub/Scrub	495	5	12	511
Southern Appalachian Low Mountain Pine Forest	203	3	6	211
Pine Plantations	59	0	0	59
Grassland/Herbaceous	49	1	20	70
South-Central Interior Small Stream and Riparian	22	0	4	25
Southern Interior Acid Cliff	14	0	0	14
Southern Interior Calcareous Cliff	10	0	6	16
Cumberland Riverscour	6	0	0	6
Open Water	5	0	0	5
Total	**36,344**	**260**	**3,901**	**40,505**

Goal 3. Enhanced Water Quality, Water Quantity, and Improved Hydrology

Alternative B would help protect and enhance the region's water quality and water quantity. These open waters include streams that support a high aquatic diversity, as well as numerous imperiled species downstream. As mentioned previously, protection of upland habitats would also benefit the water resources of the Paint Rock River drainage. Forest and other vegetated areas help protect the soil from erosion, minimizing run-off and sediments in streams. In addition, forested areas act as a sponge, helping to ameliorate the impacts of heavy rainfall by absorbing large volumes of water in the soil and root systems, reducing the likelihood of floods. Conversely, forested areas slowly release water, and help maintain stream flows during periods of low rainfall.

This alternative would also provide opportunities to restore the hydrology of some areas. Although currently not quantified, there are several ditches, roads without proper culverts, and in-stream barriers. These structures have altered the hydrology, changing the timing and distribution of the flow of water in those areas. Some hydrological restoration would be likely under this alternative, benefitting water resources and the aquatic species that depend on them.

The improved water quality, water quantity, and hydrology would not only benefit native habitats and wildlife. Local communities that utilize the water resources of the Paint Rock River would also benefit. The risk of flooding and streambank erosion would be reduced. Water quality and quantity would improve, benefitting those that use local waterways for irrigation and recreation.

Goal 4. Wildlife-dependent Recreation and Education

Currently, approximately 3,901 acres of protected lands exists in the CPA, including areas that are open to the public. This represents slightly less than 10 percent of the area, and the majority of lands in the CPA are private ownerships that are closed to the public. This alternative would increase opportunities for appropriate and compatible outdoor recreation (for definitions of appropriate and compatible uses refer to the Glossary). Although some refuge lands might be seasonally or permanently closed to protect vulnerable resources, the majority of the lands would be open to hunting, wildlife observation and photography, and environmental education and interpretation. There would likely be increased access to local streams for fishing and boating. Increased opportunities for outdoor recreation would also draw more visitors to the area.

SUMMARY

The Service believes that the proposed action (Alternative B) represents the best method for providing additional protection to the lands and waters of the upper Paint Rock River watershed in Tennessee. Under Alternative B, a more functional conservation landscape would be developed, by adding to the network of state lands, as well as conservation lands of other partners. This alternative would increase the protection and management of habitats for fish and wildlife, including several state and federal listed species. Furthermore, the additional protection of riparian areas and upland watershed buffers would enhance and improve the area's water resources, benefitting natural resources and people. Finally, this proposal would increase opportunities for wildlife-dependent recreation and education.

IV. Environmental Consequences

This chapter analyzes and discusses the potential environmental effects (on the resources outlined in Chapter II) of the two alternatives.

Potential effects, both positive and negative, 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;

Environmental effects analyzed include direct, short-term, indirect, long-term, and cumulative.

For the purposes of this Draft LPP/EA, the Tennessee portion of the Paint Rock River watershed delimits the AOI. The AOI is used solely to analyze the potential effects resulting from Alternatives A (No Action) and B (Proposed Action) to the environment (e.g., physical, biological, socioeconomic, and cultural). This AOI covers approximately 40,505 acres (Figure 1). Within the AOI, approximately 3,901 acres (10 percent) are currently in the public domain, with some type of conservation protection. The proposed refuge, if fully realized, would equal about 25,120 acres or 62 percent of the AOI.

ALTERNATIVE A. NO ACTION ALTERNATIVE

Under this no action alternative, the Service would not acquire, protect, and manage any lands and a Paint Rock River NWR would not be established.

Future habitat protection under existing laws and regulations may 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 resource values is the 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. Most of the wetlands in the project area qualify for protection under this program. In addition, Tennessee has regulatory authority over the area and would not permit any developments that would violate the state’s water quality standards.

However, 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. In addition, these programs are subject to changes in the law and to varying definitions and interpretations, often to the detriment of wetlands. The Corps of Engineers’

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 refuge unit area 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 Alternative would adversely impact the area's valuable mussel, fish, migratory bird, and other wildlife habitats.

EFFECTS ON THE PHYSICAL ENVIRONMENT

This section discusses potential effects to physical resources (e.g., topography, soils, water resources) 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
Some lands that remain unprotected could be used to mine limestone and other mineral resources or extract natural gas using hydraulic fracturing (fracking). Fracking can affect the underlying geology of a specific site and has been linked, in some cases, to “injection induced” earthquakes (U.S. Geological Survey 2012X). Currently, there are no mining or fracking operations in the AOI. However, several open-pit mines are found in the vicinity. For limestone quarries, open-pit mining is typically used, which can result in entire hills being leveled, resulting in a dramatically altered topography at the local level. There would be visible and/or measurable adverse effects from future mining and fracking operations on the topography and underlying geology. Hence, the impacts are expected to be moderate, because a relatively large portion of the AOI would remain unprotected under this alternative.

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 disturbed 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. Under this alternative, no refuge lands would be protected within the CPA. Adverse impacts to soils in the absence of a refuge would be moderate, because the total area that could theoretically be protected under this proposal comprises about 60 percent of 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 forests of the United States 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 (25,120 acres) were cleared of all forest (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 (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 (VOCs) 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, air quality tends to decline as areas become increasingly developed and forests are lost (Song et al. 2008). Air quality in Tennessee has remained relatively good in recent years, even as the population has increased. Additionally, 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 stormwater runoff. However, as natural vegetated lands are converted to pine plantations, urban use or farms, these natural processes are disrupted. Most commercial forestry operations utilize clear-cutting, which exposes the soil to erosion, possibly resulting in sedimentation of local waterways. In addition, the use of herbicides and fertilizers on pine plantations can cause further water quality degradation. Water quality frequently declines in areas where land is converted to urban use. 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 stormwater to rivers, wetlands, lakes, and bays. These materials can create high pollutant loadings of sediment, nutrients, heavy metals, petroleum hydrocarbons, and coliform bacteria and viruses (Gill et al. 2005). Additionally, on farms, the use of fertilizers and pesticides can affect nearby waters. 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. Although increased management efforts by state agencies and non-governmental partners would help reduce water quality degradation, it is expected that the clearing of forests 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 commercial pine plantations, urbanization, industry, mining, fracking, etc. Commercial forestry typically involves clear-cutting of sizeable acreages of forested land. This can result in a decrease in the ability of the area to retain water. This can limit water availability to creeks during droughts and makes downstream areas more prone to flash floods during extreme rainfall events. 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: 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 areas increases. Various stormwater management systems required by state environmental agencies would help mitigate some of the impacts associated with impervious surfaces. However, extreme rainfall events would likely exceed the capacity of most stormwater systems, and some runoff would be transported to area water bodies. 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. 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 the soils and groundwater. These subsurface waters play 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 use.

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 commercial forestry, agricultural, industrial, mining, fracking, 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 causes 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 noises 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, federal and state listed species, and exotic species) under the No Action Alternative.

Habitats

Beneficial
Under the No Action Alternative, uncertainty exists as to the potential for beneficial impacts to native habitats and species. Although adverse impacts to native habitats and species are anticipated under the No Action Alternative, it is possible to conceive that continued development and loss of habitat

resources into the future could sway popular opinion in such a way that additional conservation efforts could be undertaken by various governments and/or organizations/individuals. Under the No Action Alternative, it is possible that other conservation strategies could be implemented more intensely in the future. The Service currently cannot predict the likelihood of this occurrence, but it would likely require additional funding and changes in social values (i.e., more people might desire habitat conservation than do currently). In addition, as the landscape becomes more urbanized, it is possible that the economic benefits of the remaining habitats and other open space become more important. Future real estate costs would continue to be an important component in future land-use trends. However, given past actions and 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 pine plantations, developed lands, and other uses, resulting in continued loss of these resources and further fragmenting remaining natural lands and waters.

Adverse
Existing native habitats would likely be converted to pine plantations, residential development, and other land uses. Remaining larger tracts of deciduous forest would become smaller and increasingly fragmented. The water resources within the AOI would be impacted by increased stormwater runoff from the growth in impervious surfaces (e.g., roads, parking lots), leading to a deterioration of water quality of the area water bodies. Water levels in 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/fracking water consumption would increase the frequency of drying events of these wetlands and water bodies, affecting many aquatic and semi-aquatic species. Currently, over 90 percent of the AOI consists of deciduous forest (Table 6). About 10 percent of the forests in the AOI occur on state-managed lands. Ecologically healthy forest habitats that are not protected would become increasingly fragmented, with negative consequences to various terrestrial animals and plants, as well as aquatic species found in the Paint Rock River watershed. An increase in forest edges would promote the invasion of exotic plants, causing further degradation of native habitats.

Without a refuge, over 25,000 acres of habitat (mostly upland deciduous forests) could go unprotected. If this is converted to other land uses (i.e., urban, agricultural, industrial), it would comprise over 60 percent of the land currently unprotected in the AOI (Table 6), 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 pine plantations, urbanized, agricultural, or otherwise altered terrestrial environments. Examples of such species include deer, coyote, raccoon, gray squirrel, blue jay, mocking birds, etc. Aquatic diversity would likely also decline, as land use changes alter the freshwater ecology of area creeks.

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 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. Forest interior birds would likely decline, as native forests are fragmented and converted to pine plantations. A recent study in the Cumberland Plateau showed that pine plantations had significantly lower bird biodiversities than

hardwoods and other forest types (Haskell et al. 2006). Nuisance species that prefer forest edges would increase, such as brown-headed cowbirds, resulting in increased brood parasitism rates with negative consequences to native songbirds. Depending on the rarity of the native species affected that are likely to occur in the CPA, 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 15 federally listed (threatened or endangered) and three candidate species that are known to occur in the Paint Rock River watershed and/or Franklin County (Tennessee), including:

- Gray bat
- Indiana bat
- Palezone shiner
- Snail darter
- Alabama lampmussel
- Fine-rayed pigtoe
- Pale lilliput
- Pink mucket
- Rabbitsfoot
- Rough pigtoe
- Shiny pigtoe
- Slabside pearlymussel
- Snuffbox
- Anthony's riversnail
- American Hart's-tongue fern
- Morefield's Leather-flower
- Price's Potato-bean
- White fringeless orchid

Examples of Tennessee listed species likely to occur in the area include: Tennessee cave salamander, Alabama snow-wreath, Cumberland rosinweed, and sand cherry. Few of these species are expected to benefit under this alternative.

Adverse Effects
Overall, the 15 federally listed species and three candidate species above would be negatively affected under this alternative. As mentioned, about 10 percent of the area is currently protected. 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 large tracts of deciduous forests and riparian areas, several species would likely continue to decline or possibly become extirpated. Under this alternative, impacts are expected to be moderate.

As with the federal-listed species, Tennessee-listed species found in the area would likely continue to be negatively affected by direct and indirect effects of changes in land use.

Nonnative Species

Beneficial
Given the Service's policy that most exotic species are undesirable, there would be few positive consequences under this alternative.

Adverse
Many exotic species often thrive in habitats that have been converted from their native, natural state (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 reduce rare habitat and the native species associated with these areas. It is difficult to quantify the overall impacts of exotics under this alternative. Although future management would address the problem posed by exotics, nonnative species are sometimes more difficult to control in areas where native biodiversity is promoted. Lands managed for conservation often are restricted in the use of certain pesticides and herbicides. Furthermore, broad-scale application of herbicides typically is not a tool used in areas where native vegetation is being restored. Generally, it is expected that adverse effects would be minimal under Alternative A.

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

There would be no beneficial or adverse impacts to property values resulting from this alternative.

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

Effect of Refuge on Nearby Property Values

There would be no benefical or adverse impacts to property values resulting from this alternative.

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 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). Ingraham and Foster (2008) derived this amount by first estimating ecosystem service benefits (in dollars per acre) for a series of habitat types, which they then extrapolated to a national level. They estimated that forests were worth about $1,000 per acre in terms of ecosystem services alone. Cost savings associated with flood prevention and mitigation provided by wetlands and other open spaces 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 (North Carolina) 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).

Land Use Patterns

Beneficial
Under the No Action Alternative, Tennessee state agencies, and possibly other future non-governmental conservation land managers would protect some of the lands in the AOI. Tennessee has a history of funding land protection efforts. Tennessee's 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 commercial forestry, urban development, row-crop agriculture (including biofuel production), industry, mining, fracking, 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
Tennessee's population is likely to continue to rise during the next 20 years, with the State's population predicted to increase to about 7.4 million by 2030 (U.S. Census Bureau 2004, University of Tennessee 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. In Tennessee, farmland and other open space (including wildlife habitat and areas used for outdoor recreation), are being converted to urban use. Based on a report prepared for the Tennessee Advisory Commission on Intergovernmental Relations developed lands increased from about 7 percent in 1982 to more than 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 between counties. For example, 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, such as a decrease in opportunities for outdoor recreation, declines in water quality and water availability, etc. These adverse 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.).

Visual Resources

Beneficial
No benefits to this resource are expected under this alternative.

Adverse
Under this alternative, the visual resources of the area would continue to be altered by tall structures (communication towers, powerlines, etc.) and roads. This is expected to be a minor impact.

EFFECTS ON CULTURAL RESOURCES

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

Beneficial
No positive impacts on archaeological and historical 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 are mandated to protect cultural resources.

Landowners and developers have no similar legal responsibilities, unless one of their activities requires a federal permit (i.e., 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 historic properties would likely be adversely impacted under the No Action Alternative. These impacts are expected to be moderate.

ALTERNATIVE B: PROPOSED ACTION

Under the Proposed Action, the Service would authorize a 40,505-acre CPA, from within which up to approximately 25,120 acres of lands and waters could be acquired as part of the proposed Paint Rock River NWR. Proposed methods of acquisition are summarized in this Draft LPP/EA.

EFFECTS ON THE PHYSICAL ENVIRONMENT

This section discusses potential effects to physical resources under the Proposed Action.

Topography and Geology

Beneficial
Under Alternative B, mining would not be permitted within the 25,120-acre proposed refuge, and the topography would be protected from mining and other activities that can substantially alter the landscape. As discussed under the “Topography” section under the No Action alternative, current mining operations are changing the topography at selected sites within the region. Given the future demand for limestone and other mineral resources, additional areas would likely be targeted for these activities. We expect the benefit to topography and geology to be moderate, given the relatively large proportion of the AOI that would be protected.

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

Soils

Beneficial
There would be a minor benefit to soils within the proposed refuge under this alternative. 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 construction projects (e.g., roads, parking lots, buildings), 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, approximately 25,120 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 of these gases taken into account. Overall, this benefit would be minimal. Due to the comparatively small size of the proposed refuge in relation to all the forested lands on the planet, 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 LPP/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 minimal 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 approximately 25,120 acres.

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 in 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 fires release 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 minimal.

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 about 25,120 acres from commercial forestry operations, 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. 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. Best management practices would be used to minimize these effects. Runoff from roads and parking lots would cause some oils, grease, and other materials from vehicles to leach into soils or be carried as runoff into low-lying areas. Stormwater retention/detention ponds would help mitigate most of the water quality impacts associated with runoff.

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 water bodies. If nonnative plant removal operations were to occur in riparian zones, best management practices 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.

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., possible 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.

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 25,120 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.

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, 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. Stormwater management systems would help mitigate many of the impacts associated with impervious surfaces. However, extreme rainfall events would likely exceed the capacity of most stormwater systems, and some runoff would be transported off-site. 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 lands acquired or managed by the Service, 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, 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, exotic species) under the Proposed Action.

Habitats

Beneficial
With implementation of Alternative B, aquatic and riparian habitats and large stands of deciduous forest would be offered additional protection at a larger and more comprehensive scale. Under Alternative B, we expect moderate benefits to natural habitats. Table 16 lists the acreages of various habitats that could be conserved under this alternative. Out of the larger area (40,505 acres), up to 25,120 acres could 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 currently found in the CPA and would be dominated by deciduous forests. In any event, the refuge would include aquatic and riparian habitats and adjacent upland forests.

Protecting the riparian and upland forest areas would be critical to the long-term conservation of aquatic habitats. These vegetated areas help maintain or improve the area's water resources. Forests, for instance, can absorb and slowly release water; providing a flow of water that sustains smaller creeks, even during some droughts. Conversely, during periods of extreme rainfall, vegetated lands help prevent sedimentation and limit flash flood events.

Adverse
We anticipate that existing natural habitats would still be converted to pine plantations, subdivisions, and other uses 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 25,120 acres from further conversion to plantation pine 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 (i.e., 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 would expect impacts to habitats under this alternative to be minor.

Wildlife

Beneficial

Non-listed Species
There are hundreds of non-listed fish, amphibian, reptile, bird, and mammal species potentially present in the AOI. The area is a center of biodiversity for aquatic species. Numerous migratory birds utilize the forests and other habitats for breeding or 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.

Game Species
A wide variety of game species can be found throughout the AOI, including wild turkey, white-tailed deer, grey squirrels, and rabbits, providing hunting and wildlife observation opportunities. All of these species would be expected to use the refuge proposed under Alternative B.

Overall, moderate beneficial effects are expected to wildlife under Alternative B.

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. However, mitigation efforts would reduce those effects to a minimum. Various wildlife-dependent public use opportunities (e.g., wildlife observation, hunting) could cause disturbance to vulnerable species (e.g., nesting birds), 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.

Impacts to game species would include take by anglers and hunters. 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. Overall, adverse effects on game species are expected to be minimal.

Federal/State Listed and Priority Species

Beneficial Effects
Under the No Action Alternative, there would be benefits to at least 15 federally listed (threatened or endangered) and three candidate species that are known to occur in the Paint Rock River watershed and/or Franklin County, Tennessee, including:

- Gray bat
- Indiana bat
- Palezone shiner
- Snail darter
- Alabama lampmussel
- Fine-rayed pigtoe
- Pale lilliput
- Pink mucket
- Rabbitsfoot
- Rough pigtoe
- Shiny pigtoe
- Slabside pearlymussel
- Snuffbox
- Anthony's riversnail
- American Hart's-tongue fern
- Morefield's Leather-flower
- Price's potato-bean
- White fringeless orchid

Several conservation efforts are underway at select sites throughout the watershed aimed at protecting many of these vulnerable species. We believe that under this alternative, through the additional protection and conservation of riparian zones and large tracts of upland forests, several of these species would less likely be extirpated within the watershed. Under this alternative, these positive effects are expected to be moderate.

State listed wildlife species include the Tennessee cave salamander and over 40 species of plants. Additional protection of sub-watersheds would help maintain water resources for the cave salamander and other imperiled aquatic species. In addition, the protection and future management of upland tracts of forest would benefit numerous listed plant species.

Adverse Effects
Impacts to federal and state listed species are expected to be minimal. Stream and forests restoration efforts could potentially have localized, short-term consequences to some of the aquatic

species and plants, but the long-term benefits (e.g., restoring or enhancing suitable habitat) would outweigh those impacts. Best management practices 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.

Nonnative Species

Beneficial
We anticipate that the spread of exotic invasive species (primarily plants) would be reduced under this alternative and control efforts would increase, constituting a minor impact. Any feral hog populations, considered a nuisance species in Tennessee, would receive additional control efforts, aimed at eradication.

Adverse
Some of these exotics (e.g., feral hogs) are sport and subsistence species. A reduction in the abundance of these species may represent a minor impact to some people. However, we believe that the benefits (reduced crop and habitat damage, lowered risks of disease transmission to people and domesticated animals, etc.) would outweigh any negative consequences.

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 as 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 Act 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 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, is one important way to control the operating costs of local governments. Land conservation is often less expensive for a local government than a suburban-style residential development. In general, refuges and other open spaces place 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. 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 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).

Preliminary Tax Revenue Analysis
Three significant assumptions were made to calculate the maximum amount the Service would pay Franklin County and compared that amount against property tax revenue. These assumptions are:

- all 34 Franklin County parcels identified for the refuge are actually acquired in fee title by the Service. In reality, we expect many parcels would not be acquired and would either remain in private ownership or the Service would purchase an easement, in which case property taxes would remain the responsibility of the landowner;
- a flat property tax rate of 25 percent of 0.03200 per $100 of the total value stated in the 2011 county parcel data; and
- calculations calling for fair market value of parcels used instead the total value stated in the 2011 county parcel data because these data are readily available.

Table 17. Comparison of Maximum Refuge Revenue Sharing Act payments with estimated property tax generated.

Number of Parcels	Acreage	Total Value From 2011 County Parcel Data	Estimated Property Tax Generated	Maximum Service payment, 3/4 of 1% fair market value
34	25,119	$25,857,645	$206,861	$193,932

Under the Proposed Alternative, 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 acquired within the CPA.

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. Second, 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 Tennessee. 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).

Adverse
Negative consequences could include additional congestion of area roads, for instance, resulting from an increase in refuge visitors. We expect this effect to be minimal.

Effect of Refuges on Nearby Property Values

Beneficial
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, conducted for the Fish and Wildlife Service by economic researchers at North Carolina State University, homes located within half a mile of a refuge and within 8 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 homeowners 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 (North Carolina) 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).

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 25,120 acres. Public conservation lands in Tennessee are about 7 percent of the total state area (Alabama Forever Wild 2009). Still, unprotected lands would likely continue to be converted to pine plantations, development, and other land uses (Reid et al. 2008, Kirk 2009, Thurmann et al. 2011).

Adverse
Establishment of a refuge would prohibit or limit the future use of these areas to uses that are compatible with the mission of the Refuge System (e.g., hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation), no longer allowing commercial forestry, and industrial, commercial, or residential development, and most forms of agriculture, mining, etc. If fully realized, the total area of the refuge would comprise over 50 percent of the unprotected acreage in the AOI, constituting a moderate impact on land use patterns under this alternative.

Visual Resources

Beneficial
Under this alternative, the rural character of the landscape would be conserved, as no new tall structures, major roads, or significant infrastructure (i.e., dams, natural gas/power-line/sewer-line rights-of-way) would be built on protected lands.

Adverse
Any construction related to facilities for refuge operations and visitor services would conform to the character of the current landscape, and we do not expect any adverse effects on the visual aspect of the area.

EFFECTS ON CULTURAL RESOURCES

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

Beneficial
Beneficial impacts to cultural resources would be anticipated from the implementation of Alternative B. The proposed 25,120-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 of Historic Places-eligibility testing, research-directed testing or excavation, site protection, and interpretation. Critical to these efforts is the Tennessee State Historic Preservation Offices, several Native American tribes, 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 cultural and religious significance for the tribes. 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. We expect that the overall benefits to cultural resources would be moderate under this alternative.

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.

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
Alternative A would have a moderate negative cumulative effect on the topography and geology of the AOI. Without protection, mining and other activities that can alter these resources would continue. Under Alternative B, no adverse cumulative effects are anticipated.

Soils
Alternative A would likely result in moderate cumulative impacts to soils in the AOI. Without protection, lands in the AOI would continue to be converted to pine plantations, urban areas, and other uses. Soil disturbance would result from clear-cutting of forests, construction associated with development, and other factors. 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 various non-conservation land uses.

Climate Change
Under alternative A, a minimal 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 would likely contribute to an acceleration of poor air quality, a minimal 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 could 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
Alternative A is expected to result in moderate adverse cumulative effects on water quality. Land conversion to commercial forests, high intensity agriculture, and development is likely to continue in unprotected areas, resulting in a deterioration of water quality. Overall, Alternative B is predicted to have a net positive impact to water quality in the AOI as this alternative 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 some moderate cumulative effects under Alternative A. Compared to the Service acquiring lands as proposed under Alternative B, less land 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, Alternative B would result in net benefits to the hydrology and water quantity in the AOI by protecting vegetated areas.

Noise
Cumulative effects on noise are anticipated to be minimal under Alternative A. 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 due to various land use changes. In addition, habitat fragmentation would further impact species that require large 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/wildlife-vehicle collisions. If fully realized, the proposed refuge would cover over 50 percent of the total land cover in the AOI. Overall, the cumulative effects resulting from habitat loss, fragmentation, and other alterations are expected to be moderate.

Hunting Impacts

Deer

Deer hunting on proposed refuge lands would not have regional population impacts due to restricted home ranges. In Tennessee, deer home ranges are generally no more than a mile across (TWRA 2012x). Therefore, only local impacts are expected to occur.

State-wide, roughly 180,000 deer were harvested in Tennessee (2005 estimate) annually (TWRA 2011x,), which represents approximately 16 percent of the total population in the state. 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 urban. The proposed action would likely result in an increase in deer taken, as more lands that are currently closed to the public would be 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.

Wild Hogs

The wild hog is an invasive, nonnative species. In Tennessee, it is illegal to hunt wild hogs. This species is no longer classified as a game animal, but rather a nuisance species that the state aims to eradicate due to the range of negative effects these adaptable animals have on natural and agricultural areas.

On par with the state's position, public hunting of wild hogs on proposed lands would not be allowed. Unfortunately, data from around the nation shows that allowing recreational hunting of wild hog has created a demand that has resulted in the intentional spread of this exotic species. Since wild 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. The effects of an exotic, invasive species should not be of concern because the Service would likely work to extirpate this species on refuge lands. Therefore, Alternative B is expected to have a net positive effect through the reduction or elimination of wild hogs on refuge lands. This would benefit natural areas on the refuge and any agricultural lands adjacent to the proposed lands, as wild hog can cause crop loss and other damage. Conversely, under the No Action Alternative, wild hog populations are unlikely to be controlled or eradicated on the proposed lands.

Wild Turkey

Turkey is a non-migratory species and therefore hunting only impacts the local population. The turkey population in Tennessee has increased state-wide to the point where it is considered "restored" (TWRA 2012). Habitat loss and unfavorable weather during the poult season, 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). Alternative B could increase wild turkey hunting

opportunities by opening up some land to the public. Alternative B is not expected to have a significant cumulative effect on local wild turkey populations.

Migratory 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 a 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, Washington, DC 20240.

Doves

Although migratory, doves in Tennessee are typically resident. Hence, hunting in the proposed areas would only affect local populations. This species is a prolific breeder, capable of producing several broods per year. A habitat generalist, the dove thrives in secondary growth, pastures, cultivated fields, and suburban areas. Under Alternative B, more lands could be opened to the public for dove hunting. Alternative B is not expected to have any significant cumulative effects on dove numbers in the AOI as a result of increased hunting.

Quail

Quail are non-migratory, so hunting in the proposed areas would only have effects on local populations. As further described in the section on game species in Chapter II (Affected Environment), quail numbers have been declining during the last several decades in Tennessee, primarily as a result of habitat loss and degradation. However, given the type of habitat (dense forests), a potential refuge would likely not have much suitable quail habitat. Given the terrain, and the need to maintain or improve habitat for forest interior birds, any future management would not be focused on developing quail habitat. Alternative B is not expected to have any significant cumulative effects on the quail population in the AOI as a result of increased hunting opportunity on public lands.

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 would 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 Alternative B, considering their high reproductive ability/capacity/or propensity, 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). 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 by 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 attracting 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 is expected to become increasingly scarce in the foreseeable future. No significant negative impacts would be anticipated to neighboring landowners from the implementation of Alternative B, including from the Service's proposed management actions 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, and increased noise). Under Alternative B, there could be, for example, localized adverse effects of building a new refuge office and/or visitor center and upgrading access roads. Unavoidable effect could include property tax losses to towns during years that revenue sharing payments may be less than local property taxes. However, none of these effects rises to the level of significance. Some would be mitigated, and 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 or be subject to obligations under the state's property tax laws/codes.

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. Comparison of potential environmental effects* of Alternatives A and B evaluated for the proposed Paint Rock River NWR in Franklin County, Tennessee

Resource	Alternative A: No Action (No Refuge)	Alternative B: Proposed Action (Establishment of Paint Rock River Refuge)
PHYSICAL RESOURCES		
Topography and Geology	*Beneficial:* none *Adverse:* moderate; lands otherwise protected could be impacted by mining and/or fracking.	*Beneficial:* moderate; proposed lands protected from mining and fracking. *Adverse:* none

Resource	Alternative A: No Action (No Refuge)	Alternative B: Proposed Action (Establishment of Paint Rock River Refuge)
Soils	*Beneficial:* none *Adverse:* moderate; various land uses such as commercial forestry, development, mining/fracking, and agriculture would continue to disturb and degrade soils.	*Beneficial:* moderate; 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).	*Beneficial:* minimal; 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:* minimal; net increase in vegetative cover *Adverse:* minimal; prescribed fire, traffic associated with public use and refuge operations.
Water Quality	*Beneficial:* none *Adverse:* moderate; commercial forestry, development, and other land conversion of unprotected areas would cause further declines in water quality.	*Beneficial:* moderate; proposed lands remain vegetated, benefitting water quality *Adverse:* minimal effects on water quality from refuge operations and visitor uses.
Hydrology and Water Quantity	*Beneficial:* none *Adverse:* moderate; continued loss of forest cover, ditching, and expanding impervious surfaces on unprotected lands would alter hydrology and affect water quantity.	*Beneficial:* moderate; some restoration of hydrology; vegetated areas would benefit hydrology and water quality. *Adverse:* minimal impacts from refuge operations/visitor services.

Resource	Alternative A: No Action (No Refuge)	Alternative B: Proposed Action (Establishment of Paint Rock River Refuge)
Noise	*Beneficial:* none *Adverse:* minimal; additional lands developed with higher associated noise levels.	*Beneficial:* minimal; 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; large tracts of deciduous forest would continue to be lost (e.g., timber harvest) or degraded due to conversion to pine plantations, development, unfavorable fire regimes, and exotics. Riparian and aquatic habitats would suffer indirect effects of upland land conversions.	*Beneficial:* moderate; aquatic and riparian habitats and adjacent upland areas would benefit from habitat restoration/management (primarily through restoration/ management and hydrological connectivity, prescribed fire) and control of exotics. *Adverse:* some minimal impacts from construction of refuge and public use infrastructure; public use (vegetation trampling); herbicides/mechanical removal of exotics, etc.
Wildlife	*Beneficial:* none *Adverse:* moderate; land alterations and use would continue to favor common, generalist species at the expense of listed wildlife and rare habitats.	*Beneficial:* moderate; common species would be managed at more optimal levels; biodiversity would be maintained or increased. *Adverse:* minimal impacts resulting from some public uses.

Resource	Alternative A: No Action (No Refuge)	Alternative B: Proposed Action (Establishment of Paint Rock River Refuge)
Federally and State Listed Species	*Beneficial:* none *Adverse:* moderate; listed species would continue to suffer from habitat loss and degradation.	*Beneficial:* moderate; listed species would benefit from habitat restoration/management. *Adverse:* minimal (localized, short term) impacts from habitat restoration, refuge operations/management, public use.
Exotic Species	*Beneficial:* none *Adverse:* minimal; continued degradation of natural habitats resulting from spread of exotics.	*Beneficial:* minor; 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 on factors such as congressional appropriations, local property values, etc.
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

Resource	Alternative A: No Action (No Refuge)	Alternative B: Proposed Action (Establishment of Paint Rock River Refuge)
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, stormwater 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 stormwater management infrastructure. *Adverse:* none
Land Use Patterns	*Beneficial:* minimal; lands available for other non-conservation uses. *Adverse:* continued loss of natural areas through conversion to agriculture and developed areas; loss of lands open for public wildlife-appropriate and -compatible public use.	*Beneficial:* additional lands open for public wildlife-appropriate and wilddlife-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.
Visual Resources	*Beneficial: none* *Adverse: new tall structures and major roads would continue to alter the visual character of this rural landscape.*	*Beneficial: refuge lands would maintain the current visual aspect of this rural landscape.* *Adverse: none*

Resource	Alternative A: No Action (No Refuge)	Alternative B: Proposed Action (Establishment of Paint Rock River Refuge)
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.

** Potential effects both 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 site and the current land use, the Proposed Action would not have any significant 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 Tennessee Historic Preservation Office 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 as 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).

RECOMMENDATION

The Service recommends Alternative B as the Proposed Action, because it offers the best way to protect large stands of deciduous forest and riparian zones, benefitting the unique aquatic fauna and numerous other important biological resources of the region. 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 CPA. Threatened and endangered species would receive additional management attention and connectivity between existing conservation lands would be enhanced. Water resources of the Paint Rock River watershed would be maintained or improved. Opportunities for wildlife-dependent recreational activities would be increased. Further, any cultural resources found within the proposed refuge would be afforded protection by the Service.

Glossary

Appropriate Use - a proposed or existing use on a refuge that meets at least one of the following three conditions: (1) The use is a wildlife-dependent use; (2) the use contributes to fulfilling the refuge purpose(s), the National Wildlife Refuge System mission, or goals or objectives described in a refuge management plan approved after October 9, 1997, the date the National Wildlife Refuge System Improvement Act was signed into law; and (3) the use has been determined to be appropriate as specified in Section 1.11 of the National Wildlife Refuge System Improvement Act.

Area of Influence (AOI) - a generalized area which contains lands of interest to the Service and within which the agency would analyze environmental impacts of a Proposed Action. The AOI for this project was limited to the North Carolina and Tennessee portion of the Blue Ridge Ecoregion. The AOI does not convey authority to establish rules and regulations and is only used to study the effects of a proposal on the human environment, including abiotic, biological, socioeconomic, and cultural resources.

Biological Diversity (or Biodiversity) - the variety of life and its processes, including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur

Biological Integrity - biotic composition, structure, and functioning at genetic, organism, and community levels comparable with historic conditions, including the natural biological processes that shape genomes, organisms, and communities

Candidate Species - plants and animals for which the Service has sufficient information on their biological status and threats to propose them as endangered or threatened under the Endangered Species Act, but for which development of a proposed listing regulation is precluded by other higher priority listing activities.

Categorical Exclusion - pursuant to the National Environmental Policy Act (NEPA), a category of federal agency actions that do not individually or cumulatively have a significant effect on the human environment (40 CFR 1508.4).

Compatible Use - Compatible use means a wildlife-dependent recreational use or any other use of a refuge that, in the sound professional judgment of the refuge manager, will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuge (National Wildlife Refuge System Improvement Act of 1997, Public Law 105-57; 111 Stat. 1253).

Compatibility Determination - the process in which a wildlife-dependent use or any other public use on a refuge is found to be compatible or incompatible with the fulfillment of the Refuge System mission or the purposes of the refuge. This determination is a requirement for wildlife-dependent uses or any other public uses on a refuge.

Compatibility Policy - The refuge manager will not initiate or permit a new use of a national wildlife refuge or expand, renew, or extend an existing use of a national wildlife refuge unless the refuge manager has determined that the use is a compatible use (Service Manual 603 FW 2.3).

Comprehensive Conservation Plan (CCP) - Mandated by the National Wildlife Refuge System Improvement Act of 1997, a document that provides a description of the desired future conditions and long-range guidance for the refuge manager to accomplish purposes of the Refuge System and the

refuge. CCPs establish management direction to achieve refuge purposes (Public Law 105-57; Service Manual 602 FW 1.6).

Conservation Partnership Area (CPA) - An area, outlined for this proposal by the upper Paint Rock River watershed in Tennessee, within which the Service proposes to establish a refuge.

Cumulative Impact - According to NEPA, the impact on the environment which results from the incremental impact of the Proposed 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.

Easement - An agreement by which landowners give up or sell one of their rights on their property (e.g., landowners may donate rights of way across properties). It is a non-possessory interest in a real property owned by another imposing limitations or affirmative obligations with the purpose of returning or protecting the property's conservation values.

Environmental Assessment (EA) - A concise public document, prepared in compliance with NEPA, that discusses the purpose and need for an action, alternatives that were considered, and provides sufficient evidence and analysis of the action's effects to determine whether it is necessary to prepare an environmental impact statement (see immediately below) or a finding of no significant impact (40 CFR 1508.9).

Environmental Impact Statement (EIS) - A detailed, written analysis of the environmental effects of a Proposed Action, adverse effects of the project that cannot be avoided, alternative courses of action, short-term uses of the environment versus the maintenance and enhancement of long-term productivity, and any irreversible and irretrievable commitment of resources (40 CFR 1508.1 1).

Fee Title - A real estate term that means the type of ownership used giving the owner the maximum interest in the land, entitling the owner to use the property in any manner consistent with federal, state, and local laws and ordinances.

Finding of No Significant Impact (FONSI) - Supported by an environmental assessment, a document that briefly presents why a federal action will have no significant effect on the human environment, and for which an environmental impact statement, therefore, will not be prepared (40 CFR 1508.13).

Land Protection Plan (LPP) - A document that identifies and prioritizes lands for potential acquisition by the Service from a willing seller, and also describes other methods of providing protection (e.g., easements). This document is released with environmental assessments.

National Environmental Policy Act of 1979 (NEPA) - Requires all agencies, including the Service, to examine the environmental impacts of their actions, incorporate environmental information, and utilize public participation in the planning and implementation of all actions. Federal agencies must integrate NEPA with other planning requirements and prepare appropriate NEPA documents to facilitate better environmental decision-making. NEPA requires federal agencies to review and comment on federal agency environmental plans and documents when the agency has jurisdiction by law or special expertise with respect to the environmental impacts involved (42 U.S.C. 4321-4327 and 40 CFR 1500-1508).

National Wildlife Refuge - A designated area of land, water, or an interest in land or water within the Refuge System, but does not include Coordination Areas (Service Manual 603 FW 2.5 N).

National Wildlife Refuge System - All lands, waters, and interests therein administered by the Service as wildlife refuges, wildlife ranges, wildlife management areas, waterfowl production areas, coordination areas, and other areas for the protection and conservation of fish and wildlife, including those that are threatened with extinction as determined in writing by the Director or so directed by presidential or secretarial order. The determination by the Director may not be delegated (Service Manual 603 FW 2.5 I).

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Appendix A. Conceptual Management Plan

INTRODUCTION

The proposed Paint Rock River National Wildlife Refuge (NWR) is in Franklin County, Tennessee. If established, a refuge would protect a combination of upland and riparian habitats supporting multiple species of management concern. The Paint Rock River watershed is home to several federally listed species, such as gray and Indiana bats, Palezone shiner, snail darter, Alabama lampmussel, fine-rayed pigtoe, pale lilliput, Hine's emerald dragonfly, American Hart's-tongue fern, and Morefield's leather-flower, and Price's potato-bean. Additionally, numerous state listed and imperiled species are found in the watershed. Important habitats of the watershed include oak-hickory forests, bottomland hardwoods, canebrake, and streams. Should the Proposed Action to establish Paint Rock River NWR be approved, it would encompass approximately 25,120 acres of wildlife habitat that would be protected, in perpetuity, through fee-title acquisition, conservation easements, or other means.

This document, the Draft Conceptual Management Plan (Draft CMP), provides further details on the U.S. Fish and Wildlife Service's Proposed Action and how the lands identified therein would be administered.

PURPOSE OF CONCEPTUAL MANAGEMENT PLAN

The Draft Land Protection Plan and Environmental Assessment (Draft LPP/EA) examines the feasibility of establishing a national wildlife refuge in the Paint Rock River watershed. In Chapter III of the Draft EA, two alternatives are described--No Action (Alternative A), and Alternative B (Proposed Action). The Proposed Action would not be implemented until it had been officially reviewed and authorized.

If approved, Alternative B would authorize a Conservation Partnership Area (CPA) of 40,505 acres, within which approximately 25,120 acres would be conserved through fee-title purchase or less-than-fee-title (e.g., easements) purchase. For more specific information on the resources to be protected, refer to Chapter II of the Draft EA. The Service concludes that acquiring these lands over time would provide the needed protection of rare and unique habitats in the area, and build on the existing coalition of organizations and individuals that advocate conservation within Paint Rock River watershed. It would also provide the public with increased opportunities for wildlife-dependent recreation.

The Service developed this Draft CMP to describe the management direction for the proposed Paint Rock River NWR, as defined in Alternative B, and outlines possible interim habitat management priorities and compatible public uses on newly acquired lands, should a refuge be approved. The activities described in this Draft CMP would direct the way we pursue and manage acquisitions, conservation easements, and other land interests until a comprehensive conservation plan (CCP) is developed. By Service policy, a CCP must be developed within 15 years of the actual establishment of a refuge (i.e., acquisition of first land parcel). Any major changes in the activities described in this Draft CMP, any new activities, and our development of the CCP would be subject to public review and comment in accordance with the provisions of Service refuge planning policy (602 FW 1, 2, and 3) and Service and U.S. Department of the Interior policy implementing the National Environmental Policy Act (NEPA) of 1969 (Department of the Interior Manual 516, Appendix 1).

MISSION OF THE SERVICE AND THE NATIONAL WILDLIFE REFUGE SYSTEM

U.S. FISH AND WILDLIFE SERVICE

The mission of the Service is working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people. The Service accomplishes this through federal programs relating to wild birds, endangered species, certain marine mammals, fisheries, aquatic resources, and wildlife management activities.

As part of its mission, the Service manages at least 553 national wildlife refuges and other units of the Refuge System covering 150 million acres. These areas comprise the National Wildlife Refuge System, the world's largest collection of lands and waters set aside specifically for fish and wildlife. The majority of these lands, 77 million acres, is in Alaska, while 54 million acres are part of three marine national monuments in the Pacific Ocean. The remaining acres are spread across the other 49 states and several United States territories. In addition to refuges, the Service manages thousands of small wetlands, 37 wetland management districts, 70 national fish hatcheries, 65 fishery resource offices, and 81 ecological services field stations. The Service enforces federal wildlife laws, administers the Endangered Species Act, manages migratory bird populations, restores nationally significant fisheries, conserves and restores wildlife habitat, and helps foreign governments with their conservation efforts. It also oversees the Federal Aid program that distributes hundreds of millions of dollars in excise taxes on fishing and hunting equipment to state fish and wildlife agencies.

NATIONAL WILDLIFE REFUGE SYSTEM

The mission of the Refuge System, as defined by the National Wildlife Refuge System Improvement Act of 1997 is:

> "...to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans."

The wildlife and habitat vision for national wildlife refuges stresses that wildlife comes first; that ecosystems, biodiversity, and wilderness are vital concepts in refuge management; that refuges must be healthy and growth must be strategic; and that the refuge system serves as a model for habitat management with broad participation from others.

Actions were initiated in 1997 to comply with the direction of this new legislation, including an effort to complete comprehensive conservation plans for all refuges. These plans, which are completed with full public involvement, help guide the future management of refuges by establishing natural resources and recreation/education programs. Consistent with the National Wildlife Refuge System Improvement Act (Improvement Act), approved plans will serve as the guidelines for refuge management for the next 15 years. The Improvement Act states that each refuge shall be managed to:

- Fulfill the mission of the Refuge System;
- Fulfill the individual purposes of each refuge;
- Consider the needs of wildlife first;
- Fulfill requirements of comprehensive conservation plans that are prepared for each unit of the Refuge System;

- Maintain the biological integrity, diversity, and environmental health of the Refuge System;
- Recognize that wildlife-dependent recreation activities including hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation are legitimate and priority public uses; and
- Allow refuge managers authority to determine compatible public uses.

National wildlife refuges connect visitors to their natural resource heritage and provide them with an understanding and appreciation of fish and wildlife ecology to help them understand their role in the environment. Wildlife-dependent recreation on refuges also generates economic benefits to local communities. According to the report, "*Banking on Nature 2006: The Economic Benefits to Local Communities of National Wildlife Refuge Visitation*," approximately 35 million people visited national wildlife refuges in 2006, generating almost $1.7 billion in total economic activity and creating almost 27,000 private sector jobs producing about $543 million in employment income (Carver and Caudill 2007). Additionally, recreational spending on refuges generated nearly $185.3 million in tax revenue at the local, county, state, and federal levels (Carver and Caudill 2007). As the number of visitors grows, significant economic benefits are realized by local communities. In 2006, 87 million people, 16 years and older, fished (30 million), hunted (12.5 million), or observed wildlife (71 million), generating $120 billion (U.S. Fish and Wildlife Service and U.S. Census Bureau 2006). In a study completed in 2002 on 15 refuges, visitation had grown 36 percent in 7 years. At the same time, the number of jobs generated in surrounding communities grew to 120 per refuge, up from 87 jobs in 1995, pouring more than $2.2 million into local economies. The 15 refuges in the study were Chincoteague (Virginia); National Elk (Wyoming); Crab Orchard (Illinois); Eufaula (Alabama); Charles M. Russell (Montana); Umatilla (Oregon); Quivira (Kansas); Mattamuskeet (North Carolina); Upper Souris (North Dakota); San Francisco Bay (California); Laguna Atacosa (Texas); Horicon (Wisconsin); Las Vegas (Nevada); Tule Lake (California); and Tensas River (Louisiana) the same refuges identified for the 1995 study. Other findings also validate the belief that communities near refuges benefit economically. A recent study determined that refuges can also have a positive effect on nearby home values (Taylor et al. 2012). Expenditures on food, lodging, and transportation grew to $6.8 million per refuge, up 31 percent from $5.2 million in 1995. For each federal dollar spent on the Refuge System, surrounding communities benefited with $4.43 in recreation expenditures and $1.42 in job-related income (Caudill and Laughland, unpublished data). Visitation is growing with 41 million visitors to national wildlife refuges in 2008.

Volunteers continue to be a major contributor to the success of the Refuge System. In 2009, 42,918 volunteers donated 1,611,388 hours. The value of their labor was $32,630,607, the equivalent of 775 full-time employees. More than 200 friends' organizations support the work of the Service (USFWS 2009b).

The Improvement Act stipulates that comprehensive conservation plans (CCPs) be prepared in consultation with federal and state governmental agencies and adjoining private landowners and that the Service develop and implement a process to ensure an opportunity for active public involvement in the preparation and revision (every 15 years) of the CCPs. All lands of the Refuge System will be managed in accordance with an approved CCP that will guide management decisions and set forth strategies for achieving refuge unit purposes. Each CCP will be consistent with sound resource management principles, practices, and legal mandates including Service compatibility standards and other Service policies, guidelines, and planning documents (602 FW 1.1).

BACKGROUND AND RATIONALE FOR THE ESTABLISHMENT OF A PAINT ROCK RIVER NWR

The Paint Rock River watershed contains some of the last, large stands of hardwood forests in the eastern United States. In addition, numerous streams criss-cross the landscape. These and other habitats are home to many rare and endemic plant communities. Wildlife is also varied, diverse and includes numerous imperiled species with over 15 federal and dozens of state listed animal species. Threats to these plants and animals range from habitat fragmentation and isolation of small breeding populations to reductions in water quality and conversion of habitat to other uses, such as commercial forestry, agriculture, and housing developments.

The water resources of the upper Paint Rock River watershed are important for several reasons. The quality and quantity of water affects all downstream users, from the diverse aquatic species to human needs, such as recreational anglers, boaters, and residents downstream. In some areas, streamside vegetation has been cleared, accelerating erosion and polluting waterways with sediments. In addition, clear-cut areas and unimproved roads can erode, contributing to sedimentation of streams. Vegetated areas are also important in regulating the supply of water. As forests are cleared, areas are unable to store water, increasing the frequency of flood events during heavy rains. Conversely, areas with little or no vegetation dry out faster, worsening the impacts of droughts. Rare species, such as many freshwater mussels, are negatively impacted by drainage and sedimentation. Restoration can be accomplished by repairing roads, restoring stream banks, replanting cleared areas, etc.

Throughout this landscape there are several existing conservation lands, ranging from private preserves to state wildlife management areas. It is becoming increasingly important, especially with the threats and uncertainties of global climate change and what it might mean for species ability to adapt, to work collectively with all partners, from the traditional conservation agencies and organizations to the landowners who are integral to assuring that the rural landscapes would persist into the future.

The Service also sees a need to provide additional opportunities for wildlife-dependent recreation and education. It is well recognized that many of our youth no longer have an attachment with the outdoors and outdoor activity (Louv 2006). So much so that the government-wide America's Great Outdoors initiative focuses on providing increased opportunities for our nation's youth and population in general to engage with the outdoors. Establishing a new national wildlife refuge in this landscape would provide these additional opportunities.

It is envisioned that the proposed refuge would:

- Conduct landscape scale strategic habitat conservation for the important resources found within the Paint Rock River watershed through partnerships between the Service, partner agencies, and other conservation organizations.
- Protect and enhance habitats for federal trust species and species of management concern, with special emphasis on federal and state listed species.
- Protect and restore the water quality and hydrology of the Paint Rock River watershed.
- Provide opportunities for hunting, fishing, wildlife observation and photography, and environmental education and interpretation, while promoting activities that complement the purposes of the refuge and other protected lands in the region.
- Protect historical properties; facilitate archaeological and historical investigations regarding human occupation, land use, and paleoecology; and interpret the region's history and culture.

LAWS GUIDING THE NATIONAL WILDLIFE REFUGE SYSTEM

A number of laws, policies and regulations, including the following, govern the acquisition and management of land in the Paint Rock River landscape, including the Improvement Act, the National Wildlife Refuge System Administration Act, Endangered Species Act, and Migratory Bird Treaty Act.

NATIONAL WILDLIFE REFUGE SYSTEM IMPROVEMENT ACT OF 1997

The Improvement Act guides the development and operation of the Refuge System. It clearly identifies the mission of the Refuge System; requires the Secretary of the Interior to maintain the biological integrity, diversity, and environmental health of refuge lands; mandates a “wildlife first” policy on refuges; and requires comprehensive conservation planning. It also designates the following six wildlife-dependent recreational uses as priority public uses of the Refuge System: hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. The Improvement Act amended the National Wildlife Refuge System Administration Act of 1966, which continues to serve as the parent legislation for the Refuge System.

NATIONAL WILDLIFE REFUGE SYSTEM ADMINISTRATION ACT OF 1966

This Act defines the Refuge System, including refuges, areas for the protection and conservation of fish and wildlife threatened with extinction, wildlife ranges, wildlife management areas, and waterfowl production areas. It also authorizes the Secretary of the Interior to permit any use of an area, provided the use is compatible with the major purposes for establishing the area.

ENDANGERED SPECIES ACT OF 1973 (AS AMENDED)

The Endangered Species Act (ESA) directs all federal agencies to participate in endangered species conservation by protecting threatened and endangered species and restoring them to a secure status in the wild. Section 7 of the Act charges federal agencies to aid in the conservation of species listed as threatened or endangered under the ESA, and requires federal agencies to ensure that their activities will not jeopardize the continued existence of ESA-listed species or adversely modify designated, critical habitats.

MIGRATORY BIRD TREATY ACT

The Migratory Bird Treaty Act protects all migratory birds and their parts (including eggs, nests, and feathers) from illegal trade. The Migratory Bird Treaty Act is a domestic law that acknowledges the United States' involvement in four international conventions (with Canada, Japan, Mexico, and Russia) for the protection of a shared migratory bird resource. The bird resource is considered shared because these birds migrate between countries at some point during their annual life cycle.

NATIONAL ENVIRONMENTAL POLICY ACT OF 1969

The National Environmental Policy Act (NEPA) requires that all federal agencies consult fully with the public in planning any action that may significantly affect the quality of the human or natural environment.

LAND AND WATER CONSERVATION ACT

The Land and Water Conservation Fund uses monies from certain user fees, the proceeds from the disposal of surplus federal property, the federal tax on motor boat fuels, and oil and gas lease revenues (primarily Outer Continental Shelf oil monies) to fund matching grants to states for outdoor recreation projects and to fund land acquisition for various federal agencies.

MIGRATORY BIRD CONSERVATION ACT

The Migratory Bird Conservation Act provides for the acquisition of suitable habitats for use as migratory bird refuges, and the administration, maintenance, and development of these areas, under the administration of the Secretary of the Interior.

ARCHAEOLOGICAL RESOURCES PROTECTION ACT OF 1979 (ARPA)

ARPA provides protection for archeological resources on public lands by prohibiting the "excavation, removal, damage or defacing of any archeological resource located on public or Indian lands," and sets up criminal penalties for those acts. It also encourages the increased cooperation and exchange of information between governmental authorities, the professional archeological community, and private individuals having archeological resources or data obtained before 1979.

NATIONAL HISTORIC PRESERVATION ACT OF 1966

The National Historic Preservation Act requires all federal agencies to consider the effects of their undertaking on properties meeting criteria for the National Register of historic places, and ensures that historic preservation fully integrates into the ongoing programs and missions of federal agencies.

PURPOSE OF ESTABLISHMENT AND LAND ACQUISITION AUTHORITY

Refuge lands can be acquired under various legislative and administrative authorities for specified purposes. Establishment of and land acquisition for the proposed Paint Rock River National Wildlife Refuge would be authorized by the National Wildlife Refuge System Administration Act, Endangered Species Act, Emergency Wetlands Resources Act, Migratory Bird Conservation Act, Fish and Wildlife Act, and Refuge Recreation Act. The purposes guide the long-term management of the refuge, prioritize future land acquisition, and play a key role in determining the compatibility of proposed public uses. The purposes for proposed refuge are listed as follows:

> *"conservation, management, and ... restoration of the fish, wildlife, and plant resources and their habitats ... for the benefit of present and future generations of Americans" 16 U.S.C. 668dd(a)(2) (National Wildlife Refuge System Administration Act), as amended by amended by Pub. Law 105-57(The National Wildlife Refuge System Improvement Act of 1997);*
>
> *"to conserve (A) fish or wildlife which are listed as endangered species or threatened species…or (B) plants" 16 U.S.C. 1534 (Endangered Species Act of 1973);*
>
> *"the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions" 16 U.S.C. 3901(b), 100 Stat. 3583 (Emergency Wetlands Resources Act of 1986);*

"for use as an inviolate sanctuary, or for any other management purpose, for migratory birds" 16 U.S.C. 715d (Migratory Bird Conservation Act);

"for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude" 16 U.S.C. 742f(b)(1) "for the development, advancement, management, conservation, and protection of fish and wildlife resources" 16 U.S.C. 742f(a)(4)(Secretarial powers to implement laws related to fish and wildlife) (Fish and Wildlife Act of 1956);

"suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species" 16 U.S.C. 460k-1 "the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors" 16 U.S.C. 460k-2 [Refuge Recreation Act (16 U.S.C. 460k-460k-4), as amended]

VISION FOR THE PROPOSED PAINT ROCK RIVER NATIONAL WILDLIFE REFUGE

The Paint Rock River National Wildlife Refuge will protect important wildlife and habitats of the Paint Rock River watershed, a unique ecosystem that supports a high diversity of aquatic, terrestrial, and karst habitats. Together with partners, the Fish and Wildlife Service will help protect and improve the water quality, water quantity, and hydrology of the Paint Rock River, benefitting numerous imperiled freshwater species and human communities utilizing the area's water resources. The refuge will conserve, protect, and manage one of the largest contiguous tracts of hardwoods remaining in eastern North America for current and future generations. As part of a system of public and private conservation lands, the refuge will expand outdoor recreational opportunities, helping maintain a way of life and supporting local economies.

GOALS OF THE PROPOSED PAINT ROCK RIVER NATIONAL WILDLIFE REFUGE

Four overarching goals were developed for the proposed refuge, as listed.

Goal 1. Functional Conservation Landscape

The Paint Rock River NWR, as part of the Appalachian Landscape Conservation Cooperative (LCC), would contribute to a more connected and functional conservation landscape that would provide effective habitat connections between existing conservation areas, reducing fragmentation, and protecting and restoring large tracts of contiguous hardwood forests.

Goal 2. Habitat for Fish and Wildlife

The refuge would provide a wide range of quality Cumberland Plateau habitats to support native wildlife and plant diversity, including migratory birds, federal and state listed species, and other imperiled species.

Goal 3. Enhanced Water Quality, Water Quantity, and Improved Hydrology

The refuge would contribute to water quality, water quantity, and hydrology of the Paint Rock River watershed to benefit the area's high aquatic diversity and help protect the water supply for residents downstream.

Goal 4. **Wildlife-dependent Recreation and Education**
Refuge visitors of all abilities 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 the important landscape of the Paint Rock River watershed.

The rationale for each goal is summarized and described below.

GOAL 1. FUNCTIONAL CONSERVATION LANDSCAPE

Refuge lands would provide an important link for migratory birds and important habitat for numerous other imperiled species. Proposed management would complement the management of adjacent and nearby conserved lands, both public and private, helping to make the entire landscape a more functional conservation landscape. Links to existing conserved lands would also provide the opportunity for species to migrate and adapt to changes in habitats anticipated to occur from the impacts of global climate change. A national wildlife refuge in the upper Paint Rock River watershed would provide local and regional benefits to wildlife by working in concert with existing partners, including the Tennessee Wildlife Resources Commission (TWRA), other State agencies, and non-governmental organizations.

GOAL 2. HABITAT FOR FISH AND WILDLIFE

Diverse habitats and their respective ecological systems for species of greatest conservation need would be protected. Of the 25,120 acres to be encompassed by the refuge, the estimated amount of key habitats to be protected would include at least 7.8 miles of streams and over 23,000 acres of upland hardwoods. Protecting these habitats would contribute to the conservation of mussels, fish, aquatic snails, neotropical migratory birds, bats, and a host of other wildlife. The following is a description of some of the most important habitat types found within the proposed refuge.

The headwater streams are approximately 15 to 60 feet wide and shallow, seldom more than 6 feet in depth. Waters of the streams have a medium to swift flow and water quality is generally good; clarity tends to be excellent except after rain events. Substrate types in these streams vary widely from limestone bedrock to sandstone cobbles, and include a mixture of gravels, chert, sands and silt. The overall condition of stream banks is currently not known. However, it is expected that in non-forested areas, stream banks are likely exposed and eroding, and stabilization efforts would be beneficial. These aquatic habitats support numerous imperiled freshwater mussels, fish, and other species. Threats include water pollution, changes in hydrology, invasive species, and obstacles to migration and movement.

Several remnants of bottomland broadleaf communities remain evident in the Paint Rock River Valley, however. Noteworthy components of a remnant mature “late successional” forest include overcup oak (*Quercus lyrata*), swamp chestnut oak (*Q. michauxii*), water oak (*Q. nigra*), American elm (*Ulmus americana*), sweetgum (*Liquidambar styraciflua*) and shellbark hickory (*Carya lacinosa*). Other species, including swamp pin oak (*Q. palustris*) or swamp white oak (*Q. bicolor*) may have been more common in the original forests. The understory varies greatly depending on hydroperiod and soils, and may be dominated in places by giant cane (*Arundinaria gigantea*) or small trees and shrubs (e.g. hollies, spicebush) or even by grass and sedge “meadows” mixed with such herbaceous species as Eastern camas lily (*Camassia scilloides*).

Gallery forests along the streams themselves may have somewhat higher diversity of species, both woody and herbaceous. Old stands show evidence that cottonwood (*Populus deltoides*) was once an important component of these streamside forests. Along and within the river channels, scour plains develop that may support a wide variety of grass and herbaceous species, including the rare Cumberland sandreed (*Calamovilfa arcuata*) (NatureServe 2006). Numerous wildlife species, including several rare birds, utilize this habitat.

These forest types have been dramatically reduced by agriculture nearly throughout the Southern Cumberlands, having been largely replaced by pastures or field row agriculture as is the case in the Paint Rock River watershed.

Forests cover over 80 percent of the proposed area. Of these, the majority consist of hardwoods. Depending on the local soil types and topography, dominant canopy tree species include: white oak (*Q. alba*), northern red oak (*Q. rubra*), white ash (*Fraxinus americana*), yellow poplar (*Liriodendron tulipifera*), hickories (*Carya* spp.), black oak (*Q. velutina*), maple (*Acer* sp.), and chestnut oak (*Q. prinus*). Lower slopes and rock outcroppings often contain basswood (*Tilia* spp.), American beech (*Fagus grandifolia*), magnolia (*Magnolia* spp.), walnut (*Juglans nigra*), chinkapin oak (*Q. muehlenbergii*), and buckeye (*Aesculus* spp.). The area includes numerous limestone cove forests, which grow in mountain gorges. A number of distinctive species of limited or sporadic distribution are associated with the limestone cove forests, including yellowwood (*Cladrastis kentuckea*), American smoketree (Cotinus americanus), blue ash (*Fraxinus quadrangulata*), and numerous shrubs (e.g., *Viburnum rafinesqueianum*, *V. bracteatum* and others) (Smalley 1982). Numerous interior forest birds, salamanders, and rare plants are supported by upland forests of the Cumberlands. Threats include conversion to pine plantations, urbanization, invasive plants, etc.

Canebrake is a vegetative community that is dominated by giant cane (*Arundinaria* spp.). Canebrakes existed within forest openings, as an understory component of floodplain forest, and as broad cane thickets without forest overstory. Historically, cane was a prominent feature of the Southern Cumberlands, but southeastern canebrake ecosystem is now considered to be critically endangered with over 98 percent of this habitat lost (Noss et al. 1995). Several declining bird species, including Bachman's warbler, Swainson's warbler, hooded warbler, and Kentucky warbler utilize canebrake. In addition to land conversion, invasive exotic plants and fire-suppression are ongoing threats to this imperiled habitat.

Over 11,000 caves have been documented in Alabama, Georgia, and Tennessee. Most of these are concentrated in the Cumberland Plateau and Highland Rim physiographic provinces which contain some of the highest densities of caves in the country (Culver et al. 2000). Though largely undocumented, caves in the area likely support among the richest assemblages of cave-obligate species known in the country.

Franklin County, Tennessee, and the Paint Rock River watershed support at least 18 threatened, endangered, and candidate species, including:

- 2 bats
- 2 fish
- 9 mussels
- 1 aquatic snail
- 4 plants

More detailed descriptions of the current status, habitat requirements, and other information on these species can be found in Chapter 2 of the EA.

GOAL 3. ENHANCED WATER QUALITY, WATER QUANTITY, AND IMPROVED HYDROLOGY

The Service would add 25,120 acres of conservation lands to the upper Paint Rock River watershed, supporting the enhancement of water quality, quantity, and hydrology within this landscape.

Sediment is currently the primary water pollutant of concern for the Paint Rock River watershed. In the upper basin, sources of sediment tend to be unpaved roads, ditch-lines, and clear-cut areas. Unpaved roads and improperly designed ditch-lines tend to erode, causing sediments to wash into local streams. Likewise, without soil erosion controls, areas cleared of trees can also contribute sediments to local water bodies.

GOAL 4. WILDLIFE-DEPENDENT RECREATION AND EDUCATION

With the addition of approximately 25,120 acres of Service-managed lands to the conservation landscape that could support compatible wildlife-dependent public use opportunities, these opportunities would be expected to increase. The Service would work cooperatively with TWRA, Tennessee Division of Natural Areas, and other partners to provide public hunting and fishing opportunities, and the Service would provide interpretative and educational programs.

The Refuge System Improvement Act of 1997 establishes six priority public uses on refuges. Those priority uses depend on the presence, or the expectation of the presence, of wildlife. These uses are: hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. Although these priority uses must receive consideration in planning for public use, they also must be compatible with the purposes for which a refuge is established and the mission of the Refuge System. Compatibility determinations, which evaluate the effects of a particular use or activity in the context of species or habitats on a refuge, aid in making those decisions. If refuge lands were acquired, compatibility determinations would be used to decide which, where, and how public use opportunities would be permitted.

Public use opportunities contribute to the long-term protection of wildlife resources by promoting understanding, appreciation, and support for wildlife conservation. The six priority public uses would be accommodated to the maximum extent possible, where they would not have significant negative effects on wildlife. All of the proposed public use activities are contingent upon availability of staff and funding to develop and implement these programs. The Service would promote opportunities for volunteers and develop community interpretive materials and programs to enhance awareness of and appreciation for the area's resources. School and other group programs would be considered. If a refuge is established, an increase in public use would be expected from new facilities and programs such as hunts, trails, parking areas, fishing access, interpretive overlooks, and observation towers that would potentially be a part of a new refuge. The Service would allow public access for day use on many newly acquired lands, provided there are no expected negative effects on sensitive species (e.g., endangered or threatened species) or habitats, and would consider overnight access as a component of other public use activities (e.g., hunting in remote locations). See Appendix B for the interim compatibility determinations for the Proposed Action.

Hunting and Fishing

The Service would open newly acquired lands for hunting and fishing, biologically, ecologically, and safely accommodating these activities within the state's regulation framework. Newly acquired lands would be subject to interim compatibility determinations (Appendix B) until the Service completed the

planning process to formally open the refuge to these activities. Per Service policy, refuge lands have to be formally opened to hunting through a process subject to NEPA, including inter-agency consultation, public scoping and commenting, etc. As part of the planning process, the Service would coordinate with TWRA regarding hunting, fishing, and other recreational activities associated with this proposal. If possible, the Service would provide American with Disabilities Act-compliant and youth hunting opportunities. Fishing would be allowed, where accessible.

Wildlife Observation, Photography, Environmental Education, and Interpretation
Beyond hunting and fishing, the refuge would also provide opportunities for wildlife observation; photography, environmental education, and interpretation. Working with state and local agencies, the Service would study the feasibility of connecting existing hiking, bicycle, and horseback riding (only on existing roads open to public vehicular traffic) through refuge lands. A refuge may also provide interpretive and environmental education programs and increase partnership opportunities to interpret the cultural and natural resources, including the role which Native Americans and European settlers contributed to the environment of the watershed.

Environmental education, one of the six priority wildlife-dependent uses encouraged on refuge lands, incorporates on-site, off-site, and distance-learning materials, activities, programs, and products that address the audience's course of study, the mission of the Refuge System, and the management purposes of the refuge. The goal of environmental education is to promote an awareness of the basic ecological foundations of the interrelationship between human activities and natural systems. Specific programs of study may include water quality and habitat restoration and the land stewardship of the ranching community. Through curriculum-based environmental education, on- and off-refuge, refuge staff, educators, and partners hope to motivate students and other persons interested in learning the role of management in the maintenance of healthy ecosystems, working landscapes, and conservation of our fish and wildlife resources

In 2010, the President launched the America's Great Outdoors (AGO) Initiative to develop a 21st Century conservation and recreation agenda for our Nation. The proposed establishment of the Paint Rock River NWR is one of two AGO priorities for Tennessee. AGO takes as its premise that lasting conservation solutions should rise from the American people – that the protection of our natural heritage is a non-partisan objective shared by all Americans. The vision of the AGO Initiative involves connecting Americans to the great outdoors, conserving and restoring America's great outdoors, and working together for America's great outdoors. AGO seeks to empower all Americans–citizens, young people, and representatives of community groups; the private sector; nonprofit organizations; and local, state, and tribal governments–to share in the responsibility to conserve, restore, and provide better access to our lands and waters in order to leave a healthy, vibrant outdoor legacy for generations yet to come. The proposed refuge serve the conservation initiative outlined by the AGO Initiative.

For years, national wildlife refuges have been connecting children with the land and with the agencies' conservation mission. It is now apparent that such connections are of immense importance. New information shows that instead of being outdoors enjoying self discovery of wild things, most children spend their time indoors glued to their televisions, video games, computers, and cell phones, rather than experiencing nature. "Last Child in the Woods: Saving Our Children from Nature Deficit Disorder," documents this trend (Louv 2005). According to the author, increased urbanization, parental anxiety, residential development restrictions, and structured play have kept children inside rather than out. This separation from the natural world can result in a host of physical and mental ailments, from childhood obesity to Attention Deficit Hyperactivity Disorder, and can erode future support for conservation (Louv 2005). As the nation's primary conservation agency, the Service has a role in addressing this concern. The Service would also have a strong incentive to promote children in nature activities along with our other conservation partners.

The Service would attempt to work with school districts and teachers to develop environmental education programs featuring unique species and communities of the refuge and the paint Rock River watershed. The Service would work with the partners to promote environmental education, thereby maximizing the use of resources and time commitments for each partner organization. The Service would also consider the role of a refuge in other potential opportunities such as small habitat restoration projects through the use of our Partners for Wildlife program, guided trail walks, birding festivals, guest lectures, youth hunting and fishing efforts, and even simple monitoring of various forms of wildlife on and off the refuge.

ADMINISTRATION

The proposed refuge may be managed as a standalone refuge or as part of a refuge complex. Generally, a standalone refuge has a dedicated staff and equipment and is managed locally. As part of a complex, Paint Rock River refuge would likely have less on-site staff initially and would share staff and equipment with one or more other refuges. Sometimes, refuges initially are part of a complex, but as they grow in size and complexity, are then separated to become stand alone refuges. Under the refuge complex scenario, the refuge staff of the Wheeler National Wildlife Refuge Complex would have the responsibility for managing the newly established refuge. During the interim period, the Service would seek funding for refuge staff within the project boundary. Initially, staff would likely consist of a refuge manager, wildlife biologist, and maintenance worker. Other staff such as visitor service specialists, fire management specialists, and law enforcement officers would be phased in over time. In the long term, the Service's Southeast Regional Office would evaluate the need for additional full-time staff based on management needs, project loads, public use activities, and other factors, and could move forward with providing additional staff when justified. The ability to fill staff positions would depend on availability of funds and regional priorities.

The proposed Paint Rock River NWR would have good access via state and local roads. Along the north runs U.S. Highway 64. State roads 16 and 97 could be used to access eastern and western refuge properties, respectively. Existing access roads on acquired properties would be evaluated for use depending on access needs, presence of sensitive species and/or habitats, public use, and other potential future needs. Some roads may be retained and improved, while others may be abandoned and removed. Legal access to inholdings and homes would be maintained.

Throughout the remainder of this document the reader will be introduced to several terms, including "compatibility" and "compatible uses." A "compatible use" is a proposed or existing wildlife-dependent recreational use or any other use of a national wildlife refuge that, based on sound professional judgment, will not materially interfere with or detract from the fulfillment of the Refuge System mission or the purposes of the national wildlife refuge. The refuge manager would not initiate or permit a new use of a national wildlife refuge or expand, renew, or extend an existing use of a national wildlife refuge unless it has been determined that the use is consistent with the mission of the Refuge System and the purposes of each specific refuge. Further, the same use may be deemed compatible on some refuges, but not others due to refuge-specific differences. (See Appendix B for the interim compatibility determinations that outline the proposed uses authorized to continue to occur during the interim period between acquisition of a property and the development of appropriate management plan(s) for a particular property.)

FACILITIES

Because no actual lands have been acquired as of yet, it is difficult to discuss specifics of facilities and improvements that may be appropriate to effectively manage the refuge. This document will discuss general approaches adopted elsewhere when establishing a new refuge, as well as unique partnership opportunities that may present themselves in this landscape. As such, the Service may opt for the listed facilities when and where compatible.

Conversion of existing trails and ranch roads to public use and/or refuge management access corridors may occur. Such roads may also be abandoned to limit access to sensitive habitats and protected species. Roads and trails may only be open during certain times of year, or may have other restrictions to protect wildlife resources or to provide access for visitor programs, such as hunting activities. Vehicle access to refuge resources would only be allowed on designated roads and trails.

Small areas may be constructed to provide for adequate and safe parking of vehicles in potential public use areas.

Because of the potential wide geographic distribution of refuge lands across this landscape, one or more refuge headquarters and visitor contact stations may be established through the adaptive reuse of buildings acquired through land acquisition (e.g., a ranch house or hunt lodge may be used as a refuge office or education facility; a pole building or barn may be used for equipment storage). Other potential future on-site improvements, including additional trails, improved access roads, observation platforms, photography blinds, and parking areas may be discussed in a future comprehensive conservation plan. The construction of new facilities or conversion of existing structures is contingent upon availability of funds and acquisition of appropriate land.

Where facility construction, operation, or maintenance may conflict with the conservation of federally listed species, appropriate measures (e.g., buffers and seasonal restrictions) would be identified and implemented to avoid adverse effects. This would be done in consultation with the Service's Endangered Species Program

Generally, public use areas would be open from dawn to dusk and habitat management areas would be closed to the public and others (except for emergency, fire, and police response). Special use permits would be issued to researchers, educational groups, and others on an as-needed basis, providing that the activities are compatible with refuge purposes, goals, and objectives, and contribute to the ecological understanding, biological survey, or baseline data needs. Hunting, environmental education, and interpretive walks are some examples of activities that may be allowed, depending on the season and other factors, in wildlife management areas.

FUNDING

We would maintain a current inventory of management needs in appropriate Service database(s) and update the associated costs and priorities annually. Those databases provide a mechanism for each unit of the Refuge System to identify its essential staffing, mission-critical projects, and major needs, and form a realistic assessment of the funding needed to meet each refuge's goals, objectives, and strategies.

Since this refuge is only proposed and is not yet approved, no funding has been identified to support management activities and no budget has been developed and approved. Any funding for the proposed refuge would be dependent upon a variety of factors, including Southeast Region budget priorities and allocations.

STAFFING

As mentioned above, the staffing situation on national wildlife refuges is based on a number of factors including refuge size and complexity, proximity to other refuges, and funding. Based on these and other factors, the proposed refuge may be managed as a standalone refuge or as a unit of a refuge complex. A standalone refuge has a dedicated staff and equipment and is managed locally whereas a unit of a complex refuge would share staff and equipment with other refuge units. Typically, as new refuges are established, they operate as a unit of a complex refuge until such time that sufficient land has been acquired to warrant a dedicated staff. At this time, it is difficult to delineate staffing specifics for the proposed refuge because of the uncertainties associated with the refuge's size, complexity, resource issues, funding, and other factors. Because of this uncertainty, two staffing models that depict both staffing scenarios have been evaluated to better illustrate how these variables interact to determine levels of staffing. These models may serve to guide how this refuge may grow in staff over time. Initially however, the proposed refuge would be managed as a complex unit under the supervision and management of the Wheeler National Wildlife Refuge.

Refuge Complex Staffing Strategy

The initial staffing strategy for the proposed refuge under the refuge complex scenario identifies few new positions. A refuge manager would provide direction, supervision, and coordination for all management activities and ensure the effective oversight and community outreach for the successful management of acquisitions and easements. A maintenance worker would assure that management projects are completed such as invasive species control, mowing, maintaining fence, and other general maintenance activities. A refuge biologist would assist in delivering the full range of wildlife conservation and restoration projects on public land, provide technical assistance, assist in the restoration and management of new acquisitions, and monitor and inventory wildlife and habitat use and conditions. All other refuge functions such as law enforcement, outreach, or prescribed fire would be provided by the overlying refuge complex staff.

Refuge Standalone Staffing Strategy

As refuge lands would be acquired, an independent, standalone refuge staff would build upon the refuge complex staffing strategy. Visitor service staff (park ranger) would provide the needed link with local community educational institutions for wildlife-dependent education and oversee plans for any public use activities, such as the implementation of a hunting program. Refuge law enforcement would be among additional staffing requirements to ensure the safety of the visiting public and assure that wildlife laws are enforced. An administrative office assistant would also be required to handle an increasing budget and workload. An assistant refuge manager; private lands program biologist; and multi-agency fire management team consisting of a supervisory forestry technician, prescribed fire technician, equipment operator, and multiple seasonal firefighters, would assure the safe conduct of prescribed and wildfire management programs in this fire-dependent ecosystem. Additionally, collaborative staffing approaches, such as a co-located, multi-agency/organization visitor service facility and program, would also be under the direction of the refuge manager. In the long term, the Service's Southeast Regional Office would evaluate the need for additional full-time staff based on management needs, project loads, public use activities, and other factors, and could move forward with providing additional staff, if justified.

PARTNERSHIPS

The proposed establishment of the refuge is one component of a larger landscape-scale, partnership driven initiative, the Appalachian LCC. The Service currently is facilitating Initiative discussions with multiple agencies and organizations. It is built upon the premise that many conservation partners in this landscape have programs that are complimentary to one another, and that it is not only important, but critical for any individual agency or organization to work collaboratively toward conservation in the greater Paint Rock River watershed and Cumberland landscapes. These partner discussions have led to the overall development of this proposal, and also would play an integral part in any future activities if the proposal were to be approved. Examples of these partnerships activities include those listed below.

FIRE MANAGEMENT

Currently, the staff at Wheeler NWR (Decatur, Alabama) conducts prescribed burning activities on lands they manage in the area. Additional staff and equipment are available regionally. As part of the prescribed fire planning and preparation process, the Service traditionally enters into agreements with local and municipal fire departments for protocols associated with responding to fires on Service-owned lands.

LAW ENFORCEMENT

Public use areas of the refuge would be open to the public year-round from dawn to dusk. The Service may restrict access at times to address issues such as concerns about human safety, wildlife and/or habitat impacts, illegal activities, or law enforcement investigations. The Service would work with the refuge zone officer to establish formal, cooperative agreements with local law enforcement departments, the county sheriff's department, and TWRA to provide protection, enforcement, and appropriate law enforcement response for the proposed refuge. Conservation law enforcement personnel from the Service and TWRA would also likely patrol intermittently and monitor hunting, fishing, and other public use activities.

WILDLIFE-DEPENDENT RECREATIONAL OPPORTUNITIES

The Service recognizes the need to provide increased opportunities for wildlife-dependent recreation and education and has included this as one of the primary goals for the proposed refuge. Hunting and fishing are two wildlife-dependent recreational activities that both the Service and TWRA fully support. The hunting and fishing resources found within the area are well known. The Service would work to coordinate these and other recreational opportunities with TWRA and other state agencies to benefit the visiting public.

SUMMARY

In summary, working partnerships with surrounding landowners; conservation organizations; and municipal, state, and federal agencies would be critical to successful refuge management and the conservation of the Paint Rock River watershed and Cumberlands ecoregion. We would continue to cooperate with our conservation partners, all of whom are instrumental in helping us accomplish habitat management goals and objectives. It is clear that partnerships with the public; landowners; neighbors; conservation organizations; and tribal, state, municipal, and other federal agencies would be the only path to a successful Paint Rock River NWR.

MANAGEMENT OF PAINT ROCK RIVER NWR

The previously listed goals are intentionally broad, descriptive statements of the desired resource condition of proposed refuge land in the Paint Rock River watershed. They embrace the proposed refuge purposes, and the proposed vision statement. They provide general, interim management direction for a new refuge until approval of a considerably more detailed comprehensive conservation plan.

Goals are descriptive, open-ended, and broad statements of desired future conditions. More descriptive statements related to the goals are termed objectives. Objective statements contain the distinctive characteristics of being specific, measurable, achievable, realistic, and time sensitive. The following table organizes goal statements with their respective objectives, and provides the rationale used for the development of them. The listed objectives would be revisited and revised during the planning process to develop a comprehensive conservation plan, if the refuge were to be approved.

Goal 1. Functional Conservation Landscape.
The Paint Rock River refuge, as part of the Appalachian Landscape Conservation Cooperative (LCC), would contribute to a more connected and functional conservation landscape that would provide effective habitat connections between existing conservation areas, reducing fragmentation, and protecting and restoring large tracts of contiguous hardwood forests.
Objectives:
• Where feasible, focus on parcels that connect existing conservation lands
Rationale
The landscape of the upper Paint Rock River watershed exhibits multiple conservation lands, managed by a network of conservation agencies and organizations. However, many gaps currently exist between these conservation lands. These gaps fragment otherwise contiguous hardwood forests, a declining habitat type which supports numerous forest interior bird species. There are a few key parcels surrounding Bear Hollow South WMA and Jericho Falls State Natural Area which would complete the conservation picture in the south-central portion of the CPA. Some of the management activities which would occur might include: • Evaluate and rank all interested landowner parcels to assure the highest conservation value lands and connectivity with existing conservation lands are protected • Work with partner agencies to identify key habitat corridors for focused conservation efforts • Integrate climate change predictions, as they become available, into land conservation priorities.

Goal 2. Habitat for Fish and Wildlife.
The refuge would provide a wide range of quality Cumberland Plateau habitats to support native wildlife and plant diversity, including migratory birds, federal and state-listed species, and other imperiled species.
Objectives:
• Complete baseline habitat inventory on all refuge and easement lands within 3 years of acquisition. • Prioritize restoration needs for riparian and upland forests. • Complete at least one habitat restoration project every 5 years.

Rationale
The habitats associated with the existing conservation lands are well known. However, little of the private landholdings have been surveyed for wildlife or habitat. An initial baseline monitoring and ground-truthing of lands within the CPA needs to be completed in order to assist in the prioritization process. In addition to hardwood forests, restoration potential needs to be assessed for other habitats in order to prioritize restoration activities. Furthermore, more information needs to be obtained to determine what the historic forest types were in the area. This would aid in developing forest management prescriptions using such tools as selective thinning, prescribed fire, and other methods to help improve forest stand diversity and age structure.

Goal 3. Enhanced Water Quality and Improved Hydrology
The refuge would contribute to water quality, water quantity, and hydrology of the Paint Rock River watershed to benefit the area's high aquatic diversity and help protect the water supply for residents downstream.
Objectives:
• Complete baseline inventory and document road and ditchlines within 2 years of acquisition. • Determine which roads might be decommissioned. • Stabilize 10 percent of all eroding roads and ditchlines within 5 years of acquisition of refuge properties.
Rationale
A primary water quality concern in the upper Paint Rock River watershed is sediment resulting from eroding roads and ditchlines. As properties come into ownership, initial evaluations are required to document roads and ditchlines that could be contributing sediments to area streams. The refuge would determine which roads might be decommissioned and restored. Stabilization and other anti-erosion activities on remaining roads and ditchlines would include incorporating cross drains, placing riprap, replacing undersize culverts, etc.

Goal 4. Wildlife-dependent Recreation and Education.
Refuge visitors of all abilities 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 the important landscape of the Paint Rock River watershed.
Objectives:
• Develop a Hunt Plan within 1 year of acquisition of acreage suitable to support hunt programs • Within 2 years of suitable land acquisition, identify up to 3 sites suitable for development or restoration of facilities to engage public in outdoor recreation and educational programs • Within 3 years, develop step-down management plans to address all aspects of outdoor wildlife-dependent recreation identified in the interim compatibility determinations
Rationale
The Service has a long history of supporting wildlife-dependent recreation, ranging from hunting and fishing to environmental education and interpretation. The hunting and fishing traditions of local residents and visitors to this landscape area is well known and the Service anticipates hosting a full complement of recreational activities.

Access to public lands is of concern to the public and the Service would seek to accommodate opportunities for mobility impaired persons and youth to visit the refuge. Being in close proximity to urban areas, the Service would hope to engage local residents and schools in multiple educational opportunities, ranging from self-guided interpretive trails to formal curriculum for local schools.

Facilities are keys for the Service to be able to engage and interact with the public. Since many conservation partners have similar missions and interest, it is important to seek out mutually beneficial opportunities to co-locate facilities and staff to be more cost efficient and effective.

Some of the management activities which would occur might include:

- Incorporate opportunities, in cooperation with TWRA, for youth and mobility impaired hunting and fishing programs.
- Actively participate and host TWRA sponsored wildlife-dependent recreational workshops.
- Evaluate opportunities, in cooperation with TWRA and other partner groups, to connect and expand trail networks.
- Seek cooperative opportunities with partner agencies and organizations to co-locate and cooperate on educational and interpretive programs and facilities.

ACQUISITION MANAGEMENT

Protection of lands would be accomplished by targeting approximately 25,120 acres of refuge lands within the 40,505-acre acquisition boundary. The reader is referred to the Draft LPP for more specific details regarding the Service's land acquisition program.

PUBLIC USE MANAGEMENT

The initial decision-making process a refuge manager follows when first considering whether or not to allow a proposed use on a refuge involves an evaluation of the appropriateness of a given activity on a national wildlife refuge. The refuge manager must find a use to be appropriate before undertaking a compatibility review of the use. If a proposed use is not found to be appropriate, the refuge would not allow the use and would not prepare a compatibility determination. By screening out proposed uses that are not appropriate to the refuge, the refuge manager avoids unnecessary compatibility reviews. By following the process for finding the appropriateness of a use, we strengthen and fulfill the Refuge System mission. The collection of interim appropriateness reviews for this project can be found in Appendix B.

The Improvement Act establishes six priority public uses on refuges. Those priority uses depend on the presence, or the expectation of the presence of wildlife. These uses are: hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. Although these priority uses must receive our consideration in planning for public use, they also must be compatible with the purposes for which the refuge was established and the mission of the Refuge System. Compatibility determinations, which evaluate the impacts of a use that has been determined to be appropriate in the context of species or habitats, aid in making those decisions. As lands are acquired in the upper watershed, compatibility determinations would be used to decide what public

use opportunities are compatible and can be permitted. The interim compatibility determinations for these priority public uses, which would allow existing uses to continue until such time that a more comprehensive management plan is developed, can be found in Appendix B.

Table 19 summarizes the public uses that would likely be evaluated during the interim phase and their potential limitations under current conditions. More specific discussion of these public use activities follows.

Table 19. Interim Public Uses

Public Use Activity	Would this use be provided during the interim phase?
Public Hunting	Yes, limited by available hunting areas and potentially by WMA restrictions
Public Fishing	Yes, limited by available access and potentially by WMA restrictions
Environmental Education	Yes, limited due to staffing, partnership development, and facilities
Interpretation	Yes, limited due to staffing, partnership development, and facilities
Wildlife Observation	Yes, limited due to staffing, partnership development, and facilities
Photography	Yes, limited due to staffing, partnership development, and facilities
Horseback riding	Yes, limited to existing roads open to vehicular traffic
Bicycling	Yes, limited to existing roads open to vehicular traffic
Hiking	Yes, limited to existing trails
Off-road vehicle	No, all off road travel by any vehicle would not be allowed (except when conducted as part of permitted research acitivities)
Camping	No
Berry Picking	Yes, along existing trails
Firewood Cutting	Yes, downed wood only within 100 ft of a road
Caving	Yes, for research purposes only
Timber Management	Yes, as part of habitat management only
Research	Yes, permitted on a case-by-case basis; results to be shared with the Service and the public

OPERATIONS AND PLANNING

Refuges are managed according to an annual work plan that summarizes goals and objectives for the upcoming year. Specific actions for on the ground work, such as operation procedures, wildlife inventory plans, habitat management actions, public use, and other management activities are covered in detail in refuge-specific management plans. An annual work plan may generally state, for example, that a certain length of eroding roads would be repaired or maintained, helping reduce sedimentation risks to water quality. Long-term planning would include the need to develop a comprehensive conservation plan for the refuge, as discussed previously.

CONCLUSION

Should the refuge proposal go forward, the Service and the Refuge System would work towards meeting the overarching goals outlined in this Conceptual Management Plan. Partnerships with landowners; neighbors; conservation organizations; and local, state, tribal, and other federal government agencies are a crucial component of a successful Paint Rock River NWR.

Appendix B. Interim Appropriateness Findings and Interim Compatibility Determinations

APPROPRIATE USE FINDINGS

An appropriate use finding is the initial decision process a refuge manager follows when first considering whether or not to allow a proposed use on a refuge. An interim appropriate use is used as the initial step during the time period when land is first acquired and continuing until such time, no later than 15 years, when either a comprehensive conservation plan or step-down management plan is developed, so that ongoing public use activities can continue during this interim period. The refuge manager must find that a use is appropriate before undertaking a compatibility review of the use. This process clarifies and expands on the compatibility determination process by describing when refuge managers should deny a proposed use without determining compatibility. If a proposed use is not appropriate, it would not be allowed and a compatibility determination would not be undertaken.

Except for the uses noted below, the refuge manager must decide if a new or existing use is an appropriate refuge use. If an existing use is not appropriate, the refuge manager would eliminate or modify the use as expeditiously as practicable. If a new use is not appropriate, the refuge manager would deny the use without determining compatibility. Uses that have been considered and administratively determined to be appropriate or not appropriate are listed.

- As defined by the National Wildlife Refuge System Improvement Act of 1997, the six wildlife-dependent recreational uses (e.g., hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation) are determined to be generally appropriate for refuges. However, a particular refuge may have none, some, or all of these uses and the refuge manager must still determine if these uses are compatible.

- States have regulations concerning the take of wildlife that includes hunting, fishing, and trapping. The Service considers take of wildlife under such regulations appropriate. However, the refuge manager must determine if the activity is compatible before allowing it on a refuge.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: **Proposed Paint Rock River NWR**

Use: **Research**

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes** ✓ **No** ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** ✓

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: **Proposed Paint Rock River NWR**

Use: **Hiking (including backpacking, jogging, and walking)**

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes** _√_**No** ✓ _

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** ✓

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: **Proposed Paint Rock River NWR**

Use: **Horseback Riding**

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes** ✓ ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** ✓

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: **Proposed Paint Rock River NWR**

Use: **Bicycling**

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes** ✓ **No**___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** ✓

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: **Proposed Paint Rock River NWR**

Use: **Caving**

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes** ✓ **No** ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** ✓

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: **Proposed Paint Rock River NWR**

Use: **Berry, Nut, and Fruit Picking**

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes** ✓ **No** ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** ✓

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: **Proposed Paint Rock River NWR**

Use: **Firewood Cutting**

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes** ✓ **No** ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** ✓

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: **Proposed Paint Rock River NWR**

Use: **Timber Management**

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes** ✓ **No** ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** ✓

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: **Proposed Paint Rock River NWR**

Use: **Camping**

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?		✓
(h) Will this be manageable in the future within existing resources?		✓
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		✓
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		✓

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes** ✓ **No** ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ✓ **Appropriate**_____

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: **Proposed Paint Rock River NWR**

Use: **All-Terrain Vehicle (ATV)/Off-Road Vehicle (ORV) Use**

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable executive orders and Department and Service policies?		✓
(d) Is the use consistent with public safety?		✓
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?		✓
(h) Will this be manageable in the future within existing resources?		✓
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		✓
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		✓

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes** ✓ **No** ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors (including the following impacts analysis), my summary conclusion is that the proposed use is:

Not Appropriate ✓ **Appropriate**____

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

IMPACTS ANALYSIS FOR OFF-ROAD VEHICLE USE

For the purposes of this analysis, the term “off-road vehicle” (ORV) will be used to discuss various types of motorized vehicles capable of cross-country travel, including off-highway vehicles (OHVs), all-terrain vehicles (ATVs), motorcycles, and four-wheel drive vehicles (including Jeeps, Land Rovers, pickup trucks, etc.).

ORV impacts are summarized under various categories listed below.

GENERAL

Regardless of vehicle type, research generally shows very similar impacts; differences in impact level are due more to intensity of use or use characteristics, in combination with the level of fragility of the affected environment.

HYDROLOGY AND WATER QUALITY

ORVs damage riparian vegetation and aquatic vegetation within streams. This destabilizes stream banks, resulting in erosion and siltation (Texas Parks and Wildlife Department 2005). Furthermore, ORV trails expose the bare soil, causing erosion and soil loss. A study in the Nantahala Mountains of Georgia determined that a 0.002-acre area of ORV trails, with an average slope of about 14 percent, contributed about 770 lbs/acre sediment annually to a local stream (Riedel 2006). Even a single rainstorm can cause substantial erosion, depending on the slope of an ORV trail. A study conducted in Talladega National Forest, Alabama, showed that a 118-foot-long trail (with a 20 percent slope) produced 222 pounds of sediment during a 2-inch rainstorm. With increasing slope, the force of water runoff rises dramatically (Melton 2008).

TRAILS

Trail erosion and compaction caused by off-road and all-terrain vehicles reduce the quality of recreational trails and require enhanced management action to develop and maintain safe, usable trails. For example, a study conducted in the Appalachian Mountains of Ohio found trail erosion (soil loss) rates as high as 42 lbs/ft2/yr. Conversely, horse riding and hiking trails had a slight net gain of soil. ORVs tend to splash sediment off the trails, where it then makes its way downhill (Sack and da Luz 2003).

Maintenance costs for trails have been estimated between approximately $1,000/mile (Wildlife Conservation Society 2003) and $4,400/mile annually (WMTH Corporation 2008).

WILDLIFE

Effects on wildlife from ORVs range from disturbance to injury and mortality. Direct impact will kill most species, but amphibians, reptiles, small mammals, and ground nesting birds are most vulnerable (Fahrig et al. 1995, Ashley and Robinson 1996, Gibbs 1998, DeMaynadier and Hunter 2000). Noise and disturbance from ORVs can result in a range of impacts, including increased stress (Millspaugh et al. 2001), altered movement patterns (e.g., Wisdom et al. 2004, Preisler et al. 2006), avoidance of high-use areas or routes (Janis and Clark 2002, Wisdom 2007), and disrupted nesting activities (e.g., Strauss 1990).

RECREATION

ORV use often conflicts with non-motorized uses, such as hiking and horseback riding. Due to safety and other considerations, trail use by ORVs and non-ORV users is often incompatible. Yankoviak (2000) provides a systematic overview of user conflicts between ORV and non-ORV recreationists.

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COMPATIBILITY DETERMINATIONS

Introduction: The Fish and Wildlife Service reviewed several uses for compatibility during the development of the proposal to establish the Paint Rock River NWR. The descriptions, anticipated impacts, and approval of each use are addressed separately. These interim compatibility determinations are used during the time period when land is first acquired and continuing until such time, no later than 15 years, when a comprehensive conservation plan and/or earlier when an appropriate step-down management plan is/are developed, so that ongoing public use activities can continue during this interim period at levels similar to those that existed prior to acquisition by the Service. If the proposal were to be approved and during the acquisition of a particular property, the Service would develop an understanding of the types, conditions, and levels of use(s) that previously occurred on that property to determine which use(s) would continue to occur under these interim compatibility determinations.

Uses: Several uses were evaluated to determine their compatibility with the mission of the National Wildlife Refuge System and the purposes of the refuge: hunting, fishing, environmental education and interpretation, wildlife observation and photography, research, hiking, horseback riding, bicycling, caving, berry/nut/fruit picking, firewood cutting, and timber management.

Proposed Refuge Name: Paint Rock River NWR

Date Established: Currently Proposed

Establishing and Acquisition Authorities:
Endangered Species Act of 1973 (16 U.S.C. 1534, Endangered Species Act)
National Wildlife Refuge System Administration Act of 1997 (16 U.S.C. 668dd (a)(2), National Wildlife Refuge System Administration Act)

Proposed Refuge Purposes:

> *"conservation, management, and ... restoration of the fish, wildlife, and plant resources and their habitats ... for the benefit of present and future generations of Americans" 16 U.S.C. 668dd(a)(2) (National Wildlife Refuge System Administration Act), as amended by amended by Pub. Law 105-57(The National Wildlife Refuge System Improvement Act of 1997);*
>
> *"to conserve (A) fish or wildlife which are listed as endangered species or threatened species…or (B) plants" 16 U.S.C. 1534 (Endangered Species Act of 1973);*
>
> *"the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions" 16 U.S.C. 3901(b), 100 Stat. 3583 (Emergency Wetlands Resources Act of 1986);*
>
> *"for use as an inviolate sanctuary, or for any other management purpose, for migratory birds" 16 U.S.C. 715d (Migratory Bird Conservation Act);*

"for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude" 16 U.S.C. 742f(b)(1) "for the development, advancement, management, conservation, and protection of fish and wildlife resources" 16 U.S.C. 742f(a)(4)(Secretarial powers to implement laws related to fish and wildlife) (Fish and Wildlife Act of 1956);

"suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species" 16 U.S.C. 460k-1 "the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors" 16 U.S.C. 460k-2 [Refuge Recreation Act (16 U.S.C. 460k-460k-4), as amended]

National Wildlife Refuge System Mission: The mission, as defined by the National Wildlife Refuge System Improvement Act of 1997, is:

> "... to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans."

Other Applicable Laws, Regulations, and Policies:

- Antiquities Act of 1906 (34 Stat. 225)
- Migratory Bird Treaty Act of 1918 (15 U.S.C. 703-711; 40 Stat. 755)
- Migratory Bird Conservation Act of 1929 (16 U.S.C. 715r; 45 Stat. 1222)
- Migratory Bird Hunting Stamp Act of 1934 (16 U.S.C. 718-178h; 48 Stat. 451)
- Refuge Trespass Act of June 25, 1948 (18 U.S.C. 41; 62 Stat. 686)
- Fish and Wildlife Act of 1956 (16 U.S.C. 742a-742j; 70 Stat.1119)
- Refuge Recreation Act of 1962 (16 U.S.C. 460k-460k-4; 76 Stat. 653)
- Wilderness Act of 1964 (16 U.S.C. 1131-1136; 78 Stat. 890)
- Land and Water Conservation Fund Act of 1964
- National Historic Preservation Act of 1966, as amended (16 U.S.C. 470, et seq.; 80 Stat. 915)
- National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd, 668ee; 80 Stat. 927)
- National Environmental Policy Act of 1969, NEPA (42 U.S.C. 4321, et seq; 83 Stat. 852)
- Use of Off-Road Vehicles on Public Lands (Executive Order 11644, as amended by Executive Order 10989)
- Endangered Species Act of 1973 (16 U.S.C. 1531 et seq; 87 Stat. 884)
- Refuge Revenue Sharing Act of 1935, as amended in 1978 (16 U.S.C. 715s; 92 Stat. 1319)
- The Property Clause of the U.S. Constitution Article IV 3, Clause 2
- The Commerce Clause of the U.S. Constitution Article 1, Section 8
- The National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57, U.S.C. 668dd)
- Executive Order 12996, Management and General Public Use of the National Wildlife Refuge System, March 25, 1996

Definitions:

Appropriate Use - A proposed or existing use on a refuge that meets at least one of the listed four conditions:

1. The use is a wildlife-dependent recreational use as identified in the National Wildlife Refuge System Improvement Act of 1997 (Improvement Act).
2. The use contributes to fulfilling the refuge purpose(s), the Refuge System mission, or goals or objectives described in a refuge management plan approved after October 9, 1997, the date the Improvement Act was signed into law.
3. The use involves the take of fish and wildlife under state regulations.
4. The use has been found to be appropriate as specified in 603 FW 1 1.11.

Native American - American Indians in the conterminous United States and Alaska Natives (including Aleuts, Eskimos, and Indians) who are members of federally recognized tribes.

Priority General Public Use - A compatible wildlife-dependent recreational use of a refuge involving hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation.

Quality - The criteria used to determine a quality recreational experience include:

- Promotes safety of participants, other visitors, and facilities.
- Promotes compliance with applicable laws and regulations and responsible behavior.
- Minimizes or eliminates conflicts with fish and wildlife population or habitat goals or objectives in a plan approved after 1997.
- Minimizes or eliminates conflicts with other compatible wildlife-dependent recreation.
- Minimizes conflicts with neighboring landowners.
- Promotes accessibility and availability to a broad spectrum of the American people.
- Promotes resource stewardship and conservation.
- Promotes public understanding and increases public appreciation of America's natural resources and the Service's role in managing and protecting these resources.
- Provides reliable/reasonable opportunities to experience wildlife.
- Uses facilities that are accessible and blend into the natural setting.
- Uses visitor satisfaction to help define and evaluate programs.

Wildlife-Dependent Recreational Use
As defined by the Improvement Act, a use of a refuge involving hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation.

Compatibility Determinations for the Proposed Refuge: Compatibility determinations for each use listed were considered separately. Although the preceding sections from "Uses" through "Definitions" and the "Public Review and Comment" section through the final signatures are only written once, they are part of each descriptive use and become part of each compatibility determination.

Description of Use: Hunting (big game, upland game, and waterfowl)
This pre-acquisition compatibility determination serves as our commitment to allow hunting activities to continue, where they are pre-existing and owner-authorized, on lands that would be acquired by the Service, should the refuge proposal go forward.

Hunting is a traditional use in this landscape. Hunting has been identified as a priority wildlife-dependent activity under the Improvement Act. With the implementation of the Final Land Protection Plan, the Service, in cooperation with the state, would take the steps necessary (i.e., develop needed regulations and publish the appropriate *Federal Register* notice) to open the refuge to upland hunting for deer, feral hog, turkey, waterfowl, and other small game in accordance with state regulations. However, the Improvement Act also provides for the opportunity for existing public uses to continue, at the same level of activity as occurred when acquired, during an interim period until such time that a detailed plan is developed (e.g., Hunt Plan and/or Comprehensive Conservation Plan). This would provide additional opportunities for a priority recreational activity. Big game hunting potential may consist of refuge-sponsored or state-managed wildlife management area hunts for deer and wild turkey. Although feral hog are currently not known to occur in the area, the population of this nonnative species is expanding in Tennessee and will, in all likelihood, eventually make its way onto proposed refuge lands. Feral hogs are illegal to hunt in Tennessee, and would also be a prohibited species in terms of hunting on the refuge. Small game (e.g., gray squirrels, rabbits, and raccoons) and waterfowl (e.g., ducks, coots, and geese) hunting may consist of refuge-sponsored or state-managed wildlife management area hunts. Any or all hunt programs may be administered as part of the state's wildlife management area program and would be in accordance with state regulations.

Availability of Resources: The cost of administering a hunt program is unknown at this time, but revenue may be generated from fees collected from hunters. Refuge law enforcement officials and public use, administrative, managerial, and biological staff may allocate a portion of their time to support this program (e.g., with existing staff from existing refuges). Maintenance of roads and potential building of hunt check stations also are costs that could be absorbed within the refuge operating budget. There is the potential for the Service to partner with the Tennessee Wildlife Resources Agency (TWRA) to share responsibilities of administering the hunt program as part of the state's wildlife management area program or through some similar management agreement.

Anticipated Impacts of the Use: By policy, all activity addressed by this interim compatibility determination would not exceed the current use occurring on the land. Therefore there would be no additional anticipated impacts. Existing impacts would be identified and evaluated based on best professional judgment and published scientific papers. Many of the impacts associated with small game hunting are similar to those considered for other public use activities, such as waterfowl hunting and wildlife viewing and photography, with the exception of direct mortality to game species, short-term changes in the distribution and abundance of game species, and unrestricted travel through the hunt area. Direct mortality can impact isolated, resident game species populations by reducing breeding populations to a point where the isolated population can no longer be sustained. This can result in localized extirpation of isolated populations. The structure and length of hunt seasons can minimize or eliminate these anticipated impacts.

Removal of feral hogs on proposed refuge lands would help support TWRA's state-wide eradication efforts. The harvest of feral hogs on the refuge may have a beneficial impact to native wildlife and habitat, since hogs compete for mast; destroy native plants; and prey upon bird nests, small vertebrates, and invertebrates. Deer hunting can maintain herd size and sex ratios at a healthy population level commensurate with available habitat. Spring turkey hunting can disrupt nesting. Impacts of recreational small game hunting include harvest of target species–gray squirrels, rabbits, and raccoons. In addition to the harvest of legal game, killing of non-target species, such as snakes,

is known to occur. Other impacts of hunting may include littering, disturbing wildlife, trampling vegetation, and removing dead/down wood.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: Hunting would be in accordance with applicable state regulations and would not exceed the scope of current hunting activity until such time as a refuge hunt plan or comprehensive conservation plan is developed. Hunting programs may be administered as a state-managed wildlife management area unit or a refuge-sponsored management program. For all hunts, weapon restrictions would be in accordance with TWRA regulations. Vehicles would be restricted to existing designated roads and trails. All hunts would be designed in cooperation with state biologists and mangers to provide quality user opportunities based upon estimated wildlife population levels and biological parameters. Hunt season dates and bag limits would be adjusted to meet current hunter densities and activities and could be adjusted as needed to achieve balanced population levels within carrying capacities, regardless of impacts to user opportunities. As additional data are collected and a hunt plan or comprehensive conservation plan is developed, additional refuge-specific regulations or changes to the WMA could be implemented. These refuge-specific regulations could include, but may not be limited to, season dates that differ from those in surrounding state zones; refuge permit requirements; and closed areas on a permanent or seasonal basis to reduce disturbance to specific wildlife species or habitats, such as bird rookeries, wintering waterfowl, or threatened or endangered species, as well as to provide for public safety.

Justification: Under the Improvement Act, hunting is a priority public use. Hunting is an acceptable form of wildlife-dependent recreation compatible with the purposes for which the refuge would be established. The harvest of surplus animals is one tool used to maintain wildlife populations at a level compatible with habitat. Overabundance of animals, such as hogs and deer, can have detrimental impacts to native habitats. In addition to recreational opportunities, hunting to control populations of feral hogs and deer would be beneficial to native species and habitats, and would therefore be considered compatible with proposed refuge purposes.

Mandatory 15-year Re-evaluation Date:

Description of Use: Fishing

This pre-acquisition compatibility determination serves as our commitment to allow fishing activities to continue, where they are pre-existing and owner-authorized, on lands that would be acquired by the Service, should the refuge proposal go forward.

Fishing is a traditional use in this landscape. Fishing has been identified as a priority wildlife-dependent activity under the Improvement Act and is a traditional use on refuges. Recreational freshwater fishing may be allowed on refuge lakes, rivers, and/or ponds. The refuge would not have jurisdiction over state navigable waters, thus boating and access to navigable waters would continue according to state regulations. There may be the potential for visitors to fish from the banks of the refuge or by boat. This wildlife-dependent recreational use is supported by boating; therefore, boating impacts which are associated with fishing are also considered in this review. The Service would work with the TWRA and others to develop an understanding of fishing activities for a particular site during the acquisition process.

Availability of Resources: The cost of administering a fishing program is unknown, but revenue may be generated from potential access fees. Refuge law enforcement, public use, administrative, managerial, and biological staff may allocate a portion of their time to this program (e.g., with existing staff from existing refuges).

Anticipated Impacts of the Use: The primary impacts of this use are disturbance to and the taking of non-target wildlife species, vandalism (e.g., removal of stoplogs from water control structures), littering, and habitat disturbance (e.g., trampling of bank vegetation). Some wildlife may be injured or killed by discarded fishing line and hooks.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: Fishing within state navigable waters would continue. Fishing would adhere to state fishing laws and regulations should help maintain fish populations at a healthy, sustainable level. Fishing programs may be administered as a component of a state-managed wildlife management area unit or a refuge-sponsored management program.

Justification: Fishing is a priority public use under the Improvement Act and a wildlife-dependent activity that would be compatible with proposed refuge purposes.

Mandatory 15-year Re-evaluation Date:

Description of Uses: Environmental Education and Interpretation

This pre-acquisition compatibility determination serves as our commitment to allow environmental education and interpretation activities to continue, where they are pre-existing and owner-authorized, on lands that would be acquired by the Service, should the refuge proposal go forward.

Formal and informal environmental education and interpretation continues to occur in this landscape. Environmental education and interpretation comprise a variety of activities and facilities that seek to increase the public's knowledge and understanding of wildlife and to promote wildlife conservation. These are tools used to inform the public of resource values and issues. Examples of environmental education activities could include staff or teacher-led events, student and teacher workshops, and nature studies. Interpretive programs and facilities could include special events, visitor center displays, interpretive trails, visitor contact stations, auto tour routes, and signs.

Environmental education and interpretation activities consist primarily of youth and adult education and interpretation of the natural resources of the refuge. Activities may include on-site, refuge-led or refuge approved environmental education programs; teacher workshops; and interpretation of wildlife, habitat, other natural features, and/or management activities occurring in the refuge. These activities seek to increase the public's knowledge and understanding of wildlife and their habitats and to contribute to wildlife conservation and support of the refuge. Environmental education and interpretation were identified in the Improvement Act as priority public activities, provided they are appropriate and compatible with the purposes for which the refuge was established.

Environmental education and interpretation programs may be conducted by the Service or by a Service approved member. Any non-Service environmental education and interpretation activities must be reviewed and approved by the Service through a special use permit issued by the refuge. These permits would contain conditions to minimize impacts and ensure compatibility. The Service would work with the local schools and others to develop an understanding of existing environmental education and interpretation activities for particular sites during the acquisition process.

Availability of Resources: Initially, annual refuge operation and maintenance funds provided for the Wheeler National Wildlife Refuge Complex would be used to support the visitor services programs, including environmental education and interpretation opportunities, during planned programs and events.

Facilities, such as visitor centers, trails, and environmental education shelters would require funding to build and staff to maintain them, but they are a necessary expense to carry-out the refuge's mission. The management of a volunteer program would be essential to implement environmental education and interpretive programs.

Anticipated Impacts of the Use: Disturbance promulgated by refuge specific, limited programs, managed through and with direct oversight by refuge or refuge-approved members would be considered short-term and discrete disturbances due to the low anticipated frequency of use; the utility of existing infrastructure, such as fire lines and unimproved access roads; and the ability to move sites to new areas if the habitat shows signs of impact. It is anticipated that by utilizing existing resources and guiding all aspects of use, vegetation trampling, alteration of structure and species composition, and temporal wildlife impacts to species would be minimal. The minimal impact associated with conducting limited environmental educational and interpretation programs is generally determined to be acceptable. Specific sites would be evaluated on a case-by-case basis following acquisition.

The use of the refuge for on-site, hands-on, action-oriented activities by large groups to accomplish environmental education objectives may impose low-level impacts on the sites used for the activities. Impacts may include trampling of vegetation and temporary disturbance to wildlife species in the immediate use area. Such impacts would not be permanent or long-lasting. Most of the interpretive activities would be self-guiding and would pose minimal threat to wildlife and habitat.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: While the anticipated impacts are expected to be minimal, stipulations are required to ensure that wildlife resources are adequately protected. The environmental education program and interpretation activities would avoid sensitive sites and vulnerable wildlife and plant populations. Environmental education and interpretive programs and activities would be held and conducted at or near disturbed areas, including, but not limited to, fire lines and unimproved access roads where impacts can be minimized.

Activities would be held on sites where minimal impact would occur. Periodic evaluation of the sites and program would be done to assess whether the program objectives are being met and whether resources are being degraded. If adverse impacts become evident, environmental education and interpretive activities may need to be rotated or moved. Certain areas of the refuge may be restricted seasonally for breeding or nesting purposes or to protect habitat.

As long as stipulations to ensure compatibility are followed, the programs should remain compatible with the purposes of the refuge. The refuge would modify or eliminate any use that results in unacceptable impacts.

Justification: Environmental education and interpretation represent two priority wildlife-dependent recreational activities under the Improvement Act. Environmental education and interpretation are key components of the Service's initiative to connect children with nature and are used to encourage all citizens to act responsibly in protecting natural resources. Both would be compatible with proposed refuge purposes.

Mandatory 15-year Re-evaluation Date:

Description of Uses: Wildlife Observation and Photography

This pre-acquisition compatibility determination serves as our commitment to allow wildlife observation and photography activities to continue, where they are pre-existing and owner-authorized, on lands that would be acquired by the Service, should the refuge proposal go forward.

Wildlife observation and photography are traditional uses in this landscape. For the purposes of this compatibility determination, non-consumptive wildlife observation uses include wildlife watching and nature photography by walking or using motorized or non-motorized vehicles and boats, bicycles, or horses. Foot travel would generally e allowed be on refuge roads, levees, and trails.

Wildlife observation and photography are considered simultaneously in this compatibility determination. Wildlife observation and photography have been identified in the Improvement Act as priority wildlife-dependent recreational uses provided they are compatible with the purposes of the refuge. This compatibility determination applies only to personal photography and not to other forms of photography (e.g., commercial photography and filming). Commercial photography or videography, if allowed, would be covered under a separate Commercial Services compatibility determination (not being considered at this time) and would require a special use permit issued by the refuge with specific restrictions. The Service would develop an understanding of wildlife observation and photography activities for a particular site during the acquisition process.

Availability of Resources: Initially, annual refuge operation and maintenance funds provided for the Wheeler National Wildlife Refuge Complex would be used to support the visitor services program, including wildlife observation and photography opportunities.

Anticipated Impacts of the Use: The purpose of this section is to critically and objectively evaluate the potential effect that wildlife observation and photography could have on wildlife and habitat based on available information and best professional judgment. Each activity has the potential to have impacts, but the focus is to minimize impacts to levels within acceptable limits. This is based on the impacts at the existing and projected levels of use.

Even the most controlled wildlife observation and photography programs designed in-part to limit wildlife disturbance have the potential for disturbing wildlife species. In general, activities that occur outside of vehicles tend to increase the disturbance potential for most wildlife species (Klein 1993; Gabrielson and Smith 1995; Burger 1981; Pease et al. 2005) as compared to similar activities conducted within vehicles. Refuge-led or refuge-approved and led visitors would typically access refuge habitats on-foot via fire lines and/or unimproved roads and foot trails. Although this type of access could potentially disturb wildlife, it is expected to be minimal as a result of the limited and controlled character of such events and opportunities. Among wetland habitats, out-of-vehicle approaches can reduce wildlife foraging times and can cause water birds to avoid foraging habitats adjacent to the out-of-vehicle disturbance (Klein 1993). One possible reason for this result is that vehicle activity is usually brief, while walking requires a longer period of time to cover the same distance. Similarly, walking on wildlife observation trails tends to displace birds and can cause localized declines in the richness and abundance of wildlife species (Riffell et al. 1996). Wildlife photographers tend to have the largest disturbance impacts (Klein 1993; Morton 1995; Dobb 1998). While wildlife observers frequently stop their vehicles to view wildlife, wildlife photographers are much more likely to leave their vehicles and approach wildlife on foot (Klein 1993). Even a slow approach by wildlife photographers tends to have behavioral consequences to wildlife (Klein 1993). Other impacts include the potential for photographers to remain close to wildlife for extended periods of time (Dobb 1998) and the tendency of casual photographers with low power lenses to get much closer to their subjects than other activities would require (Morton 1995).

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: By design, wildlife observation and photography should have minimal species and habitat impacts. Nonetheless, as uses increase, species impacts are more likely to occur. Evaluation of the sites and programs would be conducted annually to determine if objectives are being met, if habitat impacts are minimized, and if wildlife populations are being adversely affected. If evidence of unacceptable impacts begin to appear, it may be necessary to change the activity or the program, relocate the activity or program, or eliminate the program.

Stipulations that may be employed include the following:

- Providing limited refuge-led and/or refuge-approved wildlife observation and photography opportunities during refuge events and/or through special use permits would lessen species impacts.
- Providing access only on designated roads and trails would lessen species impacts.
- Vegetation that effectively conceals visitors and provides cover for birds can help minimize impacts of people in busy areas.
- Establishing buffer zones that minimize disturbance around sensitive areas and establishing no-entry zones during refuge approved events and opportunities would help minimize impacts.
- Rerouting, modifying, or eliminating activities which have demonstrated direct species impacts should be employed.
- Education is critical for making visitors aware that their actions can have negative impacts on plants and wildlife.

Justification: Wildlife observation and photography are priority public uses of the National Wildlife Refuge System. Providing quality, appropriate, and compatible opportunities for these activities help fulfill the provisions of the Improvement Act. Wildlife observation and photography would provide excellent forums for promoting increased awareness, understanding, and support of refuge resources relative to wildlife/human interactions. The stipulations outlined above should minimize potential impacts relative to wildlife/human interactions. Under a controlled level of limited visitation, these wildlife-dependent uses would not conflict with the national policy to maintain the biological diversity, integrity, and environmental health of the refuge and would be determined to be compatible with proposed refuge purposes.

Mandatory 15-year Re-evaluation Date:

Description of Use: Research

This pre-acquisition compatibility determination serves as our commitment to allow research activities to continue, where they are pre-existing and owner-authorized, on lands that would be acquired by the Service, should the refuge proposal go forward.

Research is a regular activity in this area, with various ongoing research projects, topics, habitat types, and species. Research is the planned, organized, and systematic gathering of data to discover or verify facts. In principle, research conducted on the refuge by universities, cooperative units, non-profit organizations, partners, and other research entities furthers refuge management and serves the purposes, vision, and goals of the refuge. The refuge would likely host research from a variety of research institutions, including various universities, Native American tribes, and private research groups. All research activities, whether conducted by governmental agencies, public research entities, universities, private research groups, or any other entity, would be required to obtain special use permits from the refuge. Approved special use permits would contain conditions under which researchers must operate to help minimize negative impacts to refuge resources. All research activities would be overseen by the refuge wildlife biologist/botanist, refuge manager, or refuge staff member as assigned by the refuge manager or designee. Projects that are fish and wildlife management-oriented, which would provide needed information to refuge operation and management, would receive priority consideration and may even be solicited. A refuge research policy would be established to provide guidance for the refuge's research program. The types of research activities conducted on the refuge might cover wildlife, habitat, climate change, water resources, cultural resources, and/or public use activities. The Service would work with area researchers and others to develop an understanding of the research activities associated with a particular site during the acquisition process.

Availability of Resources: The Wheeler National Wildlife Refuge Complex maintains geographic information system databases and a library of pertinent biological texts, published scientific and biological papers, reports, and reprints. Other than the administration of associated special use permits, no refuge resources are generally required for this use. The refuge may provide some type of housing for researchers if resources were to become available.

Anticipated Impacts of the Use: Generally, adverse impacts from research are minimal. An anticipated method of accessing research sites throughout the refuge may include ATVs or similar vehicles. A critical and objective evaluation of the potential effects that ATVs could have on wildlife and habitat would be based on the most current information available and best professional judgment. Although ATVs have the potential to impact refuge resources, the focus is to minimize their negative effects. This would be based on the impacts at the existing and projected level of use. Occasionally, slight or temporary wildlife or habitat disturbances may occur (i.e., minor trampling of vegetation may occur when researchers access monitoring plots). However, these impacts are not considerable, nor are they permanent. Also, a small number of individual plants or animals might be collected for further scientific study, but these collections would be anticipated to have minimal impact on their original populations. All collections would adhere to the Service's specimen collection policy (Director's Order 109, dated March 28, 2005).

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: All research conducted on the refuge must further the purposes of the refuge and the mission of the Refuge System. All research would adhere to established refuge policy on research and policy on collecting specimens (Directors Order Number 109). To ensure that research activities are compatible, the refuge would require that a special use permit be obtained before any research activity could occur. Research proposals and/or research special use permit applications would be required to be submitted in advance of the activity to allow for review by refuge staff to ensure minimal impacts to the resources, staff, and programs of the refuge. Each special use permit would contain conditions under which the research would be conducted. Each special use permit holder would submit annual reports or updates to the refuge on research activities, progress, funding, and other information. Further, each special use permit holder would provide copies of findings, final reports, publications, and/or other documentation at the end of each project. Limiting use of ATVs primarily to designated trails and roads would minimize anticipated impacts. The refuge would deny permits for research proposals that are determined to not serve the purposes of the refuge and mission of the Refuge System. The refuge would also deny permits for research proposals that are determined to negatively impact resources or that materially interfere with or detract from the purposes of the refuge. All research activities would be subject to the conditions of their respective permits.

Justification: Research activities provide benefits to the refuge and to the natural resources supported by the refuge. Research conducted on the refuge can lead to new discoveries, new facts, verified information, and increased knowledge and understanding of resource management, as well as track current trends in fish and wildlife habitat and populations to enable better management decisions. Research has the potential to further the proposed purposes and goals of the refuge and the mission of the Refuge System.

Mandatory 10-year Re-evaluation Date:

Description of Use: Hiking (including backpacking, jogging, and walking)
This pre-acquisition compatibility determination serves as our commitment to allow hiking activities to continue, where they are pre-existing and owner-authorized, on lands that would be acquired by the Service, should the refuge proposal go forward.

Hiking is a traditional use in this area. Day-use by hikers, backpackers, and joggers are considered under this compatibility determination. Hiking would only be authorized in support of other approved refuge uses. Foot traffic trails would provide the opportunity for participants to become surrounded by the natural environment, instilling an appreciation for plants, animals, and their habitats. For existing trails in the area, the Service would develop an understanding of hiking activities for a particular site during the acquisition process.

Availability of Resources: Many existing roads and trails would be maintained for refuge purposes and therefore would not constitute additional maintenance costs to support hiking. The development of associated maps, signs, and brochures would be minor costs associated with hiking that would be supported by the Wheeler National Wildlife Refuge Complex. Designated trails may be maintained by a combination of volunteers and refuge staff.

Anticipated Impacts of the Use: Impacts from these activities could include littering, vegetation trampling, and wildlife disturbance

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: Hiking, jogging, and walking would only be authorized in support of other approved refuge uses. Hiking, jogging, and walking would be restricted to daylight hours. Certain areas of the refuge may be restricted seasonally for breeding or nesting seasons or to protect habitat. Hiking, jogging, and walking would be limited to existing, designated roads and trails.

Justification: These activities are low impact and considered to be wildlife-dependent. Hiking, jogging, and walking activities would be in support of priority public use activities and programs (e.g., wildlife observation), which would be determined to be compatible with proposed refuge purposes.

Mandatory 10-year Re-evaluation Date:

Description of Use: Horseback Riding

This pre-acquisition compatibility determination serves as our commitment to allow horseback riding to continue, where it is pre-existing and owner-authorized, on lands that would be acquired by the Service, should the refuge proposal go forward.

Horseback riding is a traditional use in this landscape. Horseback riding would only be authorized in support of other approved refuge uses. As proposed, horseback riding would occur only on designated refuge roads. Use would be expected to be light and sporadic, occurring mostly during cooler weather (November through April), particularly on weekends. Horseback riding is currently allowed on public properties near the proposed refuge. The Service would develop an understanding of horseback riding activities for a particular site during the acquisition process.

Availability of Resources: Many existing roads would be maintained for refuge purposes and therefore would not constitute additional maintenance costs to support horseback riding. The development of associated maps, signs, and brochures would be minor costs associated with horseback riding that would be supported by the Wheeler National Wildlife Refuge Complex.

Anticipated Impacts of Use: A literature review was conducted to evaluate the potential effects of horseback riding on wildlife, habitat, human health, cultural resources, and other refuge uses. Although wildlife disturbance from horseback riding is not well-documented, some studies suggest that many wildlife species are habituated to livestock and that horseback wildlife observers can approach wildlife at closer distances than by other forms of travel. Any form of approach is expected to cause some disturbance, which would vary according to the species affected and the type, level, frequency, and duration of disturbance, as well as the time of day or year that it occurs. Horseback riding has both direct and indirect effects on habitat. Trampling causes mortality of plant (and animal) species by crushing. Indirect effects result when soil is compacted and plants cannot reestablish.

Grazing can reduce vegetation. There is debate within literature over whether horse hair or feces can spread exotic weed seed. Any road can be a conduit for the introduction of exotic plants, since exposed soil and abundant sunlight provide favorable conditions for establishment.

Compacting and loosening of soils occurs from stock riding, more so in moist or wet soils. Roads for public access affect hydrologic drainage patterns. Horseback riding is proposed to continue on designated roads. While it is possible for horses to transmit parasitic diseases, particularly *Cryptosporidium parvum* and *Giardia duodenalis*, to humans via the water supply, these diseases are usually spread by pregnant mares and foals under six months old. Horse manure is not harmful to human health, although it can cause conflicts with other users since it can be odorous, unaesthetic, and a nuisance. While there can be user group conflicts or safety issues resulting from hikers, cyclists, and horseback riders using the same roads, these are not anticipated effects due to the current levels of use. Horseback travel on the designated roads is considered safe under current conditions and levels of use. Horseback riding would be permitted only on designated roads and prohibited on established, interpretive hiking trails

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: Horseback riding would only be authorized in support of other approved refuge uses, and only on roads where public vehicular traffic is allowed. Horseback travel to facilitate priority public use is only compatible on designated roads. Horses would not allowed on interpretive foot trails. Horseback riding would only be allowed between sunrise and sunset (normal refuge hours). Group size would be limited to a maximum of eight riders who travel no more than two abreast. Horseback riding would be prohibited during deer gun hunting season in all refuge hunt areas. All roads would be monitored annually to determine if they meet the compatibility criteria. Monitoring would be designed to assess the long-term effects of horse riding on refuge resources, visitor use, and route maintenance needs. Law enforcement patrols would be conducted throughout the year. The patrols would promote compliance with refuge regulations, monitor public use patterns and public safety, and document visitor interactions. Patrols would include recording visitor numbers, vehicle numbers, visitor activities, and activity locations to document the current and future level of refuge use. No corralling, tethering, or hitching of horses along roads would allowed. Other areas of the refuge may be closed to the public seasonally to protect certain species or habitat. Riders would be able to gain entrance to the refuge road system only at designated access points.

Justification: While not listed as a primary, wildlife-dependent recreational use under the Improvement Act, as amended, horseback riding is believed to be a compatible public use under the stipulations outlined in this compatibility determination. Primary reasons for this determination include the following: wildlife observation can be an element of horseback riding; horseback riding allows the refuge to reach a target audience that it would not otherwise reach; horseback riders are potential partners and a potential source of support for the wildlife refuge; and impacts associated with horseback riding are not believed to exceed impacts already caused by other public use activities. Horseback riding activities would be in support of priority public use activities and programs (e.g., wildlife observation), which would be determined to be compatible with proposed refuge purposes.

Mandatory 10-year Re-evaluation Date:

Description of Use: Bicycling

This pre-acquisition compatibility determination serves as our commitment to allow bicycling activities to continue, where they are pre-existing and owner-authorized, on lands that would be acquired by the Service, should the refuge proposal go forward.

While not one of the six priority wildlife-dependent recreational uses listed in the Improvement Act, bicycling is a mode of transportation currently used to facilitate wildlife observation. As proposed, bike riding would occur only on designated roads. This use occurs all year. Bicycling would only be authorized in support of other approved refuge uses. The Service would develop an understanding of bicycling activities for a particular site during the acquisition process.

Availability of Resources: Operation and maintenance funds to support wildlife viewing would be taken from the Wheeler National Wildlife Refuge Complex budget.

Anticipated Impacts of the Use: Minor impacts may occur, such as littering, vegetation damage, and wildlife disturbance. Refuge law enforcement officers would patrol regularly and staff would pick up litter.

This is a critical and objective evaluation of the potential effects that bicycles could have on the wildlife, habitat, and other public use activities based on available information and best professional judgment. Although bicycling has the potential to have impacts, the focus would be to minimize impacts. This is based on the impacts at the existing and projected levels of use.

Bicycling, as a mode of transportation to facilitate participation in other priority public uses, such as wildlife observation, is an appropriate form of transportation to view wildlife. Other forms of bicycle riding, such as mountain biking, are not considered appropriate under this compatibility determination. Bicycling would be allowed only on designated roads.

Wildlife disturbance relative to bicycle riding has been poorly studied with most references using other activities such as walking, hiking, and operating vehicles and their impacts on wildlife; therefore, bicycle impacts are inferred (unless noted). In general, activities that occur outside of vehicles (including bicycling) tend to increase the disturbance potential for most wildlife species (Klein 1993, Gabrielson and Smith 1995; Burger 1981; Pease et al. 2005). Out of vehicle activities along wildlife observation trails and pullouts along the trails have the greatest potential for disturbing wildlife species.

A study conducted at Back Bay National Wildlife Refuge indicated that jogging and bike riding in an open habitat, such as marshes where the activity is highly visible to wading birds, shorebirds, and waterfowl, is disruptive. As a result, marsh birds in open areas flee from joggers and bike riders (Laskowski 1999). Wildlife may receive different cues from different modes of transportation, since wildlife do not flee as readily from cars, perhaps because the person is hidden in the vehicle and not perceived as a threat (Klein 1993). A 2005 study at Back Bay National Wildlife Refuge (Pease et al. 2005) compared five different human activities (motorized tram, slow-moving truck, fast-moving truck, bicyclist, and pedestrian) in relation to waterfowl disturbance. The study found that people walking and biking disturbed waterfowl more than vehicles. Based on the current and anticipated levels of use, bicycling is not considered to have negative long-term impacts to wildlife or refuge habitats.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: Bicycling would only be authorized in support of other approved refuge uses. All forms of wildlife observation should have minimal wildlife and habitat impacts. However, bicycling can cause wildlife impacts in open wetland areas, can increase wildlife impacts, and can disrupt other individuals viewing wildlife. Bicycles would not be permitted on established interpretive trails. Evaluation of bike riding on designated roads would be conducted annually to assess if objectives are being met, if habitat impacts are within a tolerable range, and if wildlife populations are not being adversely affected. If evidence of unacceptable impacts begins to appear, it may be necessary to change the activity or the program, move the activity or program, or eliminate the program.

Justification: Bicycling to observe wildlife facilitates priority public uses of the Refuge System. Providing opportunities for these activities contributes toward fulfilling provisions of the Improvement Act. Wildlife observation from bicycles in areas where there are few impacts to wildlife would provide an appropriate mode of transportation for promoting increased awareness, understanding, and support of refuge resources and programs. At the anticipated and current levels of visitation, bicycling does not seem to conflict with the national policy to maintain the biological diversity, integrity, and environmental health of the refuge. Bicycling activities would be in support of priority public use activities and programs (e.g., wildlife observation), which would be determined to be compatible with proposed refuge purposes.

Mandatory 10-year Re-evaluation Date:

Description of Use: Caving

Caving is not one of the six priority public wildlife-dependent uses of the Refuge System. Currently, several caves that are part of the Wheeler National Wildlife Refuge Complex allow some level of caving. Entry into caves would be allowed by special use permit for the purpose of general surveying, monitoring conditions, photo documentation, mapping, search and rescue, and recreation. Depending on the complexity of a cave, these activities would be limited to experienced cavers and organized groups. Caves known to support bat populations would have additional entry requirements, in order to protect populations from white nose syndrome. These would be detailed in the special use permits.

Availability of Resources:
No additional resources would be required to administer this use. Monitoring and compliance could be handled within existing resources, programs, and staff time. This use does not require any special facilities or improvements to any existing facilities.

Anticipated Impacts of the Use:
Short-term impacts associated with this use could involve minor vegetation disturbance by foot traffic on access trails to cave entrances, littering, vandalism, and wildlife disturbance caused by entry into refuge caves. However, the frequency of cave access is not expected to occur at a level that would cause any significant effects. No long-term or cumulative impacts are anticipated.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:
Special use permit requirements would focus on protecting federal and state listed species where these are believed to occupy caves. For caves supporting bats, the primary concern would be to ensure that the fungus responsible for white nose syndrome is not inadvertently introduced. The permit would stipulate the latest decontamination procedures for cave entry and exit. In addition, potential disturbance to bats would need to be minimized. The seasonal timing of cave access and other procedures would be stipulated in the permit to address this concern. Periodic review of this activity would be conducted to avoid disturbance to any listed bats species.

Justification:
Caving in refuge caves is a low impact activity that could be managed within existing refuge resources. This activity would provide refuge personnel with important information such as current conditions in the cave, sign of illegal entry, photo documentation, etc., which aid personnel with management decisions related to the caves. It is deemed a wildlife-dependent activity by virtue of the fact that observation of wildlife is an expected or anticipated part of the experience.

Mandatory 10-year Re-evaluation Date:

Description of Use: Berry, Nut, and Fruit Picking

The picking of berries, fruits, and nuts from native trees and shrubs for individual use is an activity that occurs throughout the area. A majority of time this activity is conducted while engaging in other wildlife-dependent recreation such as wildlife observation.

Availability of Resources: No additional resources are required to administer this use. Monitoring and compliance can be managed within existing resources, programs, and staff time. This use does not require any special facilities or improvements to any existing facilities.

Anticipated Impacts of the Use: Short-term impacts could involve littering, minor vegetation damage on roadsides, and wildlife disturbance caused by human presence. Visitor consumption of berries, fruits, and nuts does not significantly impact the availability of food for wildlife under current use. No long-term or cumulative impacts are anticipated.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: Berry, fruit, and nut picking is restricted to daylight hours only. All collections are for personal use only. Commercial use which would include the resale of any berries, fruits, and nuts or their products would not be permitted. Users must observe refuge regulations and note certain areas that are closed seasonally for wildlife purposes.

Justification: Infrequent picking of berries, fruits, and nuts from native trees and shrubs by visiting public is deemed a wildlife-dependent activity by virtue of the fact that observation of wildlife is an expected or anticipated part of the experience.

Mandatory 10-year Re-evaluation Date:

Description of Use: Firewood Cutting

This use is restricted to the harvest of fallen or standing trees for non-commercial firewood gathering purposes. The refuge would issue special use permits to individuals to collect firewood from trees that have fallen as a result of high winds or other storm events, and only permit the removal of trees that have fallen adjacent to a public use graveled road or utility right of way. Occasionally, downed wood is produced as a result of a right-of-way maintenance activity. Driving vehicles off road would not be permitted to access downed trees unless a determination is made that access can be accomplished with minimal habitat disturbance. The harvest of standing trees may be permitted only when the action supports a tree thinning operation supported by an approved forest management plan. Tree harvest for firewood purposes is not a priority public use. Harvest in conjunction with tree thinning operations would be conducted in the specific timber stand where the forest management objectives are desired and harvest of fallen trees would continue to be conducted along roadsides and rights-of-way. This use would be restricted to areas open to the public in the spring, summer, and early fall in areas of the refuge where wildlife disturbance is a concern and may occur year-round in other areas where there are no wildlife disturbance concerns. Most often, wood removal activities would occur in late summer and early fall in anticipation of winter heating needs. The use would be restricted to private individuals gathering firewood for their own personal use. The use of chainsaws, axes, and other low impact methods would be permitted. The use of heavy equipment such as skidders and loaders would not be allowed.

Availability of Resources: No additional resources are required to administer this use. In the event of tree harvest in support of a timber stand improvement operation (thinning), the trees to be removed would be marked by refuge staff. However, this expense would occur regardless of whether the use of the trees was for firewood or for commercial harvest. Monitoring and compliance could be managed within existing resources, programs, and staff time. This use would not require any special facilities or improvements to any existing facilities.

Anticipated Impacts of the Use: In permitting this activity, the potential exists to displace wildlife in the immediate area due to disturbance from harvesting operations. Small amphibians and reptiles may be displaced from their burrows and refugia under tree trunks that have been on the ground for some time. Access for the purpose of removing wood may impact habitat by rutting soils, destroying ground cover, creating weed seed beds, and increasing sedimentation. These impacts could be minimized by the timing of the activity and preventing access during wet conditions. One beneficial aspect of the activity is that it prevents the accumulation of downed trees on the roadsides which hamper road maintenance activities. This benefit actually results in a cost savings to the refuge in that refuge staff do not have to clear the roadsides prior to road maintenance operations.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: Vehicle access for wood removal would be limited to existing open roads, or in the case of tree thinning operations, access would be restricted when weather conditions exist that would promote habitat degradation. A special use permit would be issued so that site specific impacts could be reduced or eliminated and refuge management goals could be met.

Justification: Impacts to the habitat as a result of access for wood removal purposes are potentially significant but also easily avoided. Short-term wildlife disturbance and minor displacement are worth the long-term benefits of timber stand improvement and the cost savings associated with allowing the public to remove downed trees adjacent to and on roadsides. Additionally, the refuge can provide a needed resource in firewood to the local community while accomplishing needed maintenance thereby lessening road maintenance costs. Impacts can be eliminated or reduced by the issuance of a special use permit, which enables refuge managers to identify and consider site specific impacts on a case-by-case basis.

Mandatory 10-year Re-evaluation Date:

Description of Use: Timber Management

The refuge would manage forested lands with the primary objective to convert pine plantations to native hardwood forests. Pine and pine-hardwood stands would be converted to hardwood stands through a variety of methods or combinations thereof–natural succession, harvesting followed by natural succession, and, perhaps, killing stands not commercially harvestable by use of herbicides. In addition, even-aged hardwood stands that generally lack the habitat complexity could be restored to a more diverse, uneven-aged forest. Many hardwood stands do not have the complexity, generally gauged by the number of varying heights of vegetation, necessary to support the greatest number and diversity of migratory forest songbirds, especially those becoming rare. Songbird surveys would be conducted in a number of stands to determine which forest composition and structure best supports neotropical migratory birds. After initial data is collected, some small and large stands would be thinned to allow light in and the mid-story and under-story vegetation to grow. Bird

response in stands not thinned would be compared to that in thinned stands. If thinning increases numbers and/or diversity of migratory songbirds, especially those becoming rare, then stands would be thinned throughout the refuge to simulate the same conditions. However, some stands may not be thinned to provide habitat diversity in hardwood stands.

Availability of Resources: A forester would be needed to plan and oversee the thinning to develop the complexity of forest layers required. Preferably, a regional forester would be hired to coordinate this activity as well as forest management on other refuges in the state. Otherwise, a forester may have to come from another refuge or area to assist with the planned management as this individual is available. Money to pay the salary and benefits of this forester would be needed. Actual harvesting of the trees would likely be contracted.

Anticipated Impacts of the Use: This activity would be designed to fulfill the primary purpose of the refuge to conserve migratory birds. It would also help meet regional and national goals to conserve migratory songbirds, including those that are becoming rare.

Converting pines to hardwoods may reduce the number of bird species present on the refuge. However, it would provide more of the habitat that historically occurred on the refuge, thus providing a larger area for the songbirds that use this habitat. This would help fulfill the requirements of the refuge systems' policy on Biological Integrity, Diversity, and Environmental Health by restoring historically occurring habitats and species.

Negative impacts from using herbicides to convert pine stands to hardwoods are expected to be minor. The Service's pesticide use proposal process would be used to ensure that relatively safe pesticides are applied. In addition, coordination with the local Ecological Services Field Office would ensure threatened and endangered species are not negatively affected.

Anticipated short-term impacts of the timber harvesting include noise effects on wildlife, inability of the public to use the stand during active harvesting, and some inconvenience to users when they have to climb over/around treetops and limbs lying on the ground (called slash). However, this slash helps provide habitat for a variety of forest creatures, including invertebrates, amphibians, reptiles, small mammals, and birds. In the long-term, many hardwood stands that are currently open would have a heavier mid-story and under-story if the study of bird response to thinning shows improved use by forest birds. This would have effects such as reducing sight distance, which can be advantageous or disadvantageous. For example, hunters may not be able to see deer from as great a distance but these game animals may approach hunters more closely. Although birders may not be able to see birds from afar, more birds would be present to observe. While numbers of forest birds that use hardwood stands would likely increase, the overall number of forest bird species would likely decline due to removal of pine habitat. To some extent, this would reverse a trend that has occurred throughout the landscape due to conversion of hardwood stands to pine during timber management. Other wildlife and plants that are adapted to hardwood forests would also likely increase while those that are adapted to pine or mixed pine-hardwood forests would probably decline.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: A forester who can plan and oversee the needed thinning operations in hardwood stands would be critical during the study of thinning and bird use and during other thinning operations that may result if bird use increases in thinned stands.

Justification: This activity is designed to fulfill refuge purposes; regional, national, and international goals for bird conservation; and the mission of the Refuge System.

Mandatory 10-year Re-evaluation Date:

References

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Appendix C. Intra-Service Section 7 Biological Evaluation

Intra-Service Section 7 Biological Evaluation would be initiated and would run concurrently with the public review and comment period for the Environmental Assessment

SOUTHEAST REGION
INTRA-SERVICE SECTION 7
BIOLOGICAL EVALUATION FORM
[Federally endangered, threatened, and candidate species]

[Note: This form provides the outline of information needed for intra-Service consultation. If additional space is needed, attach additional sheets, or set up this form to accommodate your responses.]

Originating Person: Rob Hurt
Telephone Number: (256) 353-7243 Ext. 29 E-Mail: rob_hurt@fws.gov
Date: September 20, 2012

PROJECT NAME (Grant Title/Number): Proposed Paint Rock River National Wildlife Refuge and Conservation Partnership Area

I. Service Program:
- ___ **Ecological Services**
- ___ **Federal Aid**
  - ___ **Clean Vessel Act**
  - ___ **Coastal Wetlands**
  - ___ **Endangered Species Section 6**
  - ___ **Partners for Fish and Wildlife**
  - ___ **Sport Fish Restoration**
  - ___ **Wildlife Restoration**
- ___ **Fisheries**
- _X_ **Refuges/Wildlife**

II. State/Agency: Tennessee/U.S. Fish and Wildlife Service (Service)

III. Station Name: Wheeler National Wildlife Refuge Complex (WNWRC), AL

IV. Description of Proposed Action (attach additional pages as needed):

The Service is proposing to define a Conservation Partnership Area (CPA), within which the Paint Rock River National Wildlife Refuge (Paint Rock River NWR) would be established to protect, conserve, and/or restore one of the most biologically diverse and unaltered river systems in eastern North America. Further, the proposal aims to address threats from commercial forestry, urban development, and agricultural practices on the following habitat types: riparian, aquatic/riverine, upland hardwood and bottomland forests, canebrake, and cave/karst systems.

For this project, the CPA consists of the upper (Tennessee) portion of the Paint Rock River watershed (Figure 1), and provides an area within which the Service would have the authority to acquire up to 25,120 acres in fee-title or less-than-fee-title (e.g., easements) from willing sellers. All lands acquired, up to 25,120 acres, would be contained within the boundary of the proposed Paint Rock River NWR.
It is envisioned that the proposed Paint Rock River NWR would:

- Protect and restore habitat for at least 19 federally listed and candidate species.
- Protect and maintain habitat for a diversity of fish, wildlife, and plant species, including over 40 state listed species.
- Protect some of the last remaining large tracts of eastern deciduous forests.
- Provide habitat for nongame neotropical migratory birds.
- Provide opportunities for a variety of wildlife-dependent recreation, including hunting, fishing, wildlife observation and photography, and environmental education and interpretation.

The scope of the Draft LPP/EA is limited to the proposed acquisition, in fee-title and in less-than-fee title, of lands for the establishment of the Paint Rock River NWR. The Draft LPP/EA is not intended to cover the development and/or implementation of detailed, specific programs for the administration and land management of those lands. If the refuge is established and the needed lands or interests in lands are acquired, the Service would develop a comprehensive conservation plan, a 15-year management plan, and needed step-down management plans (e.g., hunting). These plans would be developed and reviewed in accordance with the Departmental requirements of the National Environmental Policy Act. Intra-Service biological evaluations or assessments (under Section 7 of the Endangered Species Act) for individual management activities, or groups of activities, would be conducted at the time those activities would be proposed.

V. Pertinent Species and Habitat: The Paint Rock River is one of the most biologically diverse watersheds in North America for freshwater mussels, with 48 species recorded between 1990 and 2008 (Fobian et al. 2008, Williams et al. 2008). The exceptional mussel diversity is likely due to the river's limited amount of habitat alteration, extensive habitat diversity, abundant nutrients, and calcium-enriched waters. Rare species can be found throughout the river, ranging from the shallow shorelines in the headwaters region downstream to the embayed region near the confluence of the Tennessee River (Wheeler Reservoir). Rare species can also be found in a variety of substrates, ranging from coarse gravel and cobble to fine silt. Nine species of mussels occurring here are either protected under the Endangered Species Act or are candidates for protection. The pale lilliput (*Toxolasma cylindrellus*) occurs nowhere else except for the upper Paint Rock River and its headwaters. The watershed is also home to the very rare Alabama lampmussel (*Lampsilis virescens*), once believed to occur nowhere else. However, during the spring of 2011, two leading malacologists found the lampmussel in the upper Emory River (Morgan County, Tennessee) when they were surveying for the purple bean (*Villosa perpurpurea*), another rare mussel species. Aquatic habitats vary from headwater springs and small gravelly creeks to larger river bodies. In general, terrestrial habitats are composed of mixed oak-hickory-pine associations, with greater pine influences in forest types further south. Caves are a prominent feature due to the prevalence of limestone geology underlying the landscape. The western escarpment of the Cumberland Plateau, which constitutes a sizeable portion of the project area, has one of the densest concentrations of caves in the United States. Primary habitats in the project area include: streams and rivers, riparian/bottomland hardwood forests, upland forests, canebrake, and cave/karst systems. Table 1 outlines the land cover (habitat) types within the CPA.

Table 1. Major habitat types and acreages with the CPA

Land Cover Type	Unprotected Acres	Protected Acres	Total Acres
Southern Ridge and Valley Dry Calcareous Forest	20,445.80	2,002.10	22,447.90
South-Central Interior Mesophytic Forest	8,024.70	908.3	8,933.00
Allegheny-Cumberland Dry Oak Forest and Woodland	5,187.20	898.2	6,085.40
Cultivated/Planted[1]	1,652.20	38.0	1,690.20
Scrub/Shrub	499.9	12.0	511.90
Developed[2]	423.4	6.5	429.90
Southern Appalachian Low Mountain Pine Forest	205.3	5.8	211.10
Pine Plantations	59.2	0.0	59.20
Grassland/Herbaceous	49.6	20.3	69.90
South-Central Interior Small Stream and Riparian	21.6	3.6	25.20
Southern Interior Acid Cliff	14.2	0.0	14.20
Southern Interior Calcareous Cliff	10.5	6.0	16.50
Cumberland Riverscour	5.3	0.2	5.50
Open Water	5.1	0.0	5.10
Total	***36,604.00***	***3,901.00***	**40,505.00**

1 - combined Pasture/Hay and Row Crop
2 - combined Developed Open Space and Low Intensity Developed
Source: U.S. Geological Survey and North Carolina State University 2010

There is a total of 15 federally listed (threatened or endangered) species, and three candidate species present in or occur downstream from and influenced by environmental conditions of the CPA (Figure 1).

Table 2. Listed/proposed species that may occur within or are influenced by the CPA

Common Name	Scientific Name	Federal Status
Mammals		
Gray Bat	*Myotis grisescens*	E
Indiana Bat	*Myotis sodalis*	E
Fish		
Palezone Shiner	*Notropis albizonatus*	E
Snail Darter	*Percina tanasi*	T
Invertebrates		
Alabama Lampmussel	*Lampsilis virescens*	E
Fine-rayed Pigtoe	*Fusconaia cuneolus*	E
Pale Lilliput	*Toxolasma cylindrellus*	E
Pink Mucket	*Lampsilis abrupta*	E
Rabbitsfoot	*Quadrula cylindrica cylindrica*	C
Rough Pigtoe	*Pleurobema plenum*	E
Shiny Pigtoe	*Fusconaia cor*	E
Slabside Pearlymussel	*Pleuronaia dolabelloides*	C
Snuffbox	*Epioblasma triquetra*	E
Anthony's Riversnail	*Athearnia anthonyi*	E
Plants		
American Hart's-tongue Fern	*Phyllitis scolopendrium* var. *americana*	T
Morefield's Leather-flower	*Clematis morefieldii*	E
Price's Potato-bean	*Apios priceana*	T
White Fringeless Orchid	*Platanthera intergrilabia*	C

Key: C=Candidate (for federal listing), E=Endangered, T=,Threatened

Sources: USFWS Endangered Species Program 2012

VI. **Location:** The proposed CPA and Paint Rock River NWR are located within Franklin County, Tennessee, in the upper Paint Rock River watershed. It is bounded to the north, east, and west by tributary watersheds of the Elk River watershed and to the south by the State of Alabama (Figure 1).

VII. **Determination of Effects:** The Service concludes that the issuance of the Draft LPP/EA for the proposed CPA and Paint Rock River NWR is not likely to adversely affect any federally listed species or candidate species. There is no critical habitat within the CPA for any federally listed species. We anticipate that a Final LPP/EA would be issued in June 2013. Any construction, survey, acquisition, or management activities associated with the proposed refuge would undergo Endangered Species Act consultation when those activities become more clearly defined and the locations are known. In the future, we anticipate surveys for listed species and chemical contaminants may need to occur on project lands in association with acquisition. We also anticipate that habitat management activities, such as brush removal, timber management, fire management, nonnative plant removal, riparian and stream restoration, etc., would occur and may require Intra-Service consultation. Any future construction, outreach, or public use activities may also require Intra-Service consultation.

_____ _____
Signature (originating station) **date**

_____
Title

IX. Reviewing Ecological Services Office Evaluation:

A. Concurrence _____ Non-concurrence _____

B. Formal consultation required _____

C. Conference required _____

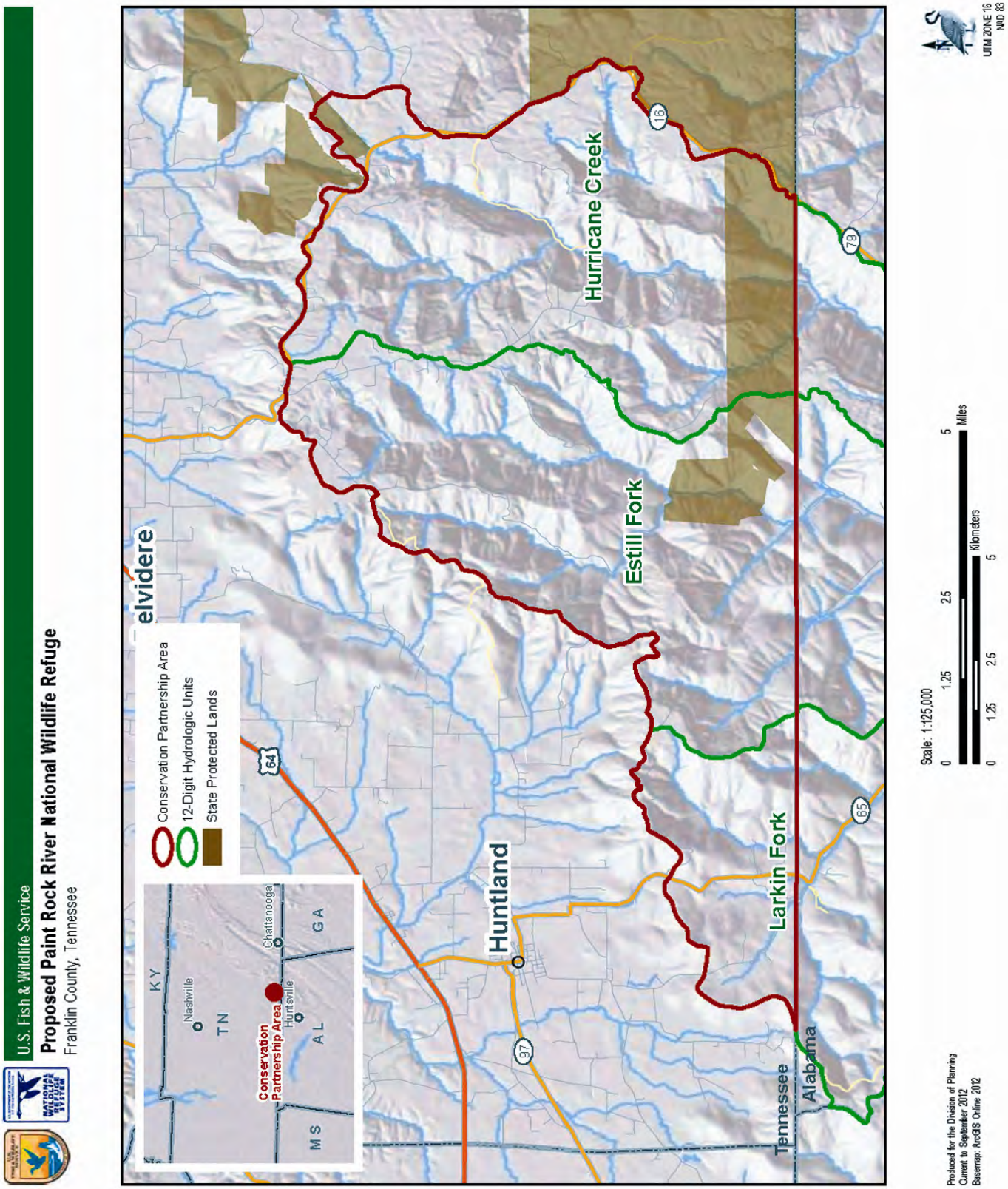
D. Informal conference required _____

E. Remarks (attach additional pages as needed):

_____ _____
Signature **date**

_____ _____
Title office

Location of CPA



Appendix D. Interim Recreation Act Funding Analysis

Proposed Station Name: Paint Rock River National Wildlife Refuge

Date Established: Currently Proposed

Purpose(s) for which the Refuge is Proposed to be Established:

> *"conservation, management, and ... restoration of the fish, wildlife, and plant resources and their habitats ... for the benefit of present and future generations of Americans" 16 U.S.C. 668dd(a)(2) (National Wildlife Refuge System Administration Act), as amended by amended by Pub. Law 105-57(The National Wildlife Refuge System Improvement Act of 1997);*
>
> *"to conserve (A) fish or wildlife which are listed as endangered species or threatened species…or (B) plants" 16 U.S.C. 1534 (Endangered Species Act of 1973);*
>
> *"the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions" 16 U.S.C. 3901(b), 100 Stat. 3583 (Emergency Wetlands Resources Act of 1986);*
>
> *"for use as an inviolate sanctuary, or for any other management purpose, for migratory birds" 16 U.S.C. 715d (Migratory Bird Conservation Act);*
>
> *"for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude" 16 U.S.C. 742f(b)(1) "for the development, advancement, management, conservation, and protection of fish and wildlife resources" 16 U.S.C. 742f(a)(4)(Secretarial powers to implement laws related to fish and wildlife) (Fish and Wildlife Act of 1956);*
>
> *"suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species" 16 U.S.C. 460k-1 "the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors" 16 U.S.C. 460k-2 [Refuge Recreation Act (16 U.S.C. 460k-460k-4), as amended]*

Recreational Use(s) Evaluated: (1) Recreational hunting of resident game (e.g., deer, turkey, and small game) and migratory birds (i.e., waterfowl) in accordance with federal and State of Tennessee regulations; (2) recreational fishing of freshwater fish species (e.g., largemouth bass, bream, catfish, and crappie) in accordance with State of Tennessee regulations; (3) environmental education and interpretation; (4) wildlife observation and photography; (5) research; (6) hiking (as component of priority public uses); (8) horseback riding (as component of priority public uses); and (9) bicycling (as component of priority public uses).

Funding Required to Administer and Manage the Proposed Recreational Use(s): The Service would use existing staff from nearby refuges such as the Wheeler National Wildlife Refuge Complex. Funding to support the proposed refuge would be made available to implement

initial protection activities, hunt implementation, data collection, and non-consumptive uses. The Service would also cooperate with TWRA to support initial public use activities on the proposed refuge, including the provision of law enforcement support. The Service would continue discussions with TWRA regarding opportunities for state wildlife management area designation(s) and management, co-management, and joint activities.

Based on a review of the refuge budget allocated for recreational use management, I certify that funding is adequate to ensure compatibility and to administer and manage the recreational use(s).

Project Leader: _____

Signature/Date

Refuge Supervisor: _____

Signature/Date

Chief, National Wildlife Refuge System, Southeast Region _____

Signature/Date

Appendix E. Public Involvement

Direct mailings (letters to the following groups were mailed out in mid-January 2013)

- Landowners (approximately 30)
- State and local elected officials and city/county managers
- State natural resources agencies
- Tribal contacts

Digital media

- Web site uploaded January 16, 2013

Press release

- Distributed on January 17, 2013, to several local news organizations

Open house

This event, lasting about four hours, provided the public with an opportunity to interact individually with Service experts in real estate, aquatic and forest biology, private land stewardship, and refuge creation. Written comments were taken. The open house was announced in the press release announcing the project, as well as in letters and e-mails sent to landowners, state and local elected officials, conservation partners, and other state and federal natural resource agencies. The open house was held on February 5, 2013, at the Franklin County Library in Winchester, Tennessee.

Public Meeting

Following the open house, a public meeting was held at the request of the Keith Springs community and other interested individuals. The meeting was held at the Winchester National Guard Amory on February 19, 2013. Approximately 150 people attended. Following a brief presentation on the project and some of the issues brought up by the public, Service staff answered questions. Channel 4 (WSMV-TV, which serves the greater Nashville area) was present for part of the meeting and reported on the project (broadcast and online).

Known online media coverage (listed by outlet) related to the projects includes:

- Aetna Nation Facebook (www.facebook.com/AetnaNation)
- Alabama Deer Hunting Forum (www.Aldeer.com)
- www.bigfishtackle.com
- www.ConcreteCamouflage.com
- www.Examiner.com
- www.fishingrssfeeds.com
- Fly Rod and Reel (www.Flyrodreel.com)
- Franklin County Tennessee Facebook (www.facebook.com/FranklinCountyTN)
- www.GovGuru.com

- www.nickajack-naturalist.com
- Pensacola News Journal (www.PNJ.com)
- www.RefugeWatch.org
- Sewanee Environmental Institute Facebook (www.facebook.com/pages/Sewanee-Environmental-Institute)
- The Lemon Fair (www.LemonFair.net)
- www.TheChattanoogan.com
- www.Tennessean.com
- www.TimesFreePress.com
- www.WetMyHook.com
- Winchester Herald Chronicle (www.HeraldChronicle.com)

A summary of the public comments was posted on the project website in early March 2013 and individuals on the project mailing list were sent an e-mail link to the site. In addition, hard-copies of the comments summary was sent to individuals on the mailing list who did not provide e-mail addresses.

Appendix F. Information on Preparers

Contributors to the documents:

- Bill Gates, Wildlife Biologist, Wheeler NWR Complex, USFWS
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Proposed Establishment of
Paint Rock National Wildlife Refuge

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March 2013