

Environmental Assessment

Big Four Hollow Restoration

Hocking County Ohio

Wayne National Forest

April 28, 2003

Abstract: The proposal is to correct several water quality problems in the Big Four Hollow watershed. The problems include acid mine drainage seeps produced in abandoned coal mines, a stream channel blocked by strip mining, and erosion triggered by mining activities. The proposed action includes treating the acid water coming from the seeps with limestone, reconstructing the blocked channel, converting a pond to a wetland/marsh, and installing water control structures in Longstreth Marsh.

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Summary

The Wayne National Forest proposes to correct several water quality problems in the Big Four Hollow watershed. The Big Four Hollow restoration project falls within the Monday Creek Watershed. The problems include acid mine drainage seeps produced in abandoned coal mines, a stream channel blocked by strip mining, and erosion triggered by mining activities. The project area is located within the Monday Creek Watershed in southwestern Hocking County, near the Village of Longstreth along Hocking County road 24 and Ward Township road 277 and is within the Athens Ranger District, Wayne National Forest, Ohio. This action is needed to correct several water quality problems in the Big Four Hollow watershed. The problems include acid mine drainage seeps produced in abandoned coal mines, a stream channel blocked by strip mining, and erosion triggered by mining activities. Water quality inventories show that the water leaving Big Four Hollow has a significant negative impact on the water quality, and the plants and animals in Monday Creek. By addressing these problems we will make a substantial and significant improvement to the water quality in both Big Four Hollow and Monday Creek.

In addition to the proposed action (Alternative A), the Forest Service also evaluated the following alternatives:

Alternative B (Minimal Disturbance)

The goal of this alternative is to minimize disturbance in big Four Hollow by concentrating the treatments in the channel closest to the road. This alternative will include reconstructing the blocked channel near pond 55 and exclude installing water control structures in Longstreth Marsh. All construction work will be done in a way that will minimize disturbance to the surrounding vegetation.

Alternative C (No Action or Existing Condition)

This alternative defers all remediation action to another time and does not address the purpose and need for action.

Based upon the effects of the alternatives, the responsible official will decide

- If the restoration action will be implemented as is proposed?
- If the restoration actions will be implemented in a modified manner?
- If any restoration work will be initiated at this time?
- Will a decision to do restoration in Big Hour Hollow require an amendment to the Wayne National Forest Land and Resource Management Plan?

Chapter 1. Introduction

Document Structure

The Forest Service has prepared this Environmental Assessment in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This Environmental Assessment discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into five parts:

1. *Chapter 1. Introduction:* The section includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.
2. *Chapter 2. Alternatives:* This section provides a more detailed description of the agency's proposed action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on significant issues raised by the public and other agencies. This discussion also includes possible mitigation measures. Finally, this section provides a summary table of the environmental consequences associated with each alternative.
3. *Chapter 3. Environmental Consequences:* This section describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by resource area. Within each section, the affected environment is described first, followed by the effects of the No Action Alternative that provides a baseline for evaluation and comparison of the other alternatives that follow.
4. *Forest Service Participants:* This section provides a list of preparers and agencies consulted during the development of the environmental assessment.
5. *Appendices:* The appendices provide more detailed information to support the analyses presented in the environmental assessment.

Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at the Forest Headquarters Office in Nelsonville, Ohio.

Background

In 1988, the Wayne National Forest completed a comprehensive land management planning effort with the publishing of the Wayne National Forest Land and Resource Management Plan (Forest Plan). During this effort, we made a concerted effort to seek out public involvement. With the public's help, we identified issues and alternative approaches to management of the Wayne National Forest. An environmental impact statement (EIS) was prepared in conjunction with the Forest Plan to document the analysis. We developed the EIS in accordance with the National Environmental Policy Act (NEPA) and the Council on Environmental Quality implementing regulations for NEPA.

The approval of the Record of Decision for the final EIS on January 4, 1988 represents the first level of decision-making related to land and resource management planning. This decision determined the desired future condition of the Wayne National Forest and established the guidance under which we implement future projects.

The second, and final, level of decision-making focuses on the analysis and implementation of management practices and projects designed to achieve the goals and objectives of the Forest Plan. This involves site-specific analysis to meet the requirements of the National Environmental Policy Act and specific on-site resource needs.

The environmental assessment (EA) for the proposed Big Four Hollow Restoration Project documents the site-specific analysis for project implementation occurring at the second level of decision-making. This EA was initiated as a result of environmental analysis of the proposed project in accordance with NEPA

procedures. These procedures afforded interested and affected publics the opportunity to participate. This report was prepared outlining the alternatives for implementing this project, noting any needed mitigation measures and predicting the relevant environmental consequences. The decision maker may now consider the results of this analysis in making an informed decision.

Purpose and Need for Action

The purpose and need for this proposal is to correct several water quality problems in the Big Four Hollow watershed. The Big Four Hollow restoration project falls within the Monday Creek Watershed. It is located in southwestern Hocking County, near the Village of Longstreth along Hocking County road 24 and Ward Township road 277. The problems include acid mine drainage seeps produced in abandoned coal mines, a stream channel blocked by strip mining, and erosion triggered by mining activities. Water quality inventories show that the water leaving Big Four Hollow has a significant negative impact on the water quality, and the plants and animals in Monday Creek. By addressing these problems we will make a substantial and significant improvement to the water quality in both Big Four Hollow and Monday Creek.

The Wayne National Forest has, for the past six years, worked in partnership with other federal agencies, state agencies and colleges, local government, and local citizens groups to improve water quality in the Monday Creek Watershed. The partners recognize the importance of clean water to Wayne National Forest users and to the surrounding communities. This partnership has been very successful in finding funds to address a broad range of problems in the watershed and its support will greatly facilitate this project.

This project responds to Wayne National Forest Land and Resource Management Plan direction to protect and enhance water quality.

FIGURE 1: VICINITY MAP

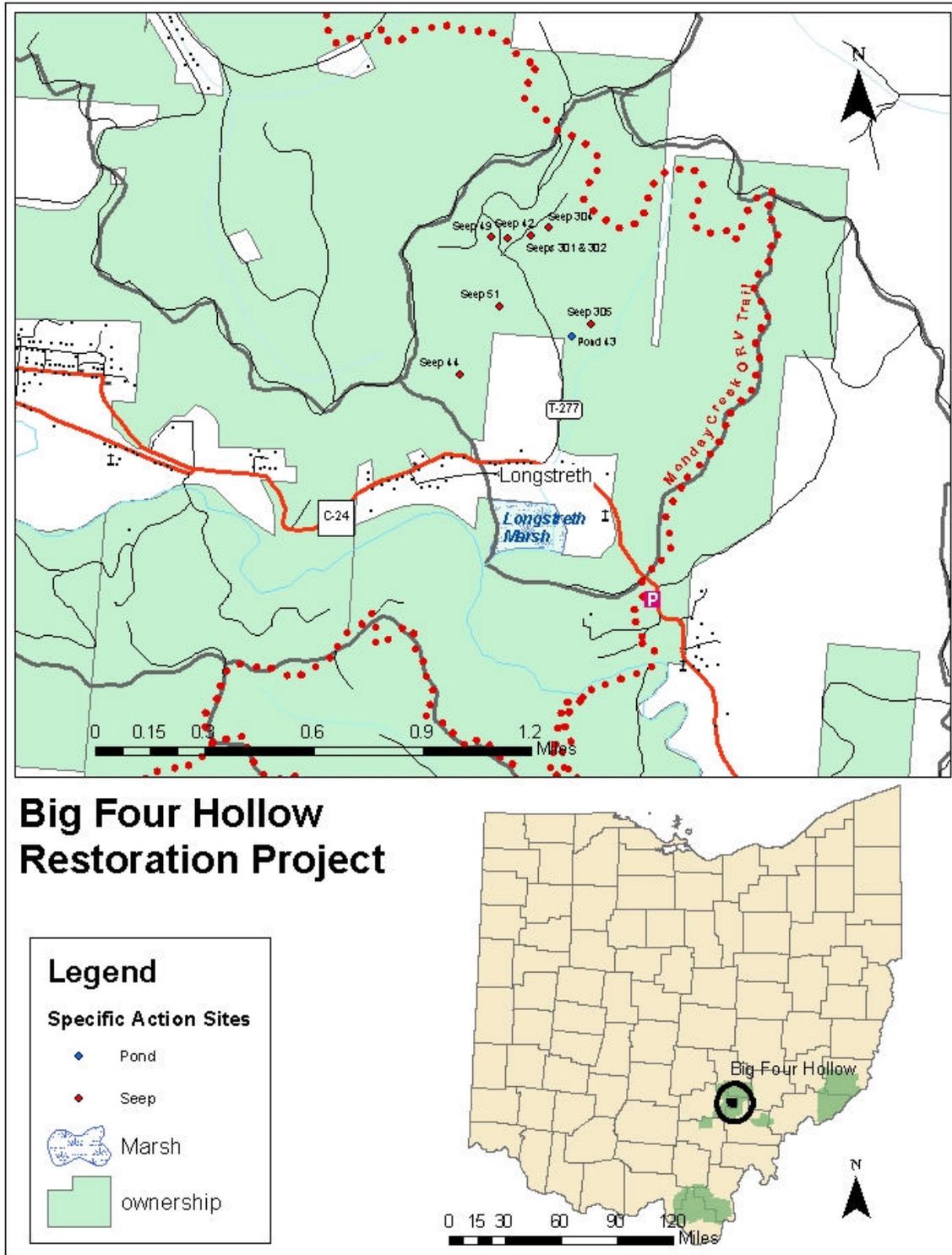
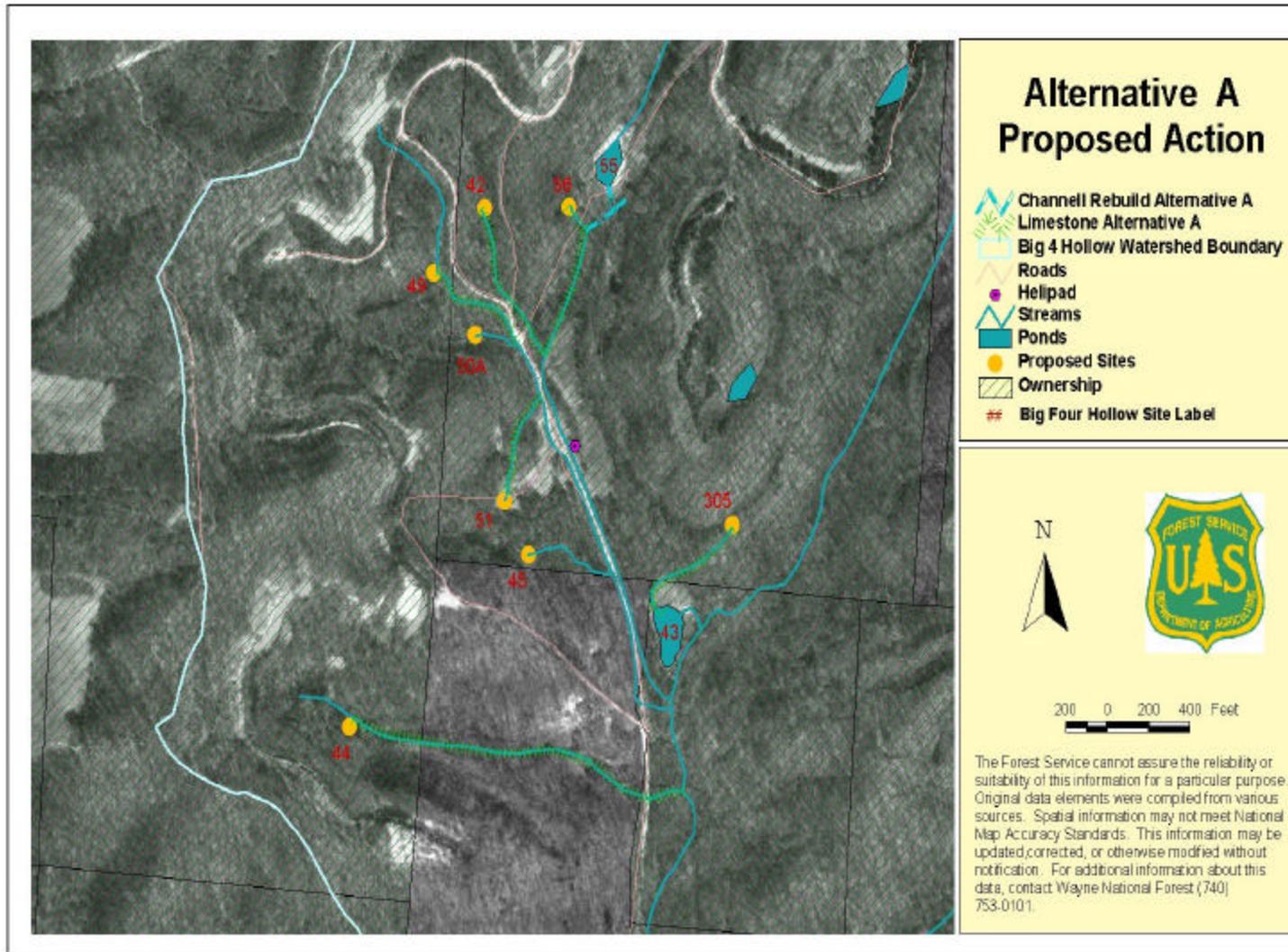


FIGURE 2: PROPOSED ACTION



Proposed Action

The Wayne National Forest is proposing to correct several water quality problems in the Big Four Hollow watershed. The problems include acid mine drainage seeps produced in abandoned coal mines (seeps are identified on the enclosed project map), a stream channel blocked by strip mining, and erosion triggered by mining activities (Longstreth Marsh and the trail between seeps 42 and 56). The enclosed project map (Figure 2) shows the individual sites proposed for treat in this project. We estimate that all of these activities will impact approximately 10 acres. The proposed action will include treating the acid water coming from the seeps with limestone, reconstructing the blocked channel, converting pond 43 to a wetland/marsh, and installing water control structures in Longstreth Marsh. All construction work will be done in a way that will minimize disturbance to the surrounding vegetation.

Decision Framework

The Watershed Group Leader of the Wayne National Forest will make the following decisions based on the interdisciplinary analysis presented in this Environmental Assessment.

- Should the restoration action be implemented as is proposed?
- Should the restoration actions be implemented in a modified manner?
- Should any restoration work be initiated at this time?
- Will a decision to do restoration in Big Hour Hollow require an amendment to the Wayne National Forest Land and Resource Management Plan?

Project Area

The proclamation boundary for the Wayne NF encompasses 833,990 acres in 12 Ohio counties (Forest Service 1988), of which approximately 230,000 acres are lands directly managed by the Forest Service. The Project area is specifically located in the Athens Ranger District in the southeastern portion of Hocking County within Sections FR1 and FR30, Township 15N, and Range 11W in Ward Township (Figure 1). The Project area is within Management Area 3.2 and the goals, objectives, and prescriptions of Management Area 3.2 are provided in the Forest Plan (Forest Service 1988).

Other Projects in the Proposed Alternative Areas

The Big Four Hollow is located in the 3.2 management area and a branch of the ORV trail system passes through the northwestern part of the watershed. These trails will require periodic maintenance. There are no other projects or other activates planed for this watershed. This project is part of a long term program directed at significantly improving the water quality in the entire Monday Creek drainage.

Mitigations Included in the Proposed Action

Summarize the mitigation measures listed in Appendix B.

Issues Related to the Proposed Action

On June 14, 2002 a letter was sent to approximately 150 individuals and organizations on the interested parties mailing list requesting their comments about the proposed action. This letter contained the general proposal and an area map showing where the project area. We received four letters commenting on this project. A list of those groups or individuals that responded is listed in Appendix A. The interdisciplinary team evaluated each comment to determine how it should be addressed. The interdisciplinary team also introduced several issues that were not brought out in the public comments. The results of the evaluation are displayed in Appendix A.

Four major issues were identified from public and internal comments. This input served as a basis for evaluating the alternatives, including the proposed action. These issues were also used to assess environmental consequences.

Issue 1: Need to address flooding of homes near Longstreth marsh.

The residents in the area east of Longstreth marsh have, in the past, contacted the Forest about seasonal flooding of the marsh.

This issue is addressed in the proposed action by installing water control structures in Longstreth Marsh.

Issue 2: Need to convert the channelized stream into a more natural drainage.

The Forest staff is concerned that the stream is flowing in two constructed channels on either side of the road. There is a need to reconstruct a more natural channel.

Issue 3: There are two additional sources of AMD that were not included in the proposed action.

Some Forest staff felt that there is a need to add limestone or steel slag to the pond at the north end of the watershed to buffer acid sources farther down stream and that we need to address the seep in the valley between seep 49 and seep 51 (seep 50a).

Issue 4: Resources should be focused on fixing the sources of AMD.

A concern was raised during scoping that the addition of limestone and steel slag to the ponds/streams is a short-term fix that will disturb the environment. They felt that resources should be focused on fixing the sources of the AMD.

Chapter 2. Alternatives

Process used to develop alternatives

Following public input activities, the interdisciplinary (ID) team met and discussed issues and alternatives. Given the issues, the team developed three alternatives that respond to concerns. The proposed action is called Alternative A. The proposal that minimizes the level of disturbance associated with current remediation actions and corrects some problems resulting from past activities is Alternative B. The no action alternative is called Alternative C.

Alternative A (Proposed Action)

Alternative A is explained in detail in the purpose and need section of this EA.

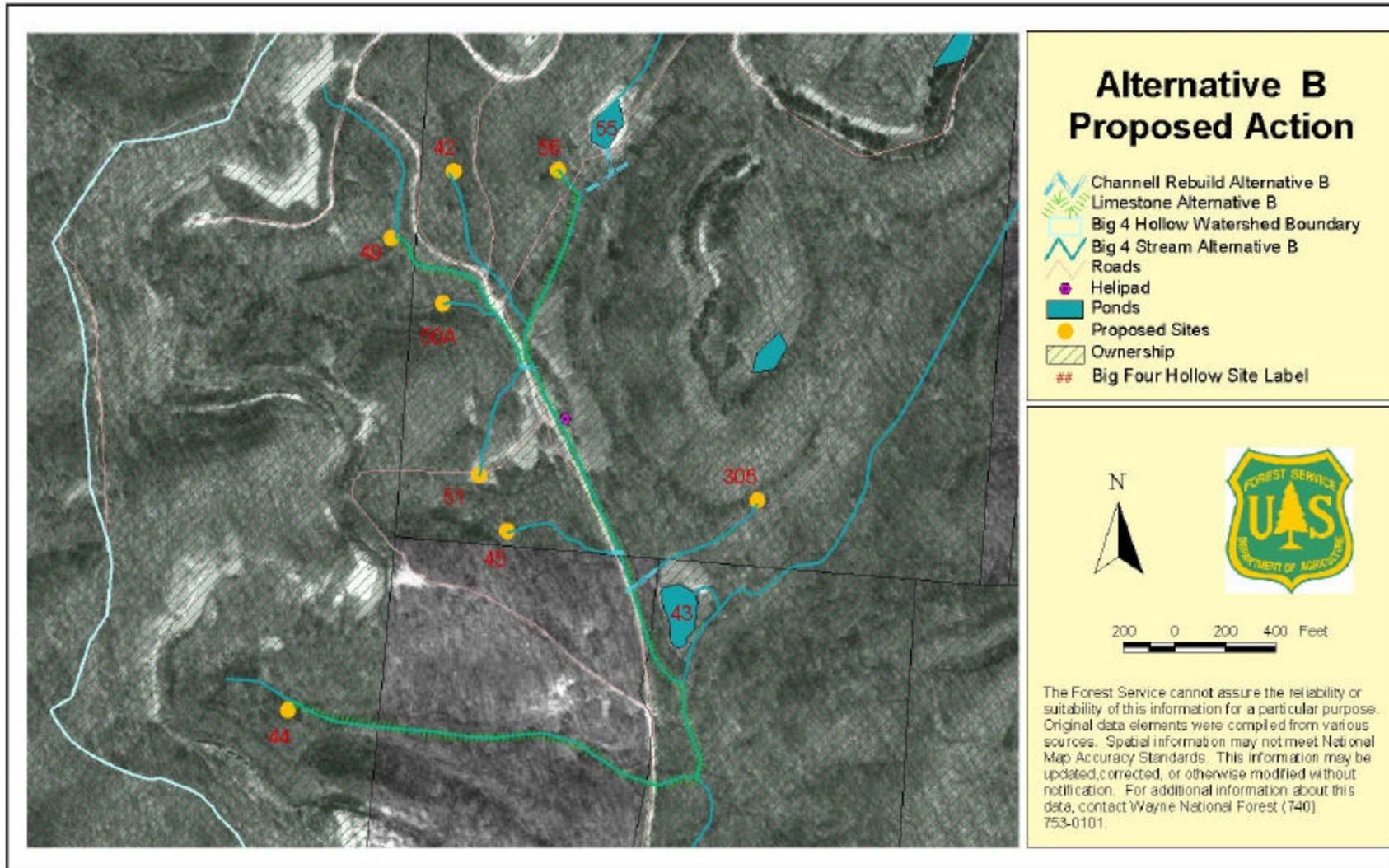
Alternative B (Minimal Disturbance)

The goal of this alternative is to minimize disturbance in big Four Hollow by concentrating the treatments in the channel closest to the road (seeps are identified on the alternative map, Figure 2). This alternative will include reconstructing the blocked channel near pond 55 and exclude installing water control structures in Longstreth Marsh. Limestone will be added to channel on the east side of the road beginning just above seep 49 and continue to the juncture of seep 51. At this point the east channel will be brought across and join the west channel forming just one channel on the west side of the road. Limestone will be added to the west channel beginning at seep 56 and continue to the juncture of seep 44. The channel from seep 44 will be lined with limestone from the seep to the main channel. The drainage from seep 45 will be brought across the road to join the main channel. The drainage from seep 305 will be connected to the main channel diverting it from pond 43. We estimate that all of these activities will impact approximately 8 acres. All construction work will be done in a way that will minimize disturbance to the surrounding vegetation.

Alternative C (No Action or Existing Condition)

This alternative defers all remediation action to another time and does not address the purpose and need for action.

FIGURE 3: ALTERNATIVE B



Alternatives not considered in detail

The interdisciplinary team determined that there are no additional alternatives that would address the purpose and need for action and be scientifically and economically feasible.

Chapter 3. Environmental Consequences

This section presents the environmental effects of implementing each alternative. Knowing the expected environmental consequences of proposed activities gives the decision maker a basis for selecting which actions to implement. The need for an environmental impact statement is based on what environmental effects are expected from the proposed actions. The following effects are discussed because they are related to the alternatives and major issues. The effects on plant and animal habitat, including the effects to threatened and endangered species, Regional Forester sensitive species, forest species of concern, and management indicator species, are shown to document compliance with the Endangered Species Act and the Forest Plan. The effects on heritage resources are shown to document compliance with the National Historic Preservation Act and other acts that protect heritage resources.

Affected Environment

Big Four Hollow is completely undermined and was substantially crop stripped in the middle Kittanning #6 coal seam. It is the primary source of acid mine drainage (AMD). The upper coal seam (#6a) is strip mined and augured on the western side of the watershed. It is not thought to be a significant source of AMD. Thousands of feet of crop strip mining function to funnel surface water into the underground mines. Large stream captures in Sand Run, an adjacent watershed, may divert significant amounts of surface water to seep #49 (described in the alternatives section). Many smaller seeps exist throughout the watershed, but are not proposed for treatment. A foreseeable action in the future is to close the subsidence's that are capturing stream water in the Sand Run area, but will not be addressed in this environmental assessment. The existing wetland at the mouth of the Big Four drainage is providing significant buffering capacity for the acid mine drainage in the Big Four creek.

Geology

The Project area is located in the unglaciated portion of the Allegheny Plateau Section of the Appalachian Plateau Physiographic Province (Ohio Department of Natural Resources [ODNR] 1999). Unlike the glaciated, flatter and smoother north, west, and interior of Ohio, the unglaciated land of the Project area is characterized by rolling hills and valleys, often with steep slopes, or bluffs. Elevation in the Project area ranges from approximately 700 to 1,000 feet above mean sea level.

The rock strata underlying the Project area are mostly sandstone and shale, with both large and small coal seams, "redbeds" (which are mostly shale), and clay. These coal seams were accessed and mined through underground vertical mine shafts, horizontal mine entries (*i.e.*, drift entries), and surface strip mining. Much of the excavated non-coal material (*i.e.*, mine spoil) was placed in piles adjacent to these activities and has altered the topography of the majority of the drainages in the Project area. The most important coal seam in the Project area was the #6 Middle Kittanning of the middle-Pennsylvanian.

The Surface Mining Control and Reclamation Act of 1977 prohibits most coal operations on National Forest System lands. Although, the Wayne NF has granted permission, because of valid rights, to some mining activities, no mining activities are planned for the Project area. Additionally, two oil and gas wells are located in the Project area

Soils

The Project area is contained within the boundaries of the Shelocta-Brownsville-Latham-Steinsburg and the Eden-Bratton-Brushcreek Ohio Soil Regions (ONDR 2002). Soil types are mostly Otwell silt loam or Chagrin silt loam on the moderate slopes and floodplains, respectively, with some Westmoreland-Guernsey silt loam in the steeper areas. These are deep well drained soil on flood plains and terraces. Serious occurrences of soil erosion are primarily limited to road use. The roads are poorly maintained and are in need of reconstruction or redesignation.

Water Resources

Big Four Hollow is completely undermined and was substantially crop stripped in the middle kitting #6 coal seam. It is the primary source of acid mine drainage (AMD). The upper coal seam (#6a) is strip mined and augered on the western side of the watershed. It is not thought to be a significant source of AMD. Thousands of feet of crop strip mining function to funnel surface water into the underground mines. Large stream captures in Sand Run, an adjacent watershed, may divert significant amounts of surface water to seep #49 (described in the alternatives section). Many smaller seeps exist throughout the watershed, but are not proposed for treatment. A foreseeable action in the future is to close the subsidence's that are capturing stream water in the Sand Run area, but will not be addressed in this environmental assessment.

Ground Water

There are no designated sole source aquifers located near the Project area (United States Environmental Protection Agency [USEPA] 1996). Hocking County's highest yielding ground-water source is an unconsolidated sand and gravel aquifer along the Hocking River. This aquifer runs diagonally through the county from the northwest to the southeast. Sand and gravel aquifers are commonly the highest yielding aquifers in Ohio. The most common ground water source is a shaley sandstone and shale sedimentary bedrock aquifer.

Normal ground water drainage has been severely impacted by historic mining activities in the Project area. Changes in soil structure, geology, and topography have been altered to various degrees throughout the Project area, therefore influencing the direction, volume, and chemical composition of surface and subsurface (near surface) ground water. Collected surface water and ground water may be temporarily detained in subsurface mines, accumulate dissolved metals and acidity, and flows out in continuously flowing, causing the AMD in the Project area.

Surface Water

The Project area is located within the boundaries of the USEPA's designated Hocking Watershed. Within the Hocking Watershed, the Big Four Hollow Watershed drains the Project area into Monday Creek, which in turn flows into the Hocking River.

Normal surface water drainage has been severely impacted by historic mining activities in the Project area. Changes in soil structure, geology, and topography have been altered to various degrees throughout the Project area, therefore influencing the direction of flow, volume, and chemical composition of surface water. Stream drainages or channels have been altered by surface grading and mining activities and/or blocked by the placement of mine spoil in historic channels. In addition, several small ponds or mine pits in the Project area were created as a direct result of past mining activities. These surface ponds allow waters to be held in contact with mine spoil and exposed rock for longer periods of time, thereby increasing the amount of dissolved metals that eventually drain into nearby waterways. Several of these

ponds have been or are currently maintained by beavers.

Water quality data Levels of pH ranged from 2.6 to 4.0 within the Big Four Hollow Watershed. The pH in the main channel of the stream is at 3.0 before entering the marsh area and 5.8 when exiting the marsh. This is a result of natural buffering in the marsh. High levels of acidity, iron, sulfate, and aluminum loadings were also recorded.

Vegetation

The Wayne NF is located within the Ecoregion Humid Temperature Domain, Hot Continental Division, Eastern Broadleaf Forest (Oceanic) Province, Southern Unglaciated Allegheny Plateau Section. The Project area is located primarily in the Western Hocking Plateau Subsection (USEPA Ecoregion Title: Ohio/Kentucky Carboniferous Plateau) (Forest Service 1999).

The Project area is part of the mixed mesophytic forest region (Hix *et al.* 1997). Mesophytic forests are woody plant communities that exist on deep, well drained soils that are rich in exchangeable nutrients and are characterized by a diverse dominant and codominant canopy and subcanopy. Approximately 75 percent of the Project area is second growth forest. The remaining 25 percent is in upland brush, emergent and scrub-shrub wetlands, roads, trails, exposed coal refuse piles, and water resources. Although it contains some conifers, the Project area is dominated by hardwood forest types, the majority of which is of the oak-hickory forest type with successional yellow poplar (*Liriodendron tulipifera*) dominating the lowlands. Pine plantations consisting of shortleaf pine (*Pinus echinata*) and white pine (*Pinus strobus*) are found in some areas. Where Project elements would be implemented white oak (*Quercus alba*), sweetgum (*Liquidambar styraciflua*), and yellow poplar are the most common tree species. Other common tree species include red oak (*Q. rubra*), black oak (*Q. velutina*), chestnut oak (*Q. prinus*), sugar maple (*Acer saccharum*), red maple (*A. rubrum*), American beech (*Fagus grandifolia*), shagbark hickory (*Carya ovata*), mockernut hickory (*C. tomentosa*), bitternut hickory (*C. cordiformis*), sycamore (*Platanus occidentalis*), and white ash (*Fraxinus americana*).

Common understory tree and shrub species in the Project area include young maples and beech, black cherry (*Prunus serotina*), dogwood (*Cornus florida*), ironwood (*Carpinus caroliniana*), hornbeam (*Ostrya virginiana*), hackberry (*Celtis occidentalis*), spicebush (*Lindera benzoin*), and blueberry (*Vaccinium* spp.), with redbud (*Cercis canadensis*), green briar (*Smilax* spp.), and blackberry (*Rubus* spp.) occupying more open and edge type habitats. Common understory herbaceous species include trout lily (*Erythronium americanum*), Christmas fern (*Polystichum acrostichoides*), and various species of violets (*Viola* spp.) and mints (*Dicerandra* spp.). Herbaceous species common to roadsides and more open canopy habitats include panic grass (*Panicum* spp.), common milkweed (*Asclepias syriaca*), clover (*Trifolium* spp.), aster (*Aster* spp.), and goldenrod (*Solidago* spp.).

Wetland plant species common in the Project area include sugar maple, yellow poplar, American elm (*Ulmus americana*), Virginia creeper (*Parthenocissus quinquefolia*), avens (*Geum* spp.), woodland nettle (*Laportea canadensis*), clearweed (*Pilea pumila*), Pennsylvania sedge (*Carex pennsylvanica*), porcupine sedge (*C. hystericina*), green bulrush (*Scirpus atrovirens*), and soft stem bulrush (*S. validus*).

Wetlands

An existing wetland at the mouth of the Big Four drainage has provided significant buffering capacity for acid mine drainage. Recent data indicates that acid loads leaving the wetland were significantly reduced. The wetland formed as a result of the construction of a railroad embankment along Monday Creek. Excessive sedimentation from unreclaimed surface mines caused the wetland to form in a low gradient valley. The stream that discharges into the wetland has become moderately channelized, thus reducing the overall buffering capacity. There is some concern that the wetlands treatment efficiency is

diminishing because of the channelization. An opportunity exists to enhance the efficiency of the wetland through stage control improvements. The Longstreth community is located adjacent to the wetland and the Forest has been contacted in the past about seasonal flooding.

Fish and Wildlife

The Project area supports several types of aquatic habitats including seeps, creeks, ponds, strip mine pits, and wetlands. Most of these habitats have been identified as having reduced pH levels and high concentrations of dissolved metals. When pH decreases below 5.0, most types of algae and rooted aquatic plants can no longer survive. Increased acid levels in fresh water can affect microorganisms responsible for the decomposition of organic material such as leaves and detritus, and this in turn may lead to a reduction of populations of aquatic invertebrates that utilize decomposed organic material and feed upon microorganisms.

In addition, variations in acid levels can weaken aquatic invertebrates, making them vulnerable to disease and parasites. Changes in pH can also affect the growth and development of aquatic larvae and eggs. The majority of aquatic invertebrates that could potentially occur in the Project area, including mayflies, caddisflies, stoneflies, dragonflies, damselflies, and beetles, will not survive in waters with pH levels below 4.5. In addition to the increase in stress due to the reduced food supply (*i.e.*, aquatic invertebrates), most fish species cannot survive in waters with pH levels below 4. Low pH levels damage gills and increase sodium levels in fish blood to above normal levels. Metal toxicity caused by AMD produces an additive detrimental affect on aquatic biota. Small amounts of these metals can stress fish or even cause death, especially in young, developing fish. Large amounts can settle on a stream bottom and smother the few invertebrates that may be acid tolerant.

Certain amphibians recently have been found to be more tolerant of acid waters. However, this may be more of a result of the ability of these species actively seek out microhabitats (*i.e.*, vernal pools, road cuts) with higher pH levels than the surrounding aquatic habitats. The four-toed salamander (*Hemidactylum scutatum*) is commonly associated with sphagnum moss dominated habitats that tend to flourish where acid conditions exist.

Few data exists on the tolerance of mollusks, crustaceans, amphibians, and turtles to low pH levels. Most research indicates that the pH levels in the Project area are much too low to be conducive to support healthy populations of any of these groups. In turn, the lack of basic food chain elements (*i.e.*, amphibians, fish) provided by these aquatic species would undoubtedly have negative affects on terrestrial species in the Project area. Species of waterfowl, wading birds, and small mammals that feed upon fish and amphibians may no longer use the Project area, or use the Project area in a much reduced capacity, as a result of AMD.

The Project area supports several types of terrestrial habitats including upland forests, shrub, and open areas and forested, scrub-shrub, and emergent wetland areas. However, the majority of the Project area and those areas located around the element sites are young to mid-successional forested uplands associated with small drainages and/or ponds. Common wildlife species in the Project area include popular game species such as the white-tailed deer (*Odocoileus virginianus*), wild turkey (*Meleagris gallopavo*), ruffed grouse (*Bonasa umbellus*), eastern cottontail (*Sylvilagus floridanus*), and gray squirrel (*Sciurus carolinensis*). Raccoon (*Procyon lotor*), opossum (*Didelphis virginiana*), coyote (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), and the white-footed mouse (*Peromyscus leucopus*) would also be common transient or resident mammal species. The beaver (*Castor canadensis*) has been active along the main drainage of the Big Four Hollow Watershed. Two mine portals in the Project area may provide entranceways to suitable hibernacula for several bat species such as the big brown bat (*Eptesicus fuscus*) and evening bat (*Nycticeius humeralis*). These potential hibernacula have been surveyed to determine bat use or habitat suitability. In addition, the species composition (*i.e.*, shagbark hickory) of the forest in the Project area may provide suitable roost trees for bats. Species of reptiles such

as the ringneck snake (*Diadophis punctatus*) and copperhead (*Agkistrodon contortrix*) may be found utilizing the forested habitats of the Project area.

The extensive forest and smaller riparian and wetland areas provide nesting and foraging habitat for a variety of bird species, such as the northern cardinal (*Cardinalis cardinalis*), pileated woodpecker (*Dryocopus pileatus*), blue jay (*Cyanocitta cristata*), American crow (*Corvus brachyrhynchos*), eastern phoebe (*Sayornis phoebe*), white-breasted nuthatch (*Sitta carolinensis*), black-capped chickadee (*Parus atricapillus*), brown creeper (*Certhia familiaris*), and various flycatchers and warblers. The forest is also habitat for a variety of terrestrial insects and invertebrates, which serve as a food source for songbirds and other animals. Waterfowl such as the wood duck (*Aix sponsa*) and wading birds such as the great blue heron (*Ardea herodias*) probably use the Project area wetlands and pond more for resting than foraging due to the lack of aquatic plant and animal foods present as a result of AMD.

Endangered and Threatened Species

The USFWS has provided a list of potential species federally listed as endangered and threatened pursuant to the Endangered Species Act (ESA) that have part of their range within or near the Wayne NF (USDA 2001). The species and their status are listed in Table 1.

TABLE 1. FEDERALLY LISTED ENDANGERED AND THREATENED SPECIES THAT MAY OCCUR IN THE WAYNE NATIONAL FOREST.

Species	Common Name	Federal Status ^a	State Status ^a
Plant			
<i>Aconitum noveboracense</i>	Northern monkshood	T	E
<i>Isotria medeoloides</i>	Small whorled pogonia	T	E
<i>Spiraea virginiana</i>	Virginia spiraea	T	E
<i>Trifolium stoloniferum</i>	Running buffalo clover	E	E
Mollusks			
<i>Cyprogenia stegaria</i>	Fanshell	E	E
<i>Lampsilis abrupta</i> (<i>L. orbiculata</i>)	Pink mucket	E	E
Insects			
<i>Nicrophorus americanus</i>	American burying beetle	E	E
Birds			
<i>Haliaeetus leucocephalus</i>	Bald eagle ^b	T	T
Mammals			
<i>Myotis sodalis</i>	Indiana bat	E	E

^aStatus codes: E=Endangered, T=Threatened.

^bProposed for delisting on July 6, 1999.

Information from field surveys, species occurrence records, life history requirements, and knowledge of local experts and Forest Service personnel were all utilized to identify those species that could potentially be affected by the Project. These affect determinations are presented in the Project-specific BE. Suitable habitat was determined not to be available in the Project area, and site-specific surveys therefore were not required, for the Virginia spiraea, fanshell, pink mucket, American burying beetle, and bald eagle. However, the BE determined that suitable habitat existed in the Project area for the northern wild monkshood, running buffalo clover, small whorled pogonia, and Indiana bat. Site-specific field surveys for these species were conducted during the summer months of 2002. A summary of the results of these surveys by species is provided below.

Regional Forester's Sensitive Species

Regional Forester's Sensitive (RFS) species are those species that occur within the proclamation boundaries of the Wayne NF and are either candidates for federal listing under the ESA, species delisted under the ESA in the last five years, globally or nationally ranked 1-3 by The Nature Conservancy and Association for Biodiversity Information, or considered Sensitive on the Wayne NF based on Risk Evaluations. A total of 33 plant and animal RFS species are currently identified for the Wayne NF. This list includes 11 plant, four mollusk, four insect, three fish, one reptile, two amphibian, two bird, and six mammal species. These species are listed in Table 2.

Information from field surveys, species occurrence records, life history requirements, and knowledge of local experts and Forest Service personnel were all utilized to identify those species that could potentially be affected by the Project. These affect determinations are presented in the Project-specific BE. The BE determined that suitable habitat existed in the Project area for only the butternut, umbrella magnolia, rock skullcap, timber rattlesnake, green salamander, and Allegheny woodrat. Suitable habitat was determined not to be available in the Project area for the remainder of the RFS species listed for the Wayne NF (Table 2). Site-specific field surveys for the six species with suitable habitat in the Project area were conducted during the summer months of 2002. A summary of the results of these surveys is provided by species below.

TABLE 2. REGIONAL FORESTER'S SENSITIVE SPECIES LISTED FOR THE WAYNE NATIONAL FOREST.

Species	Common Name	State Status ^a
Plants		
<i>Carex juniperorum</i>	Juniper sedge	T
<i>Dicanthelium bicknellii</i> (<i>Panicum bicknellii</i>)	Bicknell's panicgrass	T
<i>Gentiana alba</i>	Yellow gentian	T
<i>Gentiana villosa</i>	Striped gentian	E
<i>Juglans cinerea</i>	Butternut	P
<i>Magnolia tripetala</i>	Umbrella magnolia	P
<i>Panicum philadelphicum</i>	Philadelphia panicgrass	T
<i>Phacelia ranunculacea</i>	Blue scorpionweed	E
<i>Platanthera ciliaris</i>	Yellow fringed orchid	T
<i>Scutellaria saxatilis</i>	Rock skullcap	P
<i>Vitis cinerea</i>	Pigeon grape	P
Mollusks		
<i>Obovaria subrotundra</i>	Round hickorynut	---
<i>Simponaias ambigua</i>	Salamander mussel	SI
<i>Toxolasma parvus</i>	Liliput	---
<i>Villosa lienosa</i>	Little spectaclecase	E
Insects		
<i>Euchloe oympia</i>	Olympia marble	SI
<i>Macromia wabashensis</i>	Wabash river cruiser	---
<i>Pyrgus wyandot</i>	Southern grizzled skipper	SI
<i>Speyeria idalia</i>	Regal fritillary	M
Fish		
<i>Ammocrypta pellucida</i>	Eastern sand darter	---
<i>Erimyzon sucetta</i>	Lake chubsucker	---
<i>Ichthyomyzon bdellium</i>	Ohio lamprey	E
Reptiles		

<i>Crotalus horridus</i>	Timber rattlesnake	E
Amphibians		
<i>Cryptobranchus allegheniensis</i>	Eastern hellbender	E,M
<i>Aneides aeneus</i>	Green salamander	E
Birds		
<i>Ammodramus henslowii</i>	Henslow's sparrow	SI,M
<i>Dendroica cerulea</i>	Cerulean warbler	SI,M
Mammals		
<i>Corynorhinus (=Plecotus) rafinesquii</i>	Rafinesque big-eared bat	SI, M
<i>Felis rufus</i>	Bobcat	E
<i>Lutra canadensis</i>	River otter	E
<i>Nycticeius humeralis</i>	Evening bat	---
<i>Neotoma magister</i>	Allegheny woodrat	E,M
<i>Ursus americanus</i>	Black bear	E

³Ohio Division of Wildlife and Ohio Division of Natural Areas and Preserves, Ohio Department of Natural Resources: E=Endangered, T=Threatened, SI=Special Interest, M=Monitored, P=Potential Threatened.

Land Use

The entire Project area is within the proclamation boundaries of the Wayne NF. Approximately 85 percent of the project area is directly managed by the Forest Service the remainder is privately owned. Approximately 35 percent of the Project area is maturing second growth forest. The remaining 65 percent is in upland brush, emergent and scrub-shrub wetlands, roads, trails, reclaimed strip mines, and water resources. No land is currently being used for agricultural purposes. The area was initially deep mined for the #6 Middle Kittanning coal seam. Underground mining in the Project area ceased around 1932. Un-mined outcroppings and under drainage portions of the Project area were surfaced mined with heavy equipment through the 1940s.

Current major land uses in the Project area include those associated recreational activities such as ORV trail use and hunting. The Project area is entirely within the boundaries of Management Area 3.2, which is primarily managed for timber and recreational use with an emphasis on ORV trail creation and use (Forest Plan, 4-97). Timber stands are managed primarily through even-aged practices with a hardwood rotation of 80 years and conifer rotation of 60 years. Vegetation in the management area will be managed to create a condition necessary to:

- Maintain wildlife habitat diversity and increase and enhance habitat for early succession wildlife species;
- Provide high quality hardwoods on a sustained yield basis; and,
- Provide various dispersed recreational opportunities, particularly hunting, in moderate amounts;

Recreation

The primary recreational uses in the Project area are ORV trail use and hunting. Other uses include fishing, hiking, biking, camping, and firewood, mushroom, and ginseng collecting. A small portion of the Monday Creek ORV area is on the edge of the Project area. Hiking and biking are also allowed on Monday Creek ORV trails. Use of the ORV trails is often heavy, peaking around the holidays and weekends. However use by ORV and bike riders is not allowed between December 14 and April 16. There are no designated camping areas in the Project area, however primitive camping is allowed.

Game is hunted seasonally, primarily for deer, wild turkey, ruffed grouse, and squirrel. Peaks in deer hunting, ruffed grouse, and squirrel hunting occur during the fall months, whereas wild turkey hunting occurs in the fall and spring. Spring turkey season usually begins around the last week of April and continues to the end of the third week in May. There is some fishing in pond 55.

Visual and Aesthetic Resources

The Project area primarily consists of continuous hardwood forest. Roads and trails, wetlands and strip mine reclaims in early successional stage represent significant interruptions to, or fragmentation of, the forest canopy. The fragmented nature of the forest provides visitors with a mosaic of maturing second growth forest, openings, seeps, streams, ponds, and wetlands in some areas. Historic mining has altered the topography of some areas, however, subsequent regeneration of the forest has concealed some of the mine spoil and relief sites. Historic mining has also altered the color of water by changing the color of stream and pond substrates to various shades of orange and turquoise.

Socio-economics

The population of Hocking County was estimated at 28,241 in 2000 and has experienced a relatively large increase of 10 percent over the past decade (Ohio Department of Development 2000). In contrast the population of Ohio increased 3.8 percent over the same time period. Income per capita in the county in 1999 was estimated at \$19,174, whereas the state average was estimated at \$27,171 (Ohio Department of Development 2000). The unemployment rate in the county in 2000 was estimated at 8.7 percent of the civilian work force that was the seventh highest of the 88 counties in Ohio (Ohio Department of Development 2000). Manufacturing and government jobs comprised the bulk of the work force in 2000. There have been negligible changes in agricultural, forestry, and fishery related employment over the past decade.

The Wayne NF provides an improved quality of life and community services for those who reside in the local area as well as thousands of visitors each year. People visiting and participating in the many activities the Wayne NF provides contribute to state and local tax revenues as a result of the purchase of goods and services.

Environmental Justice

Executive Order 12898, dated February 11, 1994, requires each federal agency, to the greatest extent practicable and permitted by law, to make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States.

Environmental justice is the fair treatment and meaningful involvement of all people regardless of race,

color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including a racial, ethnic, or socioeconomic group, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies.

The Forest Service is currently operating under Executive Order 12898 and USDA Departmental Regulation 5600-2 to ensure that it conducts its programs, policies, and activities that substantially affect human health or the environment in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons (including populations) from participation in, denying persons (including populations) the benefits of, or subjecting persons (including populations) to discrimination under, such programs, policies, and activities, because of their race, color, or national origin.

Other than the high unemployment rate, there are no health, economic, or social problems of significance in the vicinity of the Project area.

Cultural Resources

The Forest Service prepared a Cultural Heritage Assessment for the Project. This assessment found that the majority of the project area was surveyed for heritage resources in 1979 and no significant sites were identified within the proposed project area. The Southern edge of the project area was investigated for heritage resources on February 5, 2003. Due to historical mining practices and reclamation projects in the 1990's, no heritage resources were discovered throughout the area and none probably exist.

Air Quality and Noise

The Clean Air Act, which was last amended in 1990, requires the USEPA to set National Ambient Air Quality Standards for pollutants considered harmful to public health and the environment. The Clean Air Act established two types of national air quality standards. Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings. Air quality data for the region is limited, however, the Project area does not encompass any non-attainment zones for USEPA criteria pollutants, and air quality is expected to meet USEPA standards.

Outdoor noise levels change continually because of the temporal and spatial variations of noise sources. The majority of the time the Project area is a peaceful setting with only the sounds of nature occurring at their own temporal and spatial variations. Typical local artificial noise in the Project area includes the engine noise of ORV trail users, pumping oil wells, and the occasional low flying aircraft.

Effects of Proposed Action (Alternative A)

This alternative responds to the purpose and need for reducing significant water quality impacts to the Longstreth Wetland and Monday Creek, wetland enhancement through stage control measures, flooding impacts to the Longstreth Community, and improved plant and animal habitats along Big Four Hollow and the main stem of Monday Creek.

Direct and Indirect Effects

Implementation of open limestone channels, limestone leach beds, re-establishment of positive drainage where channels are blocked by an earthen berm, and the re-routing of a stream and of an AMD seep away from a pond will mitigate negative water quality impacts and will have a positive effect on water quality in Big Four Hollow, the Longstreth wetland, and ultimately the main stem of Monday Creek. Based on data analysis conducted by researchers at the Abandoned Mine Land Program, West Virginia University, a reduction of 87% in acid loads could be achieved by implementing the combination of treatment alternatives described above. Stage control measures to enhance the buffering capacity of the wetland may increase the efficiency of the wetland, as it will act to keep the wetland aerobic. However, data analysis from Ohio Department of Natural Resources suggests that during a high flow sampling event, acid loads leaving the wetland were higher than what was coming in. The data could not explain where the excess acid loads were coming from. Stage control, resulting in the wetland being inundated with water more frequently, may increase the potential for re-dissolving metals that have previously been deposited in the wetland.

Stage control would increase the water levels in the wetland and the effect of increased flooding to the hamlet of Longstreth would need to be considered. Constructing a properly sized earthen berm based on the high water levels could mitigate flood impacts from stage control. However, field-visits with the Army Corp in 1996 indicated that seasonal flooding to the Longstreth Community is primarily caused from backwater from Monday Creek. Several decades of mining in the watershed has resulted in sediment deposition; thus an increase in the bed elevation of Monday Creek and siltation in the marsh. The Longstreth Community is located in the floodplain of Monday Creek and has experienced flooding in the past. Stage control in the wetland will not eliminate seasonal flooding to the Longstreth Community.

Installing a water control structure in the Longstreth Wetland may potentially increase flooding to the Longstreth community and re-dissolving of metals that have previously been deposited in the wetland. Implementation of various water quality treatments described in this alternative will have long-term water quality benefits to the Longstreth Wetland and the main stem of Monday Creek. The riparian areas and biological communities will also benefit as acid loads are reduced. Sedimentation into the wetland and receiving stream will be minimized as Best Management Practices will be employed during the construction phase.

Cumulative Effects

The long-term benefits to water quality will be achieved by this project in conjunction with a variety of restoration projects currently scheduled in the upper reaches of the Monday creek watershed by WNF and partners.

Effects of Minimal Disturbance Alternative (Alternative B)

This alternative responds to the purpose and need for reducing significant water quality impacts to the Longstreth Wetland and Monday Creek while improving plant and animal habitats along Big Four Hollow and Monday Creek.

Direct and Indirect Effects

Implementation of open limestone channels, limestone leach beds, re-establishment of positive drainage where channels are blocked by earthen berms, and the re-routing of a stream and of an AMD seep away from a pond will mitigate negative water quality impacts and will have a positive effect on water quality in Big Four Hollow, the Longstreth wetland, and ultimately the main stem of Monday Creek. Based on data analysis conducted by researchers at the Abandoned Mine Land Program, West Virginia University, a reduction of 87% in acid loads could be achieved by implementing the combination of treatment alternatives described above.

A question was raised about the potential for significant iron armoring of the limestone that will be placed in the main channel of Big Four. The issue was raised because the gradient is quite low (1.35%) in the main stem. A review of water quality data from the 16 sample sites in Big Four indicates the average iron concentrations are 3.4 mg/l, as compared to the average aluminum concentration of 16.4 mg/l. The aluminum concentrations are much higher. The atomic weight of aluminum is much less than that of iron and will move more quickly through the system while in solution.

There will be some iron armoring once the pH is increased to a pH of 4.5. However, based on the above information, the probability of significant iron armoring is probably low. The limestone will retain its ability to dissolve unless it becomes buried with iron precipitate. In addition, the iron armoring that will occur will be decreased during storm events where the turbulence of the water will pick the precipitate up and move it downstream.

Implementation of various water quality treatments described in this alternative will have long-term water quality benefits to the Longstreth Wetland and the main stem of Monday Creek. The riparian areas and biological communities will also benefit as acid loads are reduced. Sedimentation into the wetland and receiving stream will be minimized as Best Management Practices will be employed during the construction phase.

Cumulative Effects

The long-term benefits to water quality will be achieved by this project in conjunction with a variety of restoration projects currently scheduled in the upper reaches of the Monday creek watershed by WNF and partners.

Effects of No Action Alternative (Alternative C)

Direct and Indirect Effects

If no act is taken at this time Big Four Hollow will continue to contribute a significant amount of acidity and other pollutants to Monday Creek.

Cumulative Effects

The acidity and pollution coming from Big four Hollow will join with the pollution generated at other sites in the Monday Creek watershed keeping Monday Creek from achieving its biological potential.

Non-Native Invasive Species

Non-native invasive species (NNIS) pose a threat to plant and animal community health and diversity. Since exotic species, by definition, have been transplanted outside their original range, they often lack natural controls (e.g., disease, predators, parasites, or climate), which allows them to out compete and

eventually replace more sensitive native species. Once NNIS become established, they are extremely difficult to eradicate, and the resulting change in community plant composition can alter ecosystem dynamics and functions over time. With any management activity that requires the use of heavy equipment brought in from off-site, or that disturbs the soil and increases sunlight exposure to the ground, there is a high risk of transporting and spreading NNIS into the project area. If these NNIS were allowed to establish, they could easily compromise habitat quality, and thus jeopardize any existing or future populations of rare species in the project area.

Much of the project area already shows signs of NNIS invasion, presumably due to past mining and/or oil and gas activity in the watershed, making equipment cleaning futile and unnecessary. However, a considerable amount of additional disturbance would occur as a result of project implementation, which could translate into an acceleration of spread of NNIS already occurring on site.

Mitigations

In order to maintain a closed canopy ecosystem, and thus impede the spread of shade-intolerant non-natives, remove as few trees as possible during construction activities.

Limit the amount of soil disturbance by using the smallest equipment necessary for project completion.

Plant only annual grasses approved by the Forest botanist in areas requiring erosion control, and allow *in situ* revegetation in areas that do not. Planting perennial non-native species within a closed-canopy environment would likely alter the site's habitat type (i.e., from sparse forest understory to grassy, weedy corridor), and thus prevent the future establishment of native forest species, while at the same time encouraging opportunistic non-natives. Since most of the soil disturbance would occur on flat to moderately sloping terrain under closed canopy conditions, heavy seeding, in general, is not necessary for site remediation.

Cattails (*Typha* spp.)

Alternative A calls for conversion of pond 43 to a wetland, which would include planting cattails along the banks for bank stabilization and water filtration. Cattails, while native, are often aggressive invaders of freshwater wetlands. Excessive cattail growth can eliminate open water, habitat diversity, and species diversity of other aquatic plants (Apfelbaum no date; pers. comm. with R. Ewing). Instead of planting cattails, I would recommend allowing native species to colonize the area naturally via waterfowl and other aquatic fauna.

Threatened, Endangered, and Sensitive Species (TES)

All National Forest projects will be reviewed for possible effects on endangered, threatened, proposed, or sensitive species (FMS 2672.4).).

Plants

Potentially Affected Federally Threatened or Endangered Species

There are four Federally listed Threatened or Endangered Species found on the Wayne (see Table 1). Suitable habitat may exist in the project area for the monkshood, pogonia and clover, but not for Virginia spirea, which will not be carried further in the analysis.

Northern wild monkshood (*Aconitum noveboracense*)

Direct, Indirect and Cumulative Effects

The only likely suitable habitat for the monkshood in the project area is near seep 44b at the base of sandstone cliffs near the headwaters of the drainage, and seep 51 around the two open mine portals. Monkshood individuals were not found in either location during summer field surveys, thus the project would have no direct effect on this species. Furthermore, habitat near seep 44b would not likely be affected by project activities, since it is improbable that limestone would be added past the beaver dam, which is east of the cliffs. Similarly, only a minimal portion of habitat near the mine portals around seep 51 would be affected by construction, since the channel runs fairly well removed from the base of the rock outcrops, and habitat directly adjacent to the channel in this section is severely degraded by non-native and other opportunistic species. However, Alternative B avoids work within this drainage altogether, and would thus be least likely to affect monkshood habitat.

Small whorled pogonia (*Isotria medeoloides*)

Direct, Indirect and Cumulative Effects

Potential habitat for the pogonia exists throughout the project area, where prime habitat exists along the proposed channel reconstruction near pond 55. This area, which contains some breaks in the forest canopy, supports other orchid species (e.g., showy orchis and crane fly orchis), as well as cucumber root, a known associate species. In spite of the high quality habitat, no pogonia individuals were found there during a late May survey, or anywhere else within the project area, thus the proposed project would have no direct effect on this species. Furthermore, since access routes would be along existing roads wherever possible, most of the habitat modification within the forested areas would largely be temporary, and revegetation could begin immediately upon project completion. However, access along some of the channels may require gravel for stabilization. The amount of habitat impacted by such treatment would not likely be great enough to affect any potential future establishment of this species in the project area, especially considering the amount of habitat remaining in the entire watershed.

Running buffalo clover (*Trifolium stoloniferum*)

Direct, Indirect and Cumulative Effects

Suitable habitat for running buffalo clover exists throughout the project area (e.g., along T-277, along the oil/gas road leading to pond 55, around the perimeter of ponds 43 and 55, along the old road leading to seeps 44a and b, and along the more open portions of the channel). These areas were surveyed in late March, and no individuals were found; therefore, the proposed project would have no direct effect on this species. Habitat along the existing, semi-maintained roads would only be altered temporarily while the roads were being improved, making these areas available for any potential future clover establishment the following growing season. Similarly, habitat around the ponds would be minimally, and only temporarily, impacted by construction activities, and would thus not likely inhibit future establishment of the clover in those areas. The old access road leading to seeps 44a and b, on the other hand, would be permanently altered by the addition of gravel for access to the seeps, and would thus constitute a loss of clover habitat. Alternatively, disturbance along the stream channels, which includes the potential removal of small trees and shrubs, may actually create habitat for the clover, especially considering that most Ohio populations have been found around waterways. Regardless, the likelihood of the clover establishing anywhere within the Big Four Watershed in the future is low due to 1) the location of Hocking County in relation to other known sites of the clover in Ohio, and 2) the fact that the clover seems to prefer limestone underlain regions compared to the

sandstone/siltstone/shale bedrock layer that underlies the project area. However, this species appears to grow in a wide variety of edaphic conditions, making its presence in the project area not entirely impossible.

Animals

Potentially Affected Federally Threatened or Endangered Species

According to the U.S. Fish and Wildlife Service (2002), the Wayne NF comprises part of the range of five Federally Threatened or Endangered animal species (Table 1). To date, only the Indiana bat has been documented to reside on the Wayne NF. On-site field visits were made to the proposed project site to assess the potential for any rare species occurrences due to the availability of appropriate habitat. Only the species with suitable habitat present at the site or which could potentially be affected by the proposed action will be addressed further in this biological evaluation.

TABLE 3. FEDERALLY ENDANGERED AND THREATENED ANIMAL SPECIES FOR THE WAYNE NATIONAL FOREST.

Species	Common Name	Status	Required Habitat	Suitable Habitat present?
<i>Myotis sodalis</i>	Indiana bat	Endangered	Roosting: caves/mines in winter; trees with flaking bark, crevices or cavities in spring, summer, and fall. Foraging: forest canopies with open understories, forest edges, ponds	Yes
<i>Haliaeetus leucocephalus</i>	Bald eagle	Threatened	Nests usually in supercanopy trees within ½ mile of large bodies of water.	No
<i>Nicrophorus americanus</i>	American burying beetle	Endangered	Broad range, including grasslands, old field shrubland, and oak-hickory forests with open understories.	Yes
<i>Cyprogenia stegaria</i>	Fanshell	Endangered	Deep water in large rivers.	No
<i>Lampsilis abrupta</i>	Pink mucket pearly mussel	Endangered	Deep water in large rivers.	No

Indiana Bat (*Myotis sodalis*)

Direct and Indirect Effects

Alternative A

There should be no effects to any Indiana bat hibernacula in Alt. A. Trees will be removed from the proposed project site, which could directly affect Indiana bats by inadvertently killing roosting individuals. **Tree removal will only occur during the hibernating season of Indiana bats, according to the non-discretionary terms and conditions in the BO** (see *Mitigation* section below), so that there will be no direct effects to Indiana bats. Tree removal could also indirectly affect Indiana bats in the short-term through loss of roosting habitat. The USFWS in the programmatic Biological Opinion (BO) on the Land and Resource Management Plan (i.e., Forest Plan) for the Wayne NF, Ohio, recognizes a list of preferred species of trees often used by Indiana bats for roosting across their range (USFWS 2001). Of

these, hickory, ash, several oaks, and elm are located in the project area. Trees that exhibited characteristics potentially suitable for bat roosting (e.g., exfoliating bark or cavities) are scattered throughout the proposed project area. However, because there will be no permanent conversion of forested habitat to non-forested habitat, the loss of trees during this project represents only a short-term decrease in habitat, since trees will be allowed to regrow in all disturbed areas.

Suitable conditions for foraging by Indiana bats also likely exist throughout the project area. T-277 and other roads/trails in the area create forest edge, and there are several ponds over which to forage. The streams may act as flyways, but the low quality water likely does not represent a current source of aquatic insect prey or a good source of drinking water. No direct impacts to Indiana bats through loss or alteration foraging habitat should occur. However, there will likely be beneficial indirect effects to Indiana bat foraging habitat with the improvement of water quality in Big Four Hollow and in pond/wetland 43. This is because an improvement in water quality increases the chances that insects will reproduce in the streams and ponds, which would provide a more prevalent food supply (USFWS 2001).

Alternative B

There should be no effects to Indiana bat hibernacula in Alt. B. The main difference between the effects in Alt. B and Alt. A (discussed above) is the fact that fewer side channels will be treated individually with limestone; thus, approximately two fewer acres will be impacted by the use of small machinery and fewer trees will need to be removed. However, more impact will occur along the main channel adjacent to T-277 than in Alt. A, because that is where the limestone treatment of the majority of the water exiting Big Four Hollow will occur. Any perceived difference in the number of trees to be removed between the alternatives is minimized by the required mitigations (described below), especially point 4. The lack of limestone treatments in side channels means the water quality there will not be improved; hence, less potential improvement to Indiana bat foraging habitat would occur in the immediate area. However, downstream effects would be the same in Alts A and B. Furthermore, several culverts or low-water crossings will need to be constructed in Alt. B to reroute all side channels into one main channel, which could result in sedimentation issues. This could affect Indiana bat foraging opportunities downstream. However, the elimination of the main channel on the west side of T-277 and the removal of the channel from seep 56 from the adjacent roadway would probably make up for any increases in sedimentation problems resulting from the stream-crossings. Best management practices associated with stream-crossing construction (required by the Forest Plan) should also minimize potential sediment entering the waterway. Finally, the lower end of the channel from seep 305 will be rerouted away from pond 43, resulting in some tree removal. No direct action would be taken to convert pond 43 into a wetland and recovery from the present state of acid water-induced sterility would take longer, since treated water would not be flowing in from seep 305. This would affect the potential ability of the pond to become an improved source of prey for Indiana bats.

Alternative C

The no-action alternative to the watershed restoration means that acid water will continue to flow throughout Big Four Hollow and into Longstreth Marsh and Monday Creek. This should have no direct effects on Indiana bats, but indirectly, the bat may exist with a reduced prey base, resulting from poor water quality. However, Indiana bats do not rely entirely on aquatic insects for their food. Indiana bats may also need to fly longer distances than otherwise necessary to find sources of clean drinking water. No trees will be removed; thus, Indiana bat summer roosting habitat would not be altered in the short term.

Cumulative Effects

Alternative A

The Monday Creek Watershed, one of the main watersheds in the Athens Unit draining into the Hocking River was cleared of its forests numerous times in the past for agriculture, timber harvest, and mineral extraction. Much of the forest has had a chance to regrow, especially on land now under FS ownership. However, the watershed continues to suffer from residual impacts, especially those caused by past mining

activities, such as acid mine drainage, which affects water quality throughout. Recently a new road (i.e., driveway) and house-site have been constructed in Big Four Hollow on the adjacent private property through which the channel from seep 44 flows. Approximately 1 acre of formerly suitable Indiana bat habitat has been permanently converted to a non-forested, non-suitable state.

Presently, a variety of watershed restoration projects aimed at improving water quality in the Monday Creek Watershed on the Wayne NF are occurring or are scheduled to occur on the Athens Unit in the vicinity of this proposed project. Those projects include similar actions as are proposed herein, but may also include other measures, such as closing of water-collecting subsidences, contouring and capping coal waste sites (i.e., gob piles), and other acid mine drainage remediation activities. Some of these actions may have some effect on potential Indiana bat hibernation sites, but mitigation included in all alternatives minimizes these effects. Most of these projects include the removal of some vegetation, ground disturbance, and similar actions to achieve objectives; however, very few if any are permanently converting forested habitat to non-forested habitat. Thus, long-term loss of Indiana bat habitat is not occurring. Additionally, these projects benefit the Indiana bat in the long term. This will occur by improving the quality of the water flowing through the watershed, thereby improving the overall health and potential diversity of the plants and animals that live there. The proposed project described herein will represent a short-term impact on about 10 acres of Indiana bat habitat since any trees removed will be left to regrow, and the restoration work will ultimately improve the available roosting and foraging habitat for Indiana bats in Big Four Hollow and connected downstream habitats. Because of required mitigation measures in all of the watershed projects (see *Mitigation* section below), which call for avoidance of potential roost trees and ensure a long-term supply of new roost trees, there will be minimal to no negative cumulative effects caused by them on Indiana bat roosting habitat, and there may be some positive effects, especially to foraging habitat.

Other activities being implemented under the Forest Plan that are occurring in the Monday Creek Watershed now or in the foreseeable future include an addition to the Monday Creek off-road vehicle trail, in which only 2 miles of new trail will be created while another 4 miles of lease roads will be reconstructed for trail use. Special use permits are considered on an on-going basis but with no regularity across the Athens Unit. Based on information provided in the Programmatic Biological Assessment (USFS 2001), the USFWS (2001) states that the amount of suitable Indiana bat habitat found on the Wayne NF, which is 95% forested, will remain relatively stable over the next five years, and only a small fraction (~5%) of the Wayne NF's forested acres will be altered by the continued implementation of the Forest Plan. Thus, cumulative impacts from projects implemented under the Forest Plan on the Wayne NF are nominal. No critical habitat has been designated for the Indiana bat on the Wayne NF; therefore, none will be affected.

Development outside the scope of the Forest Plan affecting the Wayne NF may contribute to the loss of Indiana bat habitat in the future. Ohio Department of Transportation (ODOT) is considering two potential routes for a new Nelsonville by-pass, and one route (purple), if chosen, would pass north of Nelsonville through Snake Hollow and Dorr Run, which is 2 to 3 miles south of Big Four Hollow. In my rough estimation, this route would permanently convert approximately 170 acres of FS land to highway, interchanges, and associated rights-of-way. Known summer and potential winter habitat (i.e., trees and mines, respectively) of the Indiana bat will be affected.

Development on non-FS land in the Monday Creek Watershed in the future may potentially include timber harvest projects, oil and gas extraction, residential development, business development around by-pass interchanges, and other similar actions. Depending on the timing of any of these activities, they could lead to the direct mortality of Indiana bats, if they include tree removal. Additionally, these activities could affect potential Indiana bat roosting and foraging habitat.

Alternative B

Cumulative impacts to Indiana bat summer habitat associated with Alt. B are the same as those described

under Alt. A, with the exception of the potential acreage affected by the proposed project, which becomes 8 acres instead of 10.

Alternative C

Cumulatively, the effects of acid mine drainage (AMD) on the Athens Unit have caused the Monday Creek to be ranked the third most AMD-polluted stream in the State of Ohio (MCRP 2003). Under Alt. C, the overall effectiveness of other watershed restorations projects on-going in the Monday Creek watershed will be reduced, since Big Four Hollow will continue to be a significant source of AMD in Monday Creek. AMD-pollution affects riparian vegetation and aquatic life. Indiana bats are known to use riparian habitats across their range, which will continue to be impacted along Monday Creek and beyond, as AMD moves through the system. Currently, we know Indiana bats are seasonally living in areas surrounding Big Four Hollow and, by assumption, also in Big Four Hollow; thus, the habitat as it exists now is suitable to Indiana bats (to what extent we do not know, i.e., is it marginal or excellent habitat?). However, long-term effects of poor water quality on overall forest health as it relates to Indiana bats are unknown, and may potentially result, at some future date, in the loss or degradation of suitable summer habitat. In addition, identified problems with stream-blockage, erosion, and sedimentation in Big Four Hollow and downstream will not be addressed or improved in Alt. C.

Mitigations

Alternative A and B

To be exempt from the prohibitions of section 9 of the Endangered Species Act, the Wayne NF must comply with terms and conditions for any endangered species that may be affected by Alts. A or B of the proposed project. These are outlined by the USFWS in the BO (USFWS 2001). Due to the potential loss of suitable Indiana bat habitat in the proposed project area, this evaluation is tiered back to Terms and Conditions 4, 5, and 6 for that species in the programmatic BO. The USFWS believes that the reasonable and prudent measures will significantly reduce the impacts of incidental take of Indiana bats on the Wayne NF.

1. **Term and Condition 4 states that a component of large, over-mature trees should be maintained in the stand in which the project is proposed to occur** (USFWS 2001). At least three live trees > 20" dbh of the preferred species listed in the BO should be preserved per acre. In addition, six live trees > 11" dbh of the preferred species must also be maintained. If there are no trees > 20" dbh to leave standing, 16 live trees per acre must be left, and these must include the largest specimens of the preferred species remaining in the stand (USFWS 2001). The size of the proposed project is approximately 8 - 10 acres (Alt. B or A, respectively). The remaining undisturbed forest surrounding the proposed project area easily meets these criteria.
2. **Term and Condition 5 allows the harvesting of shagbark and shellbark hickory on the forest during the Indiana bat hibernating season (after September 15 and before April 15).** Additionally, however, the Wayne NF is required to retain a minimum of 12 live trees per acre over 6" dbh, of any species, with large areas of loose bark, unless they are a safety hazard. The size of the proposed project is approximately 8 - 10 acres (Alt. B or A, respectively). The remaining undisturbed forest surrounding the proposed project area easily meets this criterion.
3. **Term and Condition 6 ensures that the exemption of incidental take is appropriately documented.** This BE provides project specific information and identifies the species that may be affected. The Indiana bat may be affected through loss or alteration of roosting/foraging habitat. However, because of the removal of only a small proportion of trees in an otherwise forested landscape, anticipated effects of the proposed project to Indiana bats are consistent with those described in the BO. Additionally, the benefits to the species through improved water quality are likely to outweigh the cost of the (non-permanent) loss of a relatively small portion of available habitat on the Wayne NF. Provided with this BE is a cumulative total of incidental take

associated with the Indiana bat (characterized by habitat manipulation acreage) that has occurred thus far under the tier I BO, as required in Term and Condition 6 (see enclosed table).

4. Additionally, in a previous watershed restoration project (Snake Hollow), the USFWS recommended the following mitigation measure: all potential roost trees in the specific areas of proposed work in the project area where tree removal will be necessary will be identified and marked by a biologist after the specifics of the project have been planned but before any work is started. These specific trees will be avoided during the project work to the maximum extent practicable. Potential roost trees include dead or dying trees, shagbark and shellbark hickories, and live trees of any species, that are > 6" dbh and possess characteristics making them suitable for bat roosting, including loose or exfoliating bark, cavities, crevices or splits, hollow boles, or broken tops.
5. Due to the proximity of the proposed work to known swarming areas, tree removal should not begin before the second half of October.
6. The beaver pond/wetland at the bottom of the channel draining seep 56 should be maintained. It possesses many snags suitable as Indiana bat roost trees, and likely acts as a source of insect prey for Indiana bats. Many animals depend on riparian or wetland habitat for at least part of their life cycle. On the Wayne National Forest, this would include most frogs, toads, salamanders, turtles, and many insects. Others include the northern watersnake, muskrat, mink, and birds such as the great blue heron, wood duck, and belted kingfisher. Wetlands also help to improve water quality by slowing surface runoff and retaining nutrients, processing organic waste, and precipitating sediment before it reaches open water. This pond/wetland would become more suitable if the water entering it from above has been treated with limestone.

American Burying Beetle (*Nicrophorus americanus*)

Direct and Indirect Effects

Alternatives A and B

Ground-disturbing work is required for Alts. A and B of the restoration project. Direct mortality of ABBs could occur during construction in any season, but during winter, the inactive beetles burrow into the soil would not have the ability to avoid direct disturbance. However, based on unsuccessful surveys to find ABBs in the vicinity, and the fact that Big Four Hollow is outside of the 10-mile radius of the reintroduction sites, no direct effects to ABBs are anticipated for either alternative. No adverse indirect effects are anticipated either, because the proposed watershed restoration activities do not represent a permanent conversion of potentially suitable ABB habitat to unsuitable habitat, and the scale of the proposed project (8 - 10 acres) is relatively small in comparison to the unaffected habitat on the Wayne NF. Furthermore, the improvement of water quality paired with the efforts to unblock natural channels, so that water will be properly drained from soils, could have beneficial indirect effects to ABBs by improving the habitat for future ABB settlement.

Cumulative Effects

Alternatives A and B

Cumulatively, the effect of combined restoration projects occurring throughout the Monday Creek Watershed (see *Indiana bat Alt. A Cumulative Effects*) could result in an increase in the amount of suitable ABB habitat available.

Direct, Indirect, and Cumulative Effects

Alternative C

The no-action alternative to undertaking watershed restoration activities in Big Four Hollow will have no direct effects on the ABB. However, indirectly, leaving the watershed in the current condition could

preclude the beetle from ever resettling the area because of the presence of acid mine drainage throughout the hollow. Blocked channels prevent water from draining naturally from the valley, and in some places, causes the water to spread out across the ground. Inundation of soils in otherwise well-drained areas could reduce available habitat by preventing ABBs from burying carcasses in the soil and successfully raising offspring. However, the no-action alternative does not alter the existing condition, and we do not know the actual status of the current suitability (or non-suitability) of the existing habitat for ABB, or if there would actually be a difference in the suitability after the proposed restoration were completed.

Regional Forester's Sensitive Species

Plants

Umbrella magnolia

Direct, Indirect and Cumulative Effects

Umbrella magnolia is not known to occur within the project area, nor were any individuals discovered during repeated field visits from March to July; therefore, the proposed project would have no direct impact on this species. Furthermore, most of the habitat disturbance would be restricted to the channel banks, except where channels are in need of complete reconstruction (i.e., near ponds 55 and 43), or where access from the road is needed. Most of the disturbance would also be temporary, except where gravel is added to access corridors for equipment stabilization. Since most of the disturbance would be restricted in time and space, the proposed construction would not likely prevent any future establishment of the magnolia in the project area. Furthermore, the amount of habitat lost permanently would be marginal to the overall viability of this species, especially considering the amount of habitat remaining in the entire watershed.

Mitigations

Planting perennial non-native species within a closed-canopy environment would likely alter the site's habitat type, and thus prevent the future establishment of native forest species, including the magnolia. Since most of the soil disturbance would occur on flat to moderately sloping terrain under closed canopy conditions, heavy seeding is not necessary for site remediation. Plant only annual grasses approved by the Forest botanist in areas requiring erosion control, and allow *in situ* revegetation in areas that do not.

Do not cut any umbrella magnolia.

Blue scorpion-weed (*Phacelia ranunculacea*)

Direct, Indirect and Cumulative Effects

Due to the timing of the field surveys, and the inconspicuous habit of this low-lying herb, the presence/absence of blue scorpionweed within the project area could not be determined with accuracy. However, the current range of this species in the state of Ohio makes its presence in Hocking County unlikely, but not impossible. Regardless, construction activities would be completed during the dry months between July and early November, which is the dormant period for this winter annual. Since most of the disturbance in the project area would be temporary in both time and space, most of the impacted areas should be suitably restored by the following

growing season and available for (re-)establishment of this species. Furthermore, the amount of habitat that would be lost permanently along graveled access routes would be marginal, and unlikely to impact the long-term viability of this species, especially considering the amount of habitat remaining in the entire watershed.

Mitigations

Planting perennial non-native species within a closed-canopy environment would likely alter the site's habitat type, and thus prevent the future establishment of native forest species, including the scorpionweed. Since most of the soil disturbance would occur on flat to moderately sloping terrain under closed canopy conditions, heavy seeding is not necessary for site remediation. Plant only annual grasses approved by the Forest botanist in areas requiring erosion control, and allow *in situ* revegetation in areas that do not.

Butternut (*Juglans cinerea*)

Direct, Indirect and Cumulative Effects

Butternut is not known to occur within the project area, nor were any individuals discovered during repeated field visits from March to July; therefore, the proposed project would have no direct effect on this species. Furthermore, most of the habitat disturbance would be restricted to the channel banks, except where channels are in need of complete reconstruction (i.e., near ponds 55 and 43), or where access from the road is needed. Most of this disturbance would be temporary, except where gravel is added to access corridors for equipment stabilization. Since most of the disturbance would be restricted in time and space, the proposed construction would not likely prevent any future establishment of butternut in the project area. Furthermore, the amount of habitat lost permanently would be marginal to the overall viability of this species, especially considering the amount of habitat remaining in the entire watershed.

Mitigations

Planting perennial non-native species within a closed-canopy environment would likely alter the site's habitat type, and thus prevent the future establishment of native forest species, including the butternut. Since most of the soil disturbance would occur on flat to moderately sloping terrain under closed canopy conditions, heavy seeding is not necessary for site remediation. Plant only annual grasses approved by the Forest botanist in areas requiring erosion control, and allow *in situ* revegetation in areas that do not.

Do not cut any butternuts.

Rock skullcap (*Scutellaria saxatilis*)

Direct, Indirect and Cumulative Effects

No skullcap individuals were found during three mid-summer field surveys; therefore, the proposed project would have no direct impact on this species. Furthermore, most of the habitat disturbance would be restricted to channel banks, except where channels are in need of complete reconstruction (i.e., near ponds 55 and 43), or where access from the road is needed. Most of this disturbance would be temporary, except where gravel is added to access corridors for equipment stabilization. Since most of the disturbance would be restricted in time and space, the proposed construction would not likely prevent any future establishment of the skullcap in the project area. Furthermore, the amount of habitat lost permanently would be marginal to the overall viability of this species, especially considering the amount of habitat remaining in the entire watershed.

Mitigations

Planting perennial non-native species within a closed-canopy environment would likely alter the site's habitat type, and thus prevent the future establishment of native forest species, including the skullcap. Since most of the soil disturbance would occur on flat to moderately sloping terrain under closed canopy conditions, heavy seeding is not necessary for site remediation. Plant only annual grasses approved by the Forest botanist in areas requiring erosion control, and allow *in situ* revegetation in areas that do not.

In accordance with Wayne National Forest Standards and Guidelines (4-47), prohibit soil disturbance within a 50 ft. radius of rock shelters and within 50 feet of the base and 50 feet of the top of naturally occurring rock faces or outcrops. Furthermore, avoid direct contact with these structures. Such measures should prevent the destruction of suitable habitat for the skullcap.

Pigeon grape (*Vitis cinerea*)

Direct, Indirect and Cumulative Effects

Due to the similarity in plant characteristics of young grapes, and the arboreal growth habit of the mature flowering individual, it is very difficult to identify this grape species with accuracy (Burns 1982), thus its presence/absence within the project area could not be determined with certainty. Most of the known occurrences of this species within the state are in the southcentral most counties, well removed from the project area; however, Burns (1982) suggests that it may be more common than records indicate, and should be looked for in appropriate habitat throughout southern Ohio. Since this species prefers the openness of streambanks and thickets in alluvial woods, it has a reasonable likelihood of occurring in Big Four Hollow, and potentially in the project area. Pigeon grape is considered imperiled in Ohio, thus the loss of a few individuals could compromise its local viability. On the other hand, opening the streambanks by removing selected small trees and shrubs may also improve habitat for the grape in the project area, if it were not first directly harmed by construction activities.

Mitigations

Avoid cutting trees that host grape vines in their canopy.

Other Plant Species of Interest

Netted chain-fern (*Woodwardia areolata*)

A population of approximately 250 individuals of netted chain-fern were found in the seep 44a and b treatment area where the old roadbed emerges into the forest on the southern side of the drainage near where the channel diverges. Netted chain-fern is a state potentially threatened species that grows in acidic substrates in shaded to semi-shaded wet woods. The only other population of this species known within the Athens RD proclamation boundary is on private land, and thus beyond jurisdictional protection. Therefore, loss of the Big Four population may jeopardize local viability of this species.

Mitigation

Do not disturb the population of chain-fern, which has been circumscribed with pink stake flags. Disturbance includes the removal of trees around the population that provide shade and temperature control to this mesic-loving species.

Animals

There are 18 animal species on the Wayne NF's Regional Forester Sensitive Species (RFSS) list. Table 2 displays the species, summarizes their general habitat requirements, and the potential for suitable habitat for each in the proposed project area. The Athens District Threatened and Endangered and Sensitive Species records were reviewed to identify any known occurrences of these species. On-site field visits were made to the proposed project site to assess the potential for any rare species occurrences due to the availability of appropriate habitat.

Species	Required Habitat	Suitable Habitat Present?
Black bear <i>Ursus americanus</i>	Winter den: dense thickets, hollow logs, tree or rock cavities, and caves; Spring, summer, fall: broad range.	Yes
River otter <i>Lutra canadensis</i>	High-quality streams, rivers, ponds, marshes, and wetlands.	No*
Bobcat <i>Lynx rufus</i>	Den: caves/mines, rocky outcrops, hollow trees and logs; Spring, summer, fall: broad range.	Yes
Evening bat <i>Nycticeius humeralis</i>	Roosting: in attics, tree cavities, and under loose bark on trees; Foraging: edges or within clearings of mature woods.	Yes
Cerulean warbler <i>Dendroica cerulea</i>	Large tracts of mature deciduous woods.	Yes
Henslow's sparrow <i>Ammodramus henslowii</i>	Various grasslands and early successional communities.	No
Timber rattlesnake <i>Crotalus horridus</i>	Den: rock outcrops; Summer: mixed deciduous or coniferous forests with closed canopy, heavy leaf litter and little herbaceous cover, and a few rocks or fallen trees.	Yes
Eastern hellbender <i>Cryptobranchus alleganiensis</i>	Large slabs of rock or other shelter-providing objects (logs and boards) on the bottom of streams or rivers.	No
Ohio lamprey <i>Ichthyomyzon bdellium</i>	General: Ohio River or the lower courses of its larger tributaries; Spawning: large extensive riffles common in the middle reaches of large Ohio River tributaries.	No
Western lake chubsucker <i>Erimyzon sucetta</i>	High-quality pothole lakes and glaciated streams with submerged vegetation and sand or fine gravel bottoms.	No
Eastern sand darter <i>Ammocrypta pellucida</i>	Sandy areas of moderate- to larger-sized streams.	No
Salamander mussel <i>Simpsonaias ambigua</i>	Medium to large rivers on mud or gravel bars and under flat slabs or stones.	No
Round hickorynut <i>Obovaria subrotunda</i>	Medium-sized streams in sand and gravel in areas with moderate flow.	No
Lilliput <i>Toxolasma parvus</i>	Ponds, lakes, and creeks to large rivers in mud, sand, or fine gravel.	No
Little spectaclecase mussel <i>Villosa lienosa</i>	Small- to medium-sized streams in sand or gravel.	No
Wabash river cruiser <i>Macromia wabashensis</i>	Large, still waterbodies or streams with patches of water willows (<i>Justicia americana</i>).	No
Southern grizzled skipper <i>Pyrgus wyandot</i>	Disturbed openings in mature oak forests, including open hillsides, disturbed ridgetops, powerline cuts, and roadsides.	No
Olympia marble	Dry ridgetops in and adjacent to open oak forests.	No

Euchloe olympia

*Currently the habitat is not suitable, but it may be in the future, if water quality is improved.

Only the species with suitable habitat present at the site or which could potentially be affected by the proposed action will be addressed further in this biological evaluation. Those species with similar habitat requirements will be addressed together in the effects analysis.

Black Bear and Bobcat

Direct, Indirect, and Cumulative Effects

Alternatives A and B

Black bear and bobcat require large tracts of land for foraging and denning/breeding habitat. A short-term direct effect on bear and bobcat could be caused by the noise and human activity in the forest during restoration activities, causing the animals to avoid the area. Under Alts. A and B, the proposed project represents a relatively small-scale disturbance (8-10 acres) in an otherwise mostly-forested landscape. The proposed project includes the removal of some vegetation, ground disturbance, and similar actions to achieve objectives; however, no action is permanently converting forested habitat to non-forested habitat, as all disturbed areas will be allowed to revegetate naturally. Additionally, this project benefits black bear and bobcat in the long term by improving the quality of the water flowing through the watershed. Over time, this will result in the improvement of the overall health and diversity of the plants and animals that live there. Prey species upon which bear and bobcat may depend should also benefit from improved water quality in the system. Potential den sites located in abandoned mines will not be affected by the restoration activities.

A variety of land use activities are occurring or are planned on both private and public land in the vicinity of the Big Four Hollow project (see *Indiana bats Alt. A Cumulative Effects*). Cumulatively, the noise and human activity from all of these land uses may impede free travel in the short term to black bear and bobcat and reduce the available areas for foraging and possibly denning. Some of the activities represent a permanent conversion of habitat to other, non-forest uses (e.g., house site and by-pass construction), while most of the projects are only a short-term alteration of forested habitat (e.g., watershed restoration projects). Some of the watershed restoration projects propose permanently closing abandon mine openings, which could potentially be used by bear or bobcat as den sites, but all such locations are inspected for any evidence of previous use by these species, and no sign has been found. The timing of such closures will preclude any direct effects to the species.

River Otter

Direct, Indirect, and Cumulative Effects

Alternatives A and B

Alts A and B of the proposed watershed restoration project are aimed at the improvement of water quality in Big Four Hollow and downstream in Monday Creek. Since river otter are not currently present in either area, the proposed project can not negatively impact the species. However, the proposed project (and others currently underway or proposed in surrounding areas in the Monday Creek Watershed) could potentially improve the habitat to the point that otter could migrate in from other areas in the future, thereby expanding the current range of this species in Ohio.

Evening Bat

Direct, Indirect, and Cumulative Effects

Alternatives A and B

Some trees will be lost in both Alts. A and B, but there will be no permanent conversion of forested habitat to non-forested habitat in the project area. Additionally, the required mitigations for the Indiana

bat minimize the removal of suitable roosting trees for evening bats (see *Indiana bat Mitigation* section). The limited alterations of between 8 and 10 acres in the project area should have little to no effect on evening bat foraging habitat, except to potentially create small clearings in the woods, in which evening bats have been found to forage.

Cerulean Warbler

Direct, Indirect, and Cumulative Effects

Alternatives A and B

Some trees will be removed in both Alts. A and B, but there will be no forest fragmentation and no permanent conversion of forested habitat to non-forested habitat as a result of this project. The loss of large trees may represent a loss of nesting habitat for cerulean warblers; however, required mitigation for Indiana bats (Terms and Conditions 4 and 5) will help prevent the loss of the larger tree component in the project area. Some opening of the canopy will likely result from tree removal, but several national forests and experts from various states reported use of openings or disturbance canopy gaps by cerulean warblers (USFSA 2002). Individuals could be directly affected by tree removal if the activity is undertaken during the nesting season. Noise and disturbance could indirectly affect birds during the nesting period as well. Both Alts. A and B of the proposed watershed restoration project are aimed at the improvement of water quality in Big Four Hollow and downstream in Monday Creek. The indirect effect of improved water quality is improved riparian habitat and overall ecosystem health.

A variety of land-use activities are occurring or are planned on both private and public land in the vicinity of the Big Four Hollow project (see *Indiana bats Alt. A Cumulative Effects*). Some of the activities represent a permanent conversion of habitat to other, non-forest uses (e.g., house site and by-pass construction), while most of the projects are only a short-term alteration of forested habitat (e.g., watershed restoration projects). Much of the private land within the forest boundaries is forested and subject to private harvest, especially as demand increases and cutting becomes restricted on the national forest (USFSA 2002). Thus, there could be a reduction of mature forest on surrounding private lands. In contrast, on the Wayne NF, which is 95% forested, forest cover will remain relatively stable over the next five years, and only a small fraction (~5%) of the Wayne NF's forested acres will be altered by the continued implementation of the Forest Plan (USFS 2001). Thus, cumulative impacts to forested habitat from projects implemented under the Forest Plan on the Wayne NF are nominal (USFWS 2001).

Timber Rattlesnake

Direct, Indirect, and Cumulative Effects

Alternatives A and B

No direct effects to timber rattlesnakes are anticipated from the proposed project activities under Alts. A and B. During the summer months, rattlesnakes are mobile animals and are able to move away from disturbance. No den sites (i.e., rocky outcrops or mine openings) should be disturbed in the proposed restoration work. No adverse indirect effects are anticipated either, because the proposed watershed restoration activities do not represent a permanent conversion of potentially suitable rattlesnake habitat to unsuitable habitat, and the scale of the proposed project (8 - 10 acres) is relatively small in comparison to the unaffected habitat on the Wayne NF. Furthermore, the improvement of water quality paired with the efforts to unblock natural channels, so that water will be properly drained from soils, could have beneficial indirect effects to rattlesnakes by drying out potentially suitable habitat. No adverse effects could be identified in Alts. A or B; thus, no cumulative effects are anticipated.

Black Bear, Bobcat, River Otter, Evening Bat, Cerulean Warbler, and Timber Rattlesnake

Direct, Indirect, and Cumulative Effects

Alternative C

The no-action alternative to undertaking watershed restoration activities in Big Four Hollow will have no direct effects on the black bear, river otter, bobcat, evening bat, cerulean warbler, or timber rattlesnake. However, the existing poor water quality in Big Four and Monday Creek prohibit river otter from utilizing the habitat. Additionally, overall ecosystem health will remain compromised, and it is not known how poor water quality affects species at risk, their habitat, or their ability to reproduce successfully over the long term. However, because most of the RFS species listed above are known to currently live in and around Monday Creek Watershed in its current condition, it can be inferred that the poor water quality is not the only limiting factor in their survival on the Wayne NF. No adverse effects could be identified for bear, bobcat, evening bats, cerulean warblers, or timber rattlesnakes; thus, no cumulative effects are anticipated. For river otter, Alt. C will preclude the return of this species to this portion of the Monday Creek Watershed in the foreseeable future.

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Pam Stachler – Forest Hydrologist

B.S. Geology, The Ohio University, 1994

M.S. Hydrogeology, The Ohio University, 1997

References

- Apfelbaum, S. no date. Cattail (*Typha* spp.) Management. Applied Ecological Services, Brodhead, Wisconsin. Available: www.appliedeco.com/Projects/CattailManage.pdf
- Burns, J. 1982. Species Abstract for *Vitis cinerea* Engelm. (Pigeon grape). Ohio Endangered and Threatened Vascular Plants. Abstracts of State-listed Taxa. Ohio Department of Natural Resources, Division of Natural Areas and Preserves. Available: <http://www.dnr.state.oh.us/dnap/Abstracts/U-V/viticine.htm>
- Hix, D.M., J.R. McClenahan, and J.N. Pearcy. 1997. Development of an Ecological Classification System for the Wayne National Forest: Final Technical Report. Ohio State University, School of Natural Resources. 30 September 1997. 131 pp.
- (ODNAP) Ohio Division of Natural Areas and Preserves. 2000. Natural Heritage Database for Wayne National Forest 12 County Area. Comma delimited ASCII file converted for view in ArcView® GIS. Housed at the Athens Ranger District office, WNF, Nelsonville, Ohio.
- (SCS) Soil Conservation Service. 1989. Soil Survey of Hocking County, Ohio. United States Department of Agriculture.
- (MCRP) Monday Creek Restoration Project. 2003. Reclamation and Remediation. Website accessed: 2/13/03. http://www.mondaycreek.org/projects_reclaim.html
- (USFWS) U. S. Fish and Wildlife Service. 2002. Federally Endangered, Threatened, Proposed and Candidate Species in Ohio. Reynoldsburg, Ohio.
- (USFS) U. S. Department of Agriculture, Forest Service. 2001. Wayne National Forest Programmatic Biological Assessment- Land and Resource Management Plan.
- (USFS) U. S. Forest Service. 2000. Region 9 Regional Forester Sensitive Plant List. Available: <http://www.fs.fed.us/r9/wildlife/tes/docs/plants.pdf>
- (USFS) U.S. Department of Agriculture, Forest Service. 1986. Land and Resource Management Plan, Draft Environmental Impact Statement, Wayne National Forest. 294 p.
- (USFS) U.S. Department of Agriculture, Forest Service. 1987. Land and Resource Management Plan, Final Environmental Impact Statement, Wayne National Forest. 177 p.
- (USFS) U.S. Department of Agriculture, Forest Service. 1988. Land and Resource Management Plan, Wayne National Forest. 30 p.

Public Comments from Initial Scoping

The ID team categorized each response received during the scoping process to identify specific comments, issues, and concerns. These comments were identified and sorted. Following each comment is a summary of how the comment was addressed in the analysis.

Approximately 150 groups, individuals, and neighbors were contacted regarding the proposed project. The following lists those who responded during the public scoping process. A complete listing of the individuals contacted can be found in the project file.

Name	Organization	Response #
Neil Hoce		1
Ora E Anderson		2
Marilyn Ort		3
Jorg Freiberg	The Portage Trail Group, Sierra Club	4

General Comments

Support for the project

Comment-Three respondents wrote letters expressing their support for the project (1, 2, and 3). The fourth (4) expressed support for the wetland conversion and stream restoration parts of the project.

Response-No response is needed.

Rare and Endangered Species

Comment-One respondent (3) expressed concern for rare and endangered plant and species.

Response-A biological evaluation will be prepared. The entire project area will be surveyed for rare and endangered species. Should any be located they will be protected.

Public Involvement

Comment-“We, your public, need to know just how big the problem is.”(2)

Response- Watershed health (“Protect and restore watershed health, including restoration of abandoned mine lands.”) is one of six Revision Topics that will be addressed during the Wayne Forest Plan revision. This process will provide the public with a description of the problems and allow for public deliberation on how these problems should be addressed. In the interim, the Watershed Restoration Group is working with a variety of partners including the Monday Creek, Sunday Creek, and Raccoon Creek restoration groups; federal agencies such as USGS, COE, EPA, NRCS; State agencies, ODNR and OEPA; local governments; and the private sector to define needs and set priorities.

Permanent solution needed

Comment-“(Funds) would be better appropriated to a permanent solution that stops the problem at the source.”(4)

Response- We believe that we would be negligent in performing our role as stewards of the public land if we do not act to correct these problems. The treatments that are being proposed are based on the best available technology. They will be designed to be effective for at least 15 to 20 years. It is possible that in the future new technologies that provide for a more permanent fix will be developed. This comment will be addressed in the No action Alternative.

Mitigation Measures

1. In accordance with Wayne National Forest Standards and Guidelines (4-47), prohibit soil disturbance within a 50 ft. radius of rock shelters and within 50 feet of the base and 50 feet of the top of naturally occurring rock faces or outcrops. Furthermore, avoid direct contact with these structures.
2. To maintain suitable habitat for the clover, avoid converting the old roadbed to a permanent, graveled access route. Instead, use the stream channel for access to the seeps, since the area would already be impacted by the proposed action.
3. Since most of the soil disturbance would occur on flat to moderately sloping terrain under closed canopy conditions, heavy seeding is not necessary for site remediation. Plant only annual grasses approved by the Forest botanist in areas requiring erosion control, and allow self-revegetation in areas that do not. Planting perennial non-native species within a closed-canopy environment would likely alter the site's habitat type, and thus prevent the future establishment of native forest species, including rare species.
4. Alternative A calls for conversion of pond 43 to a wetland, which would include planting cattails along the banks for bank stabilization and water filtration. Cattails, while native, are often aggressive invaders of freshwater wetlands. Excessive cattail growth can eliminate open water, habitat diversity, and species diversity of other aquatic plants (Apfelbaum no date; pers. comm. with R. Ewing). Instead of planting cattails, I would recommend allowing native species to colonize the area naturally via waterfowl and other aquatic fauna.
5. Do not cut any umbrella magnolia.
6. Do not cut any butternut.
7. Avoid cutting trees that host grape vines in their canopy.
8. Do not disturb the population of chain-fern, which has been circumscribed with pink stake flags. Disturbance includes the removal of trees around the population that provide shade and temperature control to this mesic-loving species.
9. In order to maintain a closed canopy ecosystem, and thus impede the spread of shade-intolerant non-natives, remove as few trees as possible during construction activities.
10. Limit the amount of soil disturbance by using the smallest equipment necessary for project completion.
11. **Term and Condition 4 states that a component of large, over-mature trees should be maintained in the stand in which the project is proposed to occur** (USFWS 2001). At least three live trees > 20" dbh of the preferred species listed in the BO should be preserved per acre. In addition, six live trees > 11" dbh of the preferred species must also be maintained. If there are no trees > 20" dbh to leave standing, 16 live trees per acre must be left, and these must include the largest specimens of the preferred species remaining in the stand (USFWS 2001). The size of the proposed project is approximately 8 - 10 acres (Alt. B or A, respectively). The remaining undisturbed forest surrounding the proposed project area easily meets these criteria.
12. **Term and Condition 5 allows the harvesting of shagbark and shellbark hickory on the forest during the Indiana bat hibernating season (after September 15 and before April 15).** Additionally, however, the Wayne NF is required to retain a minimum of 12 live trees per acre

over 6" dbh, of any species, with large areas of loose bark, unless they are a safety hazard. The size of the proposed project is approximately 8 - 10 acres (Alt. B or A, respectively). The remaining undisturbed forest surrounding the proposed project area easily meets this criterion.

13. **Term and Condition 6 ensures that the exemption of incidental take is appropriately documented.** This BE provides project specific information and identifies the species that may be affected. The Indiana bat may be affected through loss or alteration of roosting/foraging habitat. However, because of the removal of only a small proportion of trees in an otherwise forested landscape, anticipated effects of the proposed project to Indiana bats are consistent with those described in the BO. Additionally, the benefits to the species through improved water quality are likely to outweigh the cost of the (non-permanent) loss of a relatively small portion of available habitat on the Wayne NF. Provided with this BE is a cumulative total of incidental take associated with the Indiana bat (characterized by habitat manipulation acreage) that has occurred thus far under the tier I BO, as required in Term and Condition 6 (see enclosed table).
14. Additionally, in a previous watershed restoration project (Snake Hollow), the USFWS recommended the following mitigation measure: all potential roost trees in the specific areas of proposed work in the project area where tree removal will be necessary will be identified and marked by a biologist after the specifics of the project have been planned but before any work is started. These specific trees will be avoided during the project work to the maximum extent practicable. Potential roost trees include dead or dying trees, shagbark and shellbark hickories, and live trees of any species, that are > 6" dbh and possess characteristics making them suitable for bat roosting, including loose or exfoliating bark, cavities, crevices or splits, hollow boles, or broken tops.
15. Due to the proximity of the proposed work to known swarming areas, tree removal should not begin before the second half of October.
16. The beaver pond/wetland at the bottom of the channel draining seep 56 should be maintained. It possesses many snags suitable as Indiana bat roost trees, and likely acts as a source of insect prey for Indiana bats. Many animals depend on riparian or wetland habitat for at least part of their life cycle. On the Wayne National Forest, this would include most frogs, toads, salamanders, turtles, and many insects. Others include the northern watersnake, muskrat, mink, and birds such as the great blue heron, wood duck, and belted kingfisher. Wetlands also help to improve water quality by slowing surface runoff and retaining nutrients, processing organic waste, and precipitating sediment before it reaches open water. This pond/wetland would become more suitable if the water entering it from above has been treated with limestone.

Appendix C

Monitoring

The primary purpose of monitoring for this project will be to determine the effectiveness and duration of the treatments. The most efficient measure of this would be pH. Field measurements should be taken at two sites. The first at the point where the Big Four stream passes under County Road 24 and the second at the culvert where the stream enters Monday creek. Measurements should be taken, beginning approximately one month after the project is completed, quarterly for the first year and annually, during the low flow period, from then on. The Forest hydrologist will be responsible for taking and interpreting the measurements. The results of this monitoring will be reported in the Forest's annual monitoring report.