Wayne National Forest
Snake Hollow Watershed Restoration Project

ENVIRONMENTAL ASSESSMENT

Task Order No.: 43-56A1-1-0177

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United States Forest Service
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SUMMARY

The purpose of this Environmental Assessment (EA) is to identify and discuss any potential impacts to the human environment caused by United States Department of Agriculture (USDA), Forest Service (Forest Service or USFS) activities associated with implementation of the Snake Hollow Watershed Restoration Project (Project) on the Wayne National Forest (Wayne NF), Athens Ranger District, Hocking County, Ohio. Specifically, as outlined in the Forest Service's *Environmental Policy and Procedures Handbook* (Chapter 40 Section 41.2), the purpose of an EA is to: 1) briefly provide sufficient evidence and analysis for determining the need to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI); 2) aid in the Forest Service's compliance with NEPA when no EIS is necessary; and, 3) facilitate the preparation of the EIS when one is necessary (USFS 1992).

The Project area encompasses approximately 1,200 acres and consists of several perennial and intermittent streams that drain into Monday Creek. The Project area includes the entire Snake Hollow Watershed and a portion of the Monday Creek Watershed. The majority of the Project area has been significantly altered due to past mining activities. As a result, the topography of the Project area is characterized by features common to previously mined lands, which include irregular topography with abrupt elevation changes, altered drainage patterns, eroding coal refuse piles (i.e., gob piles), ponded areas (i.e., mine pits), areas of substantial subsidence, and subsurface mine openings. These alterations have caused acid mine drainage (AMD) into Project area tributaries and creeks. Acidity levels are elevated in surface and ground water, and soil erosion and sedimentation occur in the watershed due to the following conditions that are common throughout the Project area:

- surface water drainage is directly flowing into abandoned coal mine openings;
- subsidences collect and divert surface water into abandoned coal mines;
- stream channels blocked by strip mining spoil collect and divert surface water into subsidences, coal mine openings, and ponds (i.e., reduced positive drainage); and,
- erosion of coal refuse piles into drainages.

The Watershed Restoration Group for the Wayne NF proposes to perform remedial measures to restore water quality in the Snake Hollow Watershed. Implementation of these remedial measures is expected to reduce AMD, soil erosion, and sedimentation through implementation of erosion control measures, pond and stream channel restoration activities, subsidence closures, and mine portal closures. Under the No Action alternative, AMD is expected to continue to degrade the water quality within Snake Hollow and Monday Creek watersheds.

A Project scoping letter and site location map were distributed to a scoping mailing list of 123 individuals, agencies, and organizations on October 29, 2001. This letter invited comments on the proposed Project. Also, the Project was published in the quarterly list of NEPA projects for the Wayne NF. Comments received regarding alternative approaches or suggestions were considered as possible alternatives.

Alternatives considered for detailed analysis were composed of subsets of the proposed individual elements. These subsets were determined based upon benefits measured by the reduction of acid loading and associated environmental impacts. The proposed action (full

scale), Full Scale Without Steel Slag Treatment, Moderate Scale, and Minimum Scale alternatives included subsets of the following elements: staging area construction and use, borrow area construction and use, system road reconstruction and use, temporary road construction and use, waste coal pile stabilization and isolation, channel construction and reconstruction, pond drainage and maintenance, limestone treatment, steel slag treatment, subsidence closure, and mine portal closure. An additional alternative was considered as result of internal discussions regarding the feasibility of steel slag treatment.

The affected environment and the environmental consequences of the proposed action and each alternative, including the No Action alternative, were characterized and evaluated for geology, soils, water resources, vegetation, wetlands, fish and wildlife, endangered and threatened species, Regional Forester's Sensitive Species, Management Indicator Species, land use, recreation, visual/aesthetic resources, socioeconomics, cultural resources, air quality, and noise. Cumulative impacts of past, present, and reasonably foreseeable future actions also were evaluated.

With implementation of Forest-wide standards and guidelines, United States Department of the Interior, Fish and Wildlife Service's Forest Plan Biological Opinion Terms and Conditions, and Project-specific mitigation measures, implementation of the selected alternative would have no adverse effect or would not likely have significant adverse effects on geology, soils, water, vegetation, wetlands, fish and wildlife, endangered and threatened species, Regional Forester's Sensitive Species, Management Indicator Species, land use, recreation, visual/aesthetic resources, socioeconomics, cultural resources, and air and noise quality in the Project area. In addition, the Project is not expected to significantly contribute to the cumulative effects of past, present, and reasonably foreseeable future actions in the vicinity of the Project area.

This EA 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.

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LIST OF ACRONYMS AND ABBREVIATIONS

AMD	Acid Mine Drainage
ATC	ATC Associates, Inc.
BA	Biological Assessment
BE	Biological Evaluation
BO	Biological Opinion
CFR	Code of Federal Regulations
CEQ	Council on Environmental Quality
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
FONSI	Finding of No Significant Impact
Forest Plan	Wayne National Forest Land and Resource Management Plan
Forest Service	Unites States Department of Agriculture, Forest Service
FSM	Forest Service Manual
lb/d	pounds per day
MIS	Management Indicator Species
NEA	Northern Ecological Associates, Inc.
NFMA	National Forest Management Act
NMLRC	National Mine Land Reclamation Center
NEPA	National Environmental Policy Act
NF	National Forest
NWI	National Wetlands Inventory
Project	Snake Hollow Watershed Restoration Project
ODNR	Ohio Department of Natural Resources
ODW	Ohio Department of Natural Resources, Division of Wildlife
ORV	Off-Road Vehicle
RFFAs	Reasonably Foreseeable Future Actions
RFSS	Regional Forester's Sensitive Species
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFS	United States Department of Agriculture, Forest Service
USFWS	United States Department of the Interior, Fish and Wildlife Service

1.0 INTRODUCTION

1.1 PURPOSE OF THE EA

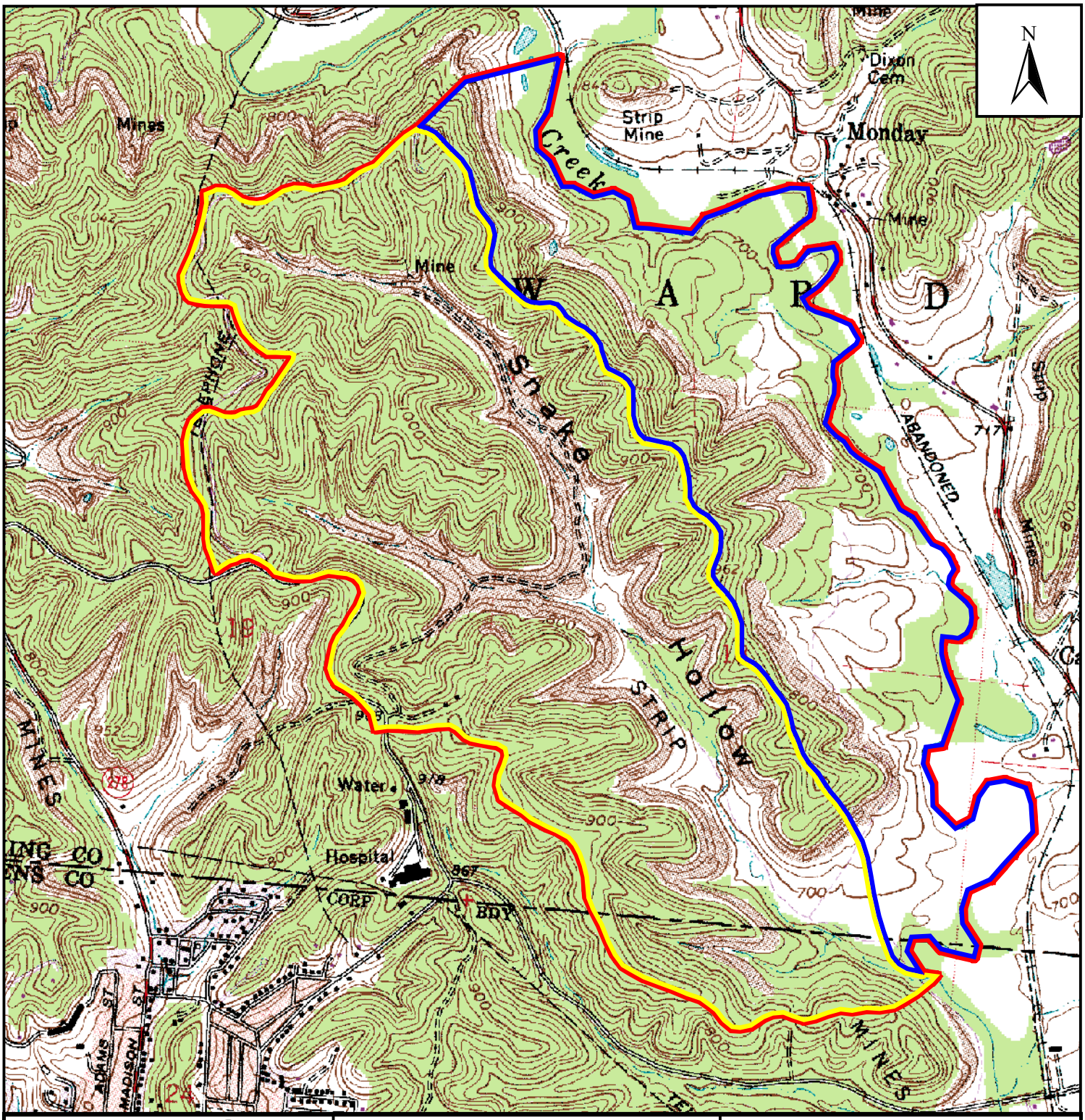
The purpose of this Environmental Assessment (EA) is to identify and discuss any potential impacts to the human environment caused by United States Department of Agriculture (USDA), Forest Service (Forest Service or USFS) activities associated with implementation of the Snake Hollow Watershed Restoration Project (Project) on the Wayne National Forest (Wayne NF), Athens Ranger District, Hocking County, Ohio. Specifically as outlined in Forest Service's *Environmental Policy and Procedures Handbook* (Chapter 40, Section 41.2), the purpose of an EA is to: 1) briefly provide sufficient evidence and analysis for determining the need to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI); 2) aid in the Forest Service's compliance with NEPA when no EIS is necessary; and, 3) facilitate the preparation of the EIS when one is necessary (USFS 1992).

This EA has been prepared following Forest Service and the President's Council on Environmental Quality (CEQ) regulations for implementing the National Environmental Policy Act (NEPA) of 1969, as amended, provision 40 Code of Federal Regulations (CFR) Part 1506.5 Sections A and B.

1.2 PROJECT AREA

The proclamation boundary for the Wayne NF encompasses 833,990 acres in 12 Ohio counties, of which 233,600 acres (as of June 2002) 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 13 and 19, Township 13N, and Range 15W 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 Wayne National Forest Land and Resource Management Plan (Forest Plan) (USFS 1988).

The Project area encompasses approximately 1,200 acres and consists of several perennial and intermittent streams that drain into Monday Creek. The Project area includes the entire Snake Hollow Watershed and a portion of the Monday Creek Watershed (Figure 1). The majority of the Project area has been significantly altered due to past mining activities. As a result, the topography of the Project area is characterized by features common to previously mined lands, which include irregular topography with abrupt elevation changes, altered drainage patterns, eroding coal refuse piles (i.e., gob piles), ponded areas (i.e., mine pits), areas of substantial subsidence, and subsurface mine openings.



Source: USGS 7.5' Series Topographic Quadrangle, Nelsonville, OH 1961 Revised 1995

Figure 1. Location of the Snake Hollow Watershed Restoration Project Area.

Client: U.S. Forest Service

Prepared By: NEA Northern Ecological Associates, Inc.

Date: 07/31/02

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1.3 PROPOSED ACTION

The Watershed Restoration Group for the Wayne NF proposes to correct numerous water quality problems in the Snake Hollow watershed. The problems include acid mine drainage produced in abandoned coal mines, subsidences that are allowing surface water to enter abandoned coal mines, stream channels blocked by strip mining, piles of waste coal left from earlier mining, and erosion triggered by mining activities and un-maintained, user-developed trails. This proposed action would require general road maintenance and reconstruction of Ward Township Road 387, Forest Road 835, and a non-forest road that would be used to access sites in the Monday Creek Watershed portion of the Project area. A temporary road would be built to access sites in the western branch of Snake Hollow Watershed. An estimated 37 acres of Forest Service land area would be impacted as a result of the proposed action. All construction work would be done in a way that will minimize disturbance to the surrounding vegetation.

1.4 PURPOSE AND NEED FOR ACTION

One of the goals of the Forest Plan is to conduct soil and water resource improvement activities on lands with declining watershed conditions. Several water quality and soil erosion problems have been identified within the Snake Hollow Watershed. The water quality and soil erosion problems are primarily associated with the alteration of normal drainage patterns caused by historic mining activities. These alterations have caused acid mine drainage (AMD) into Project area tributaries and creeks (ATC Associates, Inc. [ATC] 2000). AMD is characterized by large amounts of dilute sulfuric acid, iron, and aluminum. Acidity levels are elevated in surface and ground water, and soil erosion and sedimentation occur in the watershed due to the following conditions that are common throughout the Project area:

- surface water drainage is directly flowing into abandoned coal mine openings;
- subsidences collect and divert surface water into abandoned coal mines;
- stream channels blocked by strip mining spoil collect and divert surface water into subsidences, coal mine openings, and ponds (i.e., reduced positive drainage); and,
- erosion of coal refuse piles into drainages.

These conditions are site specific and have been surveyed, inventoried, and prioritized throughout the Project area (ATC 2000). The Watershed Restoration Group for the Wayne NF proposes to perform remedial measures to restore water quality in the Snake Hollow Watershed. Implementation of these remedial measures is expected to reduce AMD, soil erosion, and sedimentation through implementation of erosion control measures, pond and stream channel restoration activities, subsidence closures, and mine portal closures. Under the No Action alternative, AMD is expected to continue to contribute to the degradation of the water quality within Snake Hollow and Monday Creek watersheds. This Project responds to the Forest Plan direction to protect and enhance water quality.

1.5 DECISIONS TO BE MADE

The Watershed Group Leader is the officer authorized to make decisions regarding the implementation of the proposed action. The decision maker will make the following decisions based on the interdisciplinary analysis presented in this EA.

- Should the proposed action be implemented?
- Should the proposed action be implemented in a modified manner?
- Should an alternative to the proposed action be implemented?
- Should further evaluation (e.g., an EIS) of the proposed action be implemented?
- Will a decision to implement the proposed action require an amendment to the Wayne National Forest Land and Resource Management Plan?

If, on the basis of this EA, significant environmental impacts appear likely, the Forest Service would decide to proceed with further analysis documented in an EIS. If such impacts do not appear likely, the Forest Service would issue a FONSI and Decision Notice regarding the selected action. A FONSI would clear the way for the restoration of the Snake Hollow Watershed.

1.6 PUBLIC AND AGENCY INVOLVEMENT AND SCOPING

NEPA specifies early agency and public involvement to identify issues related to the proposed Project and to develop alternatives. A Project scoping letter and site location map were distributed to a scoping mailing list of 123 individuals, agencies, and organizations on October 29, 2001. This letter invited comments on the proposed Project. Also, the Project was published in the quarterly list of NEPA projects for the Wayne NF. The Wayne NF received four responses to this scoping effort. Three responses were supportive of the proposed Project and one suggested that the Forest Service evaluate the use of salt water and charcoal filters to purify AMD waters. Coordination with local, state, and Federal agencies occurred throughout the entire Project development process.

1.7 COMPLIANCE WITH FEDERAL LAWS AND REGULATIONS

1.7.1 Applicable Federal Acts

Clean Water Act

The Wayne NF must ensure that projects it authorizes, funds, or carries out comply with the Clean Water Act (CWA). The CWA is the principle law governing pollution control and water quality of waters of the United States. Section 401 of the CWA requires certification from the State of Ohio that any proposed water resources project complies with established effluent limitations and water quality standards. Section 402 of the CWA establishes conditions and permitting for discharges of pollutants under the National Pollution Discharge Elimination System. Section 404 of the CWA authorizes a separate permit program for the disposal of dredged or fill material in waters of the United States. Measures that would be implemented in

the spirit of the CWA compliance are addressed in Section 4.2 (erosion and sedimentation control), Section 4.3 (water resource and quality improvement), and Section 4.5 (wetland avoidance and protection).

Migratory Bird Treaty Act

The impact on migratory birds was considered during the evaluation of habitat and impact to those migratory birds on the Wayne NF Management Indicator Species (MIS) list. Birds that inhabit the forest canopy (e.g., cerulean warbler), should not be affected because implementation of any of the four action alternatives would result in only minor fragmentation of the canopy (see Section 4.9). Other migratory birds on the MIS list (e.g., white-eyed vireo, pine warbler, eastern bluebird, Virginia rail) are not located in the types of habitats found in the Project area.

Endangered Species Act

Compliance with the Endangered Species Act (ESA) means that the selected alternative would not jeopardize or adversely modify critical habitat of Federally-listed species, would insure the proposed activities do not contribute to loss of viability or trend toward listing wildlife species under the ESA, and would provide a process where the above-mentioned species receive full consideration in the decision making process. Compliance with the ESA is documented in Sections 4.8 and 6.0.

National Historic Preservation Act

As per Section 106 of the National Historic Preservation Act, the Wayne NF must take into account the effects of the Project on heritage resources prior to any undertaking. This law requires the Wayne NF to identify and evaluate all heritage sites within the Project boundaries and to mitigate any adverse effects to those that are considered to be significant. Determinations of significance are made through coordination with the State Historic Preservation Office. Section 106 compliance is outlined in Section 4.14.

Clean Air Act

Construction of any of the four action alternatives conforms to the Clean Air Act requirements. There are no nonattainment zones for any United States Environmental Protection Agency (USEPA) criteria pollutants within or near the Project area. There are no Class I areas on the Wayne NF. The closest Class I Area is the Dolly Sods Wilderness Area on the Monongahela National Forest in West Virginia, approximately 200 miles east of the Project area. Compliance with the Clean Air Act is documented in Section 4.15.

1.7.2 Applicable Executive Orders

Wetlands and Floodplain Management

This Project has been determined to be consistent with Presidential Executive Orders (EOs) for Protection of Wetlands (EO 11990) and Floodplain Management (EO 11988). Implementation

of any of the four action alternatives would not increase flood levels. Vegetation manipulation would be minimal across the floodplain/riparian areas. In addition, no fills would be constructed that would affect the efficiency or the capacity of the floodplain to handle flood flows. Therefore, the Project is not viewed as being incompatible with the present functions and conditions of the floodplain and the riparian area.

This Project is consistent with Federal Regulations (e.g., 36 CFR Parts 219.21(g), 261.13, 261.51, and 295) and Forest Service Policy with respect to riparian area and floodplain management. This Project would not adversely affect the safety and welfare of the public or increase potential flood damages or flood heights.

Invasive Species

Under EO 13112, Federal agencies whose actions may affect the status of invasive species shall not authorize, fund, or carry out actions that are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere unless the agency had determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species. Compliance with EO 13112 is outlined in Section 6.2.3.

Environmental Justice

EO 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 EO 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.

2.0 ALTERNATIVES

2.1 ALTERNATIVES DEVELOPMENT PROCESS

Three primary factors serve to define the elements and range of each alternative. First, the Forest Service mandate to provide protection and restoration to its watersheds is clear. Second, the Forest Service has limited flexibility in means (i.e., remedial measures) to address the stated purpose and need. Third, issues identified by agency and public scoping must be addressed. These factors were incorporated into criteria for screening alternatives to insure that the NEPA requirement that all reasonable and feasible alternatives be considered. The screening criteria were:

1. The alternative should help reduce the water quality problem in the Project area caused by AMD, soil erosion, and sedimentation and otherwise be consistent with the broad management directions identified in the Forest Plan.

2. The alternative and its elements should comply with appropriate Forest-wide standards and guidelines where applicable.

3. The alternative should address key agency and public scoping issues.

4. The no action alternative must be considered.

2.2 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

Based on internal discussions, the Wayne NF Interdisciplinary Team (ID Team) developed several alternatives that would correct water quality problems associated with AMD in the Project area. Based on past and more recent AMD remediation projects implemented in the region, it was determined early in the process that only remedial measures such as waste coal pile stabilization, channel reconstruction and construction, limestone treatment, steel slag treatment, and subsidence and mine portal closures had the ability to ameliorate water quality in the Project area. Because of the lack of remedial measures beyond those listed above and outlined in Section 2.3, alternatives that effectively would reduce AMD drainage in the Project area were limited.

The Forest Service surveyed, inventoried, prioritized, and presented a remedial measure for several sites throughout the Project area that would effectively reduce AMD (ATC 2000). During the identification of the appropriate remedial measure for each site, Forest Service personnel used their professional judgment and data generated by the *Phase I Design Feasibility Report* (ATC 2000) to determine the type of remedial action (i.e., limestone or steel slag treatment) that would best meet restoration objectives and reduce environmental impact. The *Phase I Design Feasibly Report* identified seven of the nine priority areas investigated as significant contributors to AMD in the Project area (ATC 2000). Based on this finding, two of the nine priority areas were eliminated from further analysis because they were identified as negligible contributors to acid loading. In addition to the potential for acid loading reduction, the

impact of the possible remedial actions and associated activities on the environment, such as those impacts resulting from the construction of access roads, staging areas, and source of borrow, were considered when choosing the appropriate remedial action.

Additional alternatives were eliminated from detailed analysis when the Forest Service considered two options for remedial measures at exposed coal refuse piles in the Project area. Option 1 offered a reduction of AMD through consolidation of the exposed gob into one large pile or a series of piles and then capping with on-site borrow material. The cap would be 2 feet thick and would be suitable for vegetative cover. Option 2 offered a reduction of AMD through sediment control measures used to minimize the transport of refuse into nearby streams. Sediment control would involve activities such as minor grading, pulling gob away from adjacent waterbodies, construction of limestone berms, and restricting ORV use in some areas. Option 1 was eliminated because the *Phase I Design Feasibly Report* identified the exposed gob piles as only a minor source of acid loading and the high cost of consolidation and capping would not justify its implementation over Option 2. The cost difference between Option 1 and Option 2 was determined to be better utilized for remedial activities in areas contributing a more significant portion of the acid loading in the Project area. In addition to these options outlined in the *Phase I Design Feasibly Report*, the Forest Service also considered the additional alternatives of not imposing any remedial activities and developing the area as a recreational ORV feature and/or using the open space for the creation of a permanent/hard surface helicopter landing pad to be used for emergency response. These were eliminated from analysis for this Project but are considered as cumulative impacts in Section 5.0.

The Forest Service has surveyed and evaluated all potential staging areas, access roads (proposed and existing), and borrow areas in the Project area. The use of some existing access roads was eliminated (when an alternative access road was available) based on their ownership (i.e., township road), condition (i.e., steep grade), and location relevant to the proposed remedial measures. Staging areas, access roads, and borrow areas were selected and sited so that impacts to wetlands, vegetation, and wildlife would be avoided and/or minimized to the maximum extent prudent and practicable. This preliminary elimination of staging areas, access roads, and borrow areas that would increase environmental impact formed the basis for the selection of areas or measures required to perform the remedial measures of each alternative described in detail in Section 2.4.

Once the staging areas, access roads, borrow areas, and remedial action sites were identified, the Forest Service developed an array of alternatives based upon a combination of these actions. Because countless combinations of the 36 sites where a remedial action is proposed exist, the Forest Service focused its evaluation by developing five alternatives, including the No Action alternative, that would reduce AMD at different scales based on acid loading reduction measurements obtained from the *Phase I Design Feasibly Report*.

The proposed action represents the full scale action in which all of the proposed remedial actions and associated activities such as road construction are implemented. The Moderate Scale and Minimum Scale alternatives represent subsets of the proposed action remedial sites. These subsets are primarily based upon the acid loading reduction along with the reduction in environmental impact associated with their implementation. For instance, under the lesser-scale

alternatives, a site may offer a high potential for acid loading reduction, however if it is isolated from other sites or if it is difficult to access then it was eliminated from consideration because the environmental impact outweighed the AMD-reduction benefits that would be obtained. An additional alternative was considered as a result of internal discussions regarding the feasibility of steel slag treatment.

One response during public scoping suggested that the Forest Service evaluate the technique of using saltwater and charcoal filters to reduce AMD. The Forest Service is currently working with researchers at Ohio University and the Forest Products Laboratory in Madison, Wisconsin, on a research project that is testing the feasibility of using filters to treat AMD. The pilot project is located on the Ironton Ranger District, Wayne NF in Pedro, Ohio. The filters being tested are made of specially treated wood fibers. At this time, the lack of data on filtration makes this option not practical and therefore this option was eliminated as a remedial measure and from detailed analysis. If this research project demonstrates that filtration is a practical option for addressing many of the regions acid water problems, then it would be considered for future watershed restoration and site-specific AMD reduction projects.

This preliminary consideration and elimination of remedial measures or alternatives formed the basis for the elements that would be contained in each alternative described in detail in Section 2.4.

2.3 ELEMENTS OF ALTERNATIVES

The following sections provide a description of each element of the alternatives presented in Section 2.4. Table 1 provides a matrix of the site numbers, the sites included in each alternative, and the dimension of each element at each site.

2.3.1 Staging Area Construction and Use

Staging areas are temporary-use areas where construction equipment and materials would be assembled and stored if needed. The proposed staging area is located in an area that has been previously cleared of vegetation (i.e., unmaintained parking area). The major activities to be conducted at the staging area would include improving (i.e., grading, gravel placement) the existing surface and cleaning up trash and debris. Except where safety may be a concern, the clearing of trees or snags is not anticipated for staging area construction. The proposed staging area is sited so that impacts to vegetation, wetlands, and waterbodies are avoided or minimized to the maximum extent prudent and practicable. Forest-wide standards and guidelines to reduce the potential for direct and indirect impact to waterways due to erosion and increased sedimentation would be implemented (see Section 6.0 and Appendix A). Construction equipment storage, construction personnel's vehicle parking, and any overnight storage of construction materials would be the primary use of the staging area. These uses would be confined to previously surveyed and clearly marked areas. In addition to the described primary staging area, some borrow areas may be used as temporary staging areas for equipment and material storage.

Table 1. Element Matrix and Element Dimensions for the Proposed Action (1), Full Scale Without Steel Slag Treatment (2), Moderate Scale (3), and Minimum Scale (4) Alternatives.

	Alternative				Alternative Element											
Site	1	2[a]	3	4	Staging /Borrow Area Construction and Use (acres)	System Road Reconstruction and Use (miles)	Temporary Road Construction and Use (miles)	Waste Coal Pile Stabilization and Isolation (acres)	Channel Reconstruction (feet)	Channel Construction (feet)	Pond Drainage (acres)[b]	Pond Maintenance (acres)[c]	Limestone Treatment (tons)	Steel Slag Treatment (tons)	Subsidence Closure (acres)	Mine Portal Closure (No.)
1	X	X	X	X	**0.90**											
2	X	X	X	X		**0.76**										
3	X	X	X	X			**0.25**									
4	X	X	X	X		**1.45**										
5	X	X	X			**0.58**										
6	X	X				**1.60**										
7	X	X	X	X							**0.90**					
8	X	X										**0.20**				
9	X	X	X					**3.00**	**400**							
10	X	X	X					**0.90**								
11	X	X	X					**0.90**								
13	X	X							**300**							
14	X	X							**250**							
16	X	X							**150**						**0.10**	
17	X	X							**150**							
18	X	X							**100**							
19	X	X							**100**							
20	X	X							**200**							
21	X	X	X	X					**300**							
22	X	X	X	X					**300**				**200**			
23	X	X	X	X					**1,000**				**667**	**570**		
24	X	X							**1,000**				**667**	**600**		
25	X	X	X						**760**				**507**			
26	X	X	X						**700**						**0.10**	
27	X	X	X				**0.20**									
29	X	X	X						**760**		**0.90**		**507**			
30	X	X	X	X						**700**						**1.00**
31	X	X	X	X						**150**						
32	X	X	X	X					**200**							
33	X	X	X	X					**100**							
34	X	X	X	X					**300**							
35	X	X	X	X					**250**							

Table 1. Element Matrix and Element Dimensions for the Proposed Action (1), Full Scale Without Steel Slag Treatment (2), Moderate Scale (3), and Minimum Scale (4) Alternatives (continued).

	Alternative				Alternative Element											
Site	1	2[a]	3	4	Staging /Borrow Area Construction and Use (acres)	System Road Reconstruction and Use (miles)	Non-system Road Construction and Use (miles)	Waste Coal Pile Stabilization and Isolation (acres)	Channel Reconstruction (feet)	Channel Construction (feet)	Pond Drainage (acres)[b]	Pond Maintenance (acres)[c]	Limestone Treatment (tons)	Steel Slag Treatment (tons)	Subsidence Closure (acres)	Mine Portal Closure (No.)
36	**X**	**X**	**X**	**X**					**200**						**0.10**	
37	**X**	**X**	**X**	**X**					**150**						**0.10**	
38	**X**	**X**	**X**	**X**					**1,300**							
39	**X**	**X**	**X**	**X**						**400**						
40	**X**	**X**	**X**	**X**						**400**						
41	**X**	**X**	**X**	**X**								**0.90**	**1000**			
42	**X**	**X**							**50**							
51	**X**	**X**							**150**		**0.90**		**100**	**400**		
52	**X**	**X**							**300**							
53	**X**	**X**							**250**		**0.90**				**0.10**	
54	**X**	**X**							**200**							
B1	**X**	**X**	**X**	**X**	**0.61**											
B2	**X**	**X**	**X**		**0.78**											
B3	**X**	**X**	**X**	**X**	**0.07**											
B4	**X**	**X**	**X**	**X**	**0.64**											
B5	**X**	**X**			**0.45**											

[a] Sites 23, 24, and 51 would not involve steel slag treatment under the Full Scale Without Steel Slag Treatment alternative.

[b] Site 7 is a beaver pond that would be permanently drained, Site 29 is a mine pit pond that would be lowered, Site 51 is a mine pit pond that would be temporarily drained, Site 53 is a mine pit pond that would be permanently drained.

[c] Site 8 is a beaver pond that would be maintained with a hardened structure and Site 41 is a series of three beaver ponds that would be maintained with a hardened structure.

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2.3.2 Borrow Area Construction and Use

Five borrow areas would be needed to supply fill material for temporary road construction, channel construction, and channel reconstruction activities. One of the five borrow areas sited for the Project is located on a coal refuse pile and would not impact any vegetation. The other four borrow areas are sited in areas of upland forest. Borrow area construction in these areas would require the removal of the forest canopy. Borrow area construction would follow Forest-wide standards and guidelines to reduce the potential for direct and indirect impact to waterways due to erosion and increased sedimentation (see Section 6.0 and Appendix A). All proposed borrow areas are sited so that impacts to wetlands and waterbodies are avoided or minimized to the maximum extent prudent and practicable. Some borrow areas may be used as temporary staging areas for equipment and material storage.

2.3.3 System Road Reconstruction and Use

System (permanent) road reconstruction as described in the Forest Plan and evaluated in the Forest Plan EIS would provide safe access, control erosion, and facilitate the movement of heavy machinery. System roads reconstructed for the Project would be "engineered". The proposed roads would be surveyed and designed, and construction would be inspected to ensure that they are reconstructed in accordance with road construction drawings and specifications (Forest Plan, 4-59). Because maintenance of the current system roads in the Project area has been low, some clearing of adjacent and overhanging vegetation and snags may be required to meet engineering specifications and ensure safety. In addition, stream culverts and stream crossing structures (i.e., low water fords) would need to be replaced, added, or reengineered where necessary. Any fill material would be obtained from designated borrow areas.

2.3.4 Temporary Road Construction and Use

Temporary road construction, as described in the Forest Plan and evaluated in the Forest Plan EIS, required to meet the needs of area-specific integrated resource management planning is authorized under the Forest Plan (Forest Plan, 4-59). For this Project, temporary roads would be needed to access remedial sites not immediately adjacent to system roads and would provide safe access, control erosion, and facilitate the movement of heavy machinery into these remote areas. All proposed temporary roads are sited so that impacts to vegetation, wetlands, and waterbodies are avoided or minimized to the maximum extent prudent and practicable. Any fill material would be obtained from designated borrow areas.

All temporary roads would be planned and constructed with the intention of being revegetated when the planned one-time use is over (Forest Plan, 4-59). Revegetation would be accomplished in a reasonable period of time, not to exceed one growing season after the action (Forest Plan, 4-59). Native species will be favored in seed mixtures used to restore disturbed areas, and post-construction monitoring will be conducted to assess the effectiveness of revegetation efforts (see Section 6.2 and Appendix A). After their use for Project related activities, all temporary roads would be permanently closed to motorized vehicle traffic and illegal use would be discouraged by placement of natural appearing closure devices such as vegetated earth mounds, tree tops, or stumps (Forest Plan, 4-61).

2.3.5 Waste Coal Pile Stabilization and Isolation

Stabilization and isolation of waste coal piles in the Project area would be required to meet the Project objective of reducing AMD. Rainfall seeping through exposed gob piles (i.e., waste coal piles) can contribute large amounts of leached metals to nearby streams. Stabilization and isolation would involve activities such as stream channel realignment (Section 2.3.6), pulling gob away from adjacent waterbodies, construction of limestone berms, and restricting ORV use in some areas. These stabilization and isolation activities would reduce the accelerated erosion caused by the exposed nature of the gob pile. Pulling the gob away from the streams would also reduce AMD by increasing the distance that pollutants would need to travel before entering waterbodies. Limestone berms would help to neutralize gob pile surface water runoff. Any areas of ground disturbance would be revegetated using a seed mixture favoring native species (see Section 6.2 and Appendix A).

2.3.6 Channel Reconstruction

Channel reconstruction activities are required to meet the Project objective of reducing AMD by increasing positive drainage and diverting water away from subsidences, portals, and gob piles. Channel reconstruction activities would involve the removal of materials from blocked stream channels. The removal of sand, gravel, or other common variety minerals from streams is permissible under the Forest Plan (4-37) when these activities are associated with the restoration of a more natural or stable stream channel that has been filled by sediment from strip mines or other land disturbing activities.

Channel reconstruction activities would also involve the placement of excavated materials into existing stream channels in places to realign the channel and direct water away from subsidences, gob piles, or mine portals. Fill material would be obtained from adjacent mine spoil, areas where channel blockage removal would be conducted, or borrow areas. These channels would be filled to block and divert water into a more natural drainage pattern, thereby increasing positive drainage.

2.3.7 Channel Construction

Channel construction activities are required to meet the Project objective of reducing AMD by increasing positive drainage and diverting water away from subsidences, portals, and gob piles. Channel construction activities would involve the removal of materials to create a new stream channel to connect with reconstructed or existing stream channels. New stream channels would be needed in areas where the existing topography has been degraded to the point where the natural stream channel is no longer evident.

2.3.8 Pond Drainage

Pond drainage and lowering activities are required to meet the Project objective of reducing AMD by increasing positive drainage and by creating areas where acid waters can be treated with limestone and steel slag. Ponds formed as a result of past mining activities (mine pit ponds) allow waters to be held in contact with spoil and nearby rock for longer periods of time, thereby

increasing the amount of dissolved metals and acidity that eventually drains into nearby waterways. Other ponds in the Project area have been formed by a combination of past mining activities and the activity of beavers in the Project area. Drainage and lowering water levels of these ponds and clearing of adjacent blocked channels would increase positive drainage through these areas and reduce the amount of dissolved metals and acidity that drains downstream. Table 1 indicates which ponds are primarily mine pits or beaver ponds and which ponds would be drained or lowered. Conversely, ponds can also help neutralize AMD if treated with limestone and/or steel slag; therefore some ponds in the Project area would be maintained (Section 2.3.9).

2.3.9 Pond Maintenance

Ponds can help neutralize AMD if treated with limestone and/or steel slag. Pond maintenance activities, as described in the Forest Plan and evaluated in the Forest Plan EIS, are required to meet the Project objective of reducing AMD by creating areas where acid waters can be treated with limestone and/or steel slag. Maintenance would involve the placement of berms or hardened dams to stabilize the ponds and to ensure that water is held in contact with, or seeps across, acid neutralizing limestone and/or steel slag.

2.3.10 Limestone Treatment

Limestone treatment of new channels and ponds would help meet the Project objective of reducing AMD by neutralizing acid waters. Open limestone channels are created by lining streambeds with high quality limestone, and would require periodic nourishment. The life span of the limestone channels can vary greatly and would depend upon flow conditions, with upper and lower limits for the proposed remedial sites ranging from 12 – 30 years for high flow conditions and 60 – 160 years for low flow conditions. Specific ponds in the Project area would also be treated with limestone to help neutralize acid waters. Iron hydroxides that settle out in treated ponds would be closely monitored to determine if dredging is required. In the event dredging is warranted, accumulated iron hydroxides would be properly disposed of at an approved off-site location.

2.3.11 Steel Slag Treatment

Steel slag treatment of ponds and channels would help meet the Project objective of reducing AMD by neutralizing acid waters that collect in ponds and mine pits. Steel slag treatment involves the creation of steel slag berms and in some cases steel slag bedding along reconstructed channels. Steel slag bedding would be used in conjunction with limestone treatment to further supply alkalinity to treat AMD. It is estimated that the steel slag treatment would have a life span of about 10 years (ATC 2000). Iron hydroxides that settle out in treated ponds would be closely monitored to determine if dredging is required. Although promising data on the effectiveness of steel slag treatment on the reduction of AMD are currently being collected, the use of steel slag for this Project would be considered experimental. Therefore, its use would be considered optional and may be replaced with another form of treatment or omitted as a Project element altogether at the ID Team's discretion.

2.3.12 Subsidence Closure

Closure of subsidences would help meet the Project objective of reducing AMD by directing fresh water away from sink holes that collect and direct fresh water through underground mines where acid levels are increased. By stopping the flow of fresh water into underground mines, closing mine portals and contouring the surface would return fresh water flow to the surface where it would assume a more natural flow towards downstream tributaries. Fill for subsidence closures would be obtained from nearby channel reconstruction and blockage removal activities.

2.3.13 Mine Portal Closure

Closure of mine portals would help meet the Project objective of reducing AMD by directing fresh water away from mine openings that collect and direct fresh water through underground mines where acid levels are increased. Stopping the flow of fresh water into underground mines and closing mine portals would return fresh water flow to the surface where it would assume a more natural flow towards downstream tributaries. Fill for portal closures would be obtained from nearby channel reconstruction and blockage removal activities.

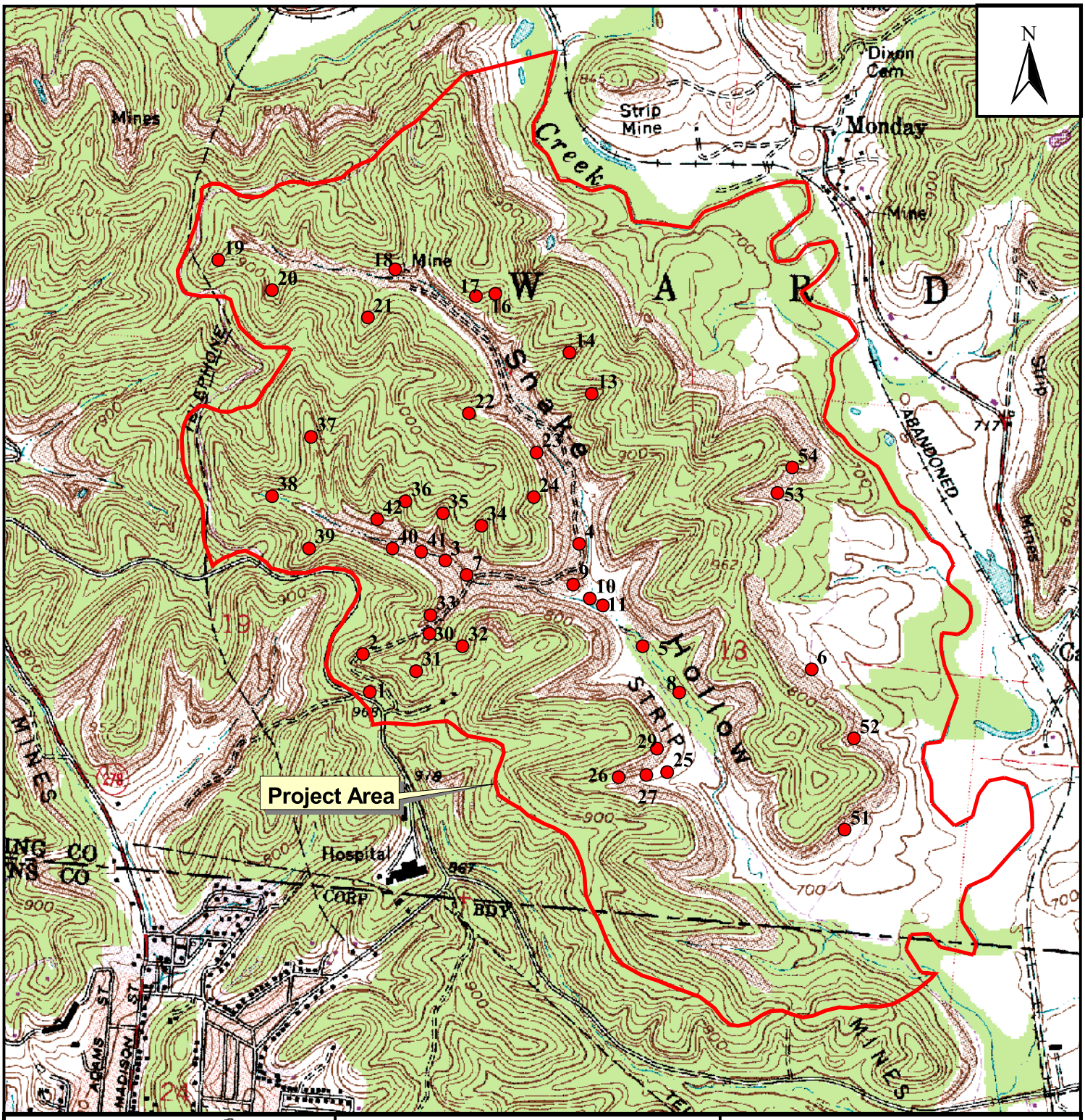
2.4 ALTERNATIVES CONSIDERED

2.4.1 No Action

Under the No Action alternative, the Forest Service would not approve or select the other alternatives presented in this EA. Selection of this alternative would allow the Project area to remain as is and none of the elements of the alternatives would be implemented. Other actions identified in the Forest Plan and previously and fully evaluated in the Forest Plan EIS and BA, would be allowed to proceed as planned in accordance with applicable guidelines and specifications following any applicable NEPA review. Implementation of the No Action alternative would result in no reduction of the acid loading contributed from AMD in the Project area. Therefore, the water quality in the Project area would remain poor and continue to contribute to problems outside the Project area (i.e., Monday Creek). The Forest Plan direction to protect and enhance water quality would not be met under the No Action alternative.

2.4.2 Proposed Action (Full Scale)

Elements to be included in the proposed action (Table 1, Figure 2) were selected based upon watershed and subwatershed water quality and acid loading data analyses and prioritizations outlined in the *Phase I Design Feasibility Report* (ATC 2000) and summary report (Stachler and Farley 2002), and field surveys conducted by Forest Service personnel. Under the proposed action, all of the proposed elements of alternatives would be implemented (Table 1). Although it is noted that it is impossible to survey, inventory, and propose a remedial action for every problem area within the Project area boundaries, the proposed action represents all of the problem areas that have been identified during exhaustive field surveys of almost the entire Project area.



200 0 200 400 Meters

700 0 700 1400 Feet

Figure 2. Location of Proposed Action Elements Within the Snake Hollow Watershed Restoration Project Area.

Client: U.S. Forest Service

Source: USGS 7.5' Series Topographic Quadrangle, Nelsonville, OH 1961 Revised 1995

● Approximate Site Location

Prepared By: NEA

Date: 07/31/02

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This alternative would implement the remedial measures at seven of the nine priority areas outlined in the *Phase I Design Feasibility Report* (ATC 2000); the remedial measures and associated activities (e.g., temporary road construction) proposed for implementation under the proposed action are identified as elements in Table 1 and depicted in Figure 2. In addition, the proposed action includes additional remedial actions that can also improve water quality problems in the Project area and can be easily, and cost-effectively implemented along with the seven high priority sites.

Under the proposed action, the acid loading in the Project area is estimated to be reduced by 1,474 pounds per day (lbs/d) (ATC 2000, Stachler and Farley 2002). Table 1 and Table 2 summarize the dimensions of each remedial action site under the proposed action. Because the proposed action occurs over a larger area and involves the most road building, tree clearing, and total land disturbance of the four alternatives, its implementation would have the greatest impact on the environment, but also would result in the greatest reduction in AMD (Table 2), erosion, and sedimentation.

2.4.3 Full Scale Without Steel Slag Treatment

During the alternative development phase, the feasibly and costs associated with the use of steel slag to treat AMD were investigated. The use of steel slag to treat AMD in the Project area would be considered experimental (ATC 2000). According to Dr. Paul Ziemkiewicz of the National Mine Land Reclamation Center (NMLRC), there are only a few sites where steel slag has been applied to treat acid water. The McCarty Highwall site in Preston County, West Virginia, is producing promising results where limestone and steel slag is treating all of the acidity and has caused no increase in metal concentrations, other than Cr, in the receiving stream (Simmons et al. 2002). The Greens Run Project in West Virginia was constructed in 2002, however data are not available at this time. It is estimated that over 1,500 tons of steel slag would need to be used at three sites under the proposed action. The cost of material is estimated to be $30.00 per ton.

Under the Full Scale Without Steel Slag Treatment alternative, the acid loading in the Project area is estimated to be reduced by 1,474 lbs/d (Table 2). Table 1 and Table 2 summarize the dimensions of each remedial action site and associated activities under the Full Scale Without Steel Slag Treatment alternative and Figure 3 provides the locations. Because the Full Scale Without Steel Slag Treatment alternative would still involve the placement of limestone in areas originally proposed for steel slag treatment, the amount of road building, tree clearing, and total land disturbance would be the same as for the proposed action (Table 2).

Table 2. Element Dimension Matrix and AMD Reduction for the No Action, Proposed Action, Full Scale Without Steel Slag Treatment, Moderate Scale, and Minimum Scale Alternatives.

Alternative Element	Alternatives				
	No Action	Proposed Action	Full Scale Without Steel Slag Treatment	Moderate Scale	Minimum Scale
Staging Area Construction and Use (acres)	0	0.9	0.9	0.9	0.9
Borrow Area Construction and Use (acres)	0	1.91	1.91	1.91	1.13
System Road Reconstruction and Use (miles)	0	4.39	4.39	2.79	2.21
Temporary Road Construction and Use (miles)	0	0.45	0.45	0.45	0.25
Waste Coal Pile Stabilization and Isolation (acres)	0	4.8	4.8	4.8	0
Channel Reconstruction (feet)	0	9,920	9,920	6,720	4,300
Channel Construction (feet)	0	1,650	1,650	1,650	1,650
Pond Drainage (acres)	0	3.6	3.6	1.8	0.9
Pond Maintenance (acres)	0	1.1	1.1	0.9	0.9
Limestone Treatment (tons)	0	3,648	3,648	2,881	1,867
Steel Slag Treatment (tons)	0	1,570	0	570	570
Subsidence Closure (acres)	0	0.5	0.5	0.3	0.2
Mine Portal Closure (No.)	0	1	1	1	1
AMD Reduction (lbs/d)[a]	**0**	**1,474**	**1,474**	**926**	**493**

[a] The contribution of steel slag treatment to AMD reduction is not included in this estimate. Although the ability of steel slag to reduce AMD is apparent, its use remains experimental, therefore its AMD reduction value is difficult to estimate.

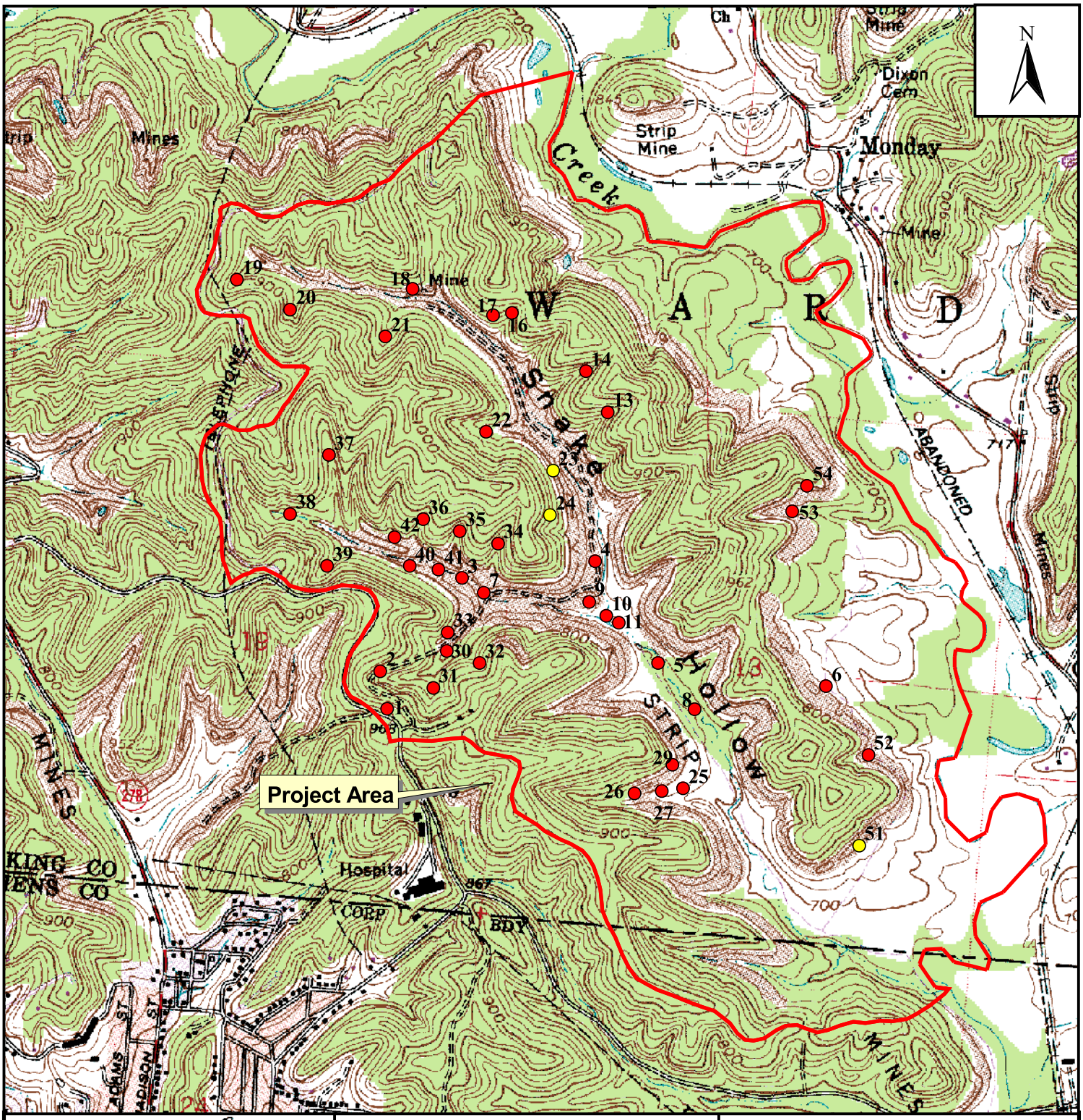

Figure 3. Location of Full Scale Alternative Without Steel Slag Treatment Alternative Elements Within the Snake Hollow Watershed Restoration Project Area.

Client: U.S. Forest Service

Source: USGS 7.5' Series Topographic Quadrangle, Nelsonville, OH 1961 Revised 1995

Prepared By: NEA

Date: 07/31/02

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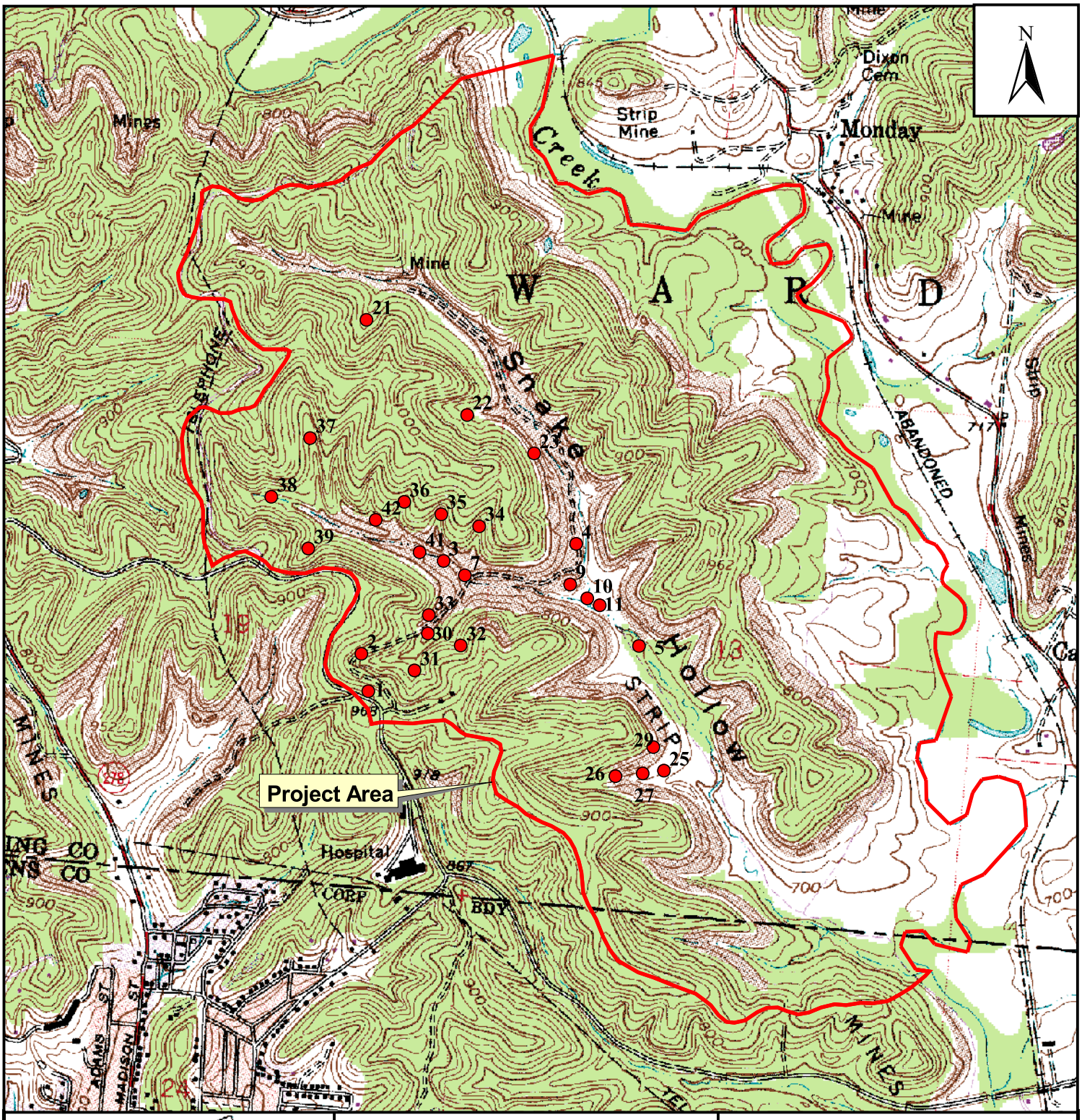
2.4.4 Moderate Scale

Elements to be included in the Moderate Scale alternative (Table 1, Figure 4) were selected based upon watershed and subwatershed water quality and acid loading data analyses and prioritizations outlined in the *Phase I Design Feasibility Report* (ATC 2000) and summary report (Stachler and Farley 2002), and field surveys conducted by Forest Service personnel. The *Phase I Design Feasibility Report* (ATC 2000) along with acid loading estimates from subwatersheds indicated that approximately two-thirds of the acid loading that would be reduced under the Full Scale alternative could be achieved with implementation of the Moderate Scale alternative. Under this alternative, the acid loading in the Project area is estimated to be reduced by 926 lbs/d (ATC 2000, Stachler and Farley 2002). This alternative would implement the remedial measures at the top four priority areas outlined in the *Phase I Design Feasibility Report*, as opposed to the seven proposed under the Full Scale alternative (ATC 2000); the remedial measures and associated activities (e.g., temporary road construction) proposed for implementation under the Moderate Scale alternative are identified as elements in Table 1 and depicted in Figure 4. In addition, the Moderate Scale alternative includes additional remedial actions that can also improve water quality in the Project area and can be easily, and cost effectively, implemented along with high priority sites. These additional actions are a subset of those proposed for the Full Scale alternative that are estimated to be contributing the most to the AMD problems in the Project area beyond that of the priority sites.

Table 1 summarizes the dimensions of the expected impacts for each remedial action site under the Moderate Scale alternative. Implementation of this alternative would significantly reduce the amount of environmental impact when compared to the Full Scale alternative (Stachler and Farley 2002), but also would provide a moderate level of reduction in AMD (Table 2), erosion, and sedimentation.

2.4.5 Minimum Scale

Elements to be included in the Minimum Scale alternative (Table 1, Figure 5) were selected based upon watershed and subwatershed water quality and acid loading data analyses and prioritizations outlined in the *Phase I Design Feasibility Report* (ATC 2000), and summary report (Stachler and Farley 2002), and field surveys conducted by Forest Service personnel. The *Phase I Design Feasibility Report* (ATC 2000) along with acid loading estimates from subwatersheds indicated that approximately one-third of the acid loading that would be reduced under the Full Scale alternative could be achieved with implementation of the Minimum Scale alternative. Under this alternative the acid loading in the Project area is estimated to be reduced by 493 lbs/d (ATC 2000, Stachler and Farley 2002). This alternative would not implement any of the remedial measures for the priority areas outlined in the *Phase I Design Feasibility Report* (ATC 2000); the remedial measures and associated activities (e.g., temporary road construction) proposed for implementation under the Minimum Scale alternative are identified as elements in Table 1 and depicted in Figure 5. Table 1 summarizes the dimensions of the expected impacts for each remedial action site under the Minimum Scale alternative.



200 0 200 400 Meters

700 0 700 1400 Feet

Figure 4. Location of Moderate Scale Alternative Elements Within the Snake Hollow Watershed Restoration Project Area.

Client: U.S. Forest Service

Source: USGS 7.5' Series Topographic Quadrangle, Nelsonville, OH 1961 Revised 1995

● Approximate Site Location

Prepared By: NEA

Date: 07/31/02

z:/projects/fs-100/aprs/snake_ea.apr

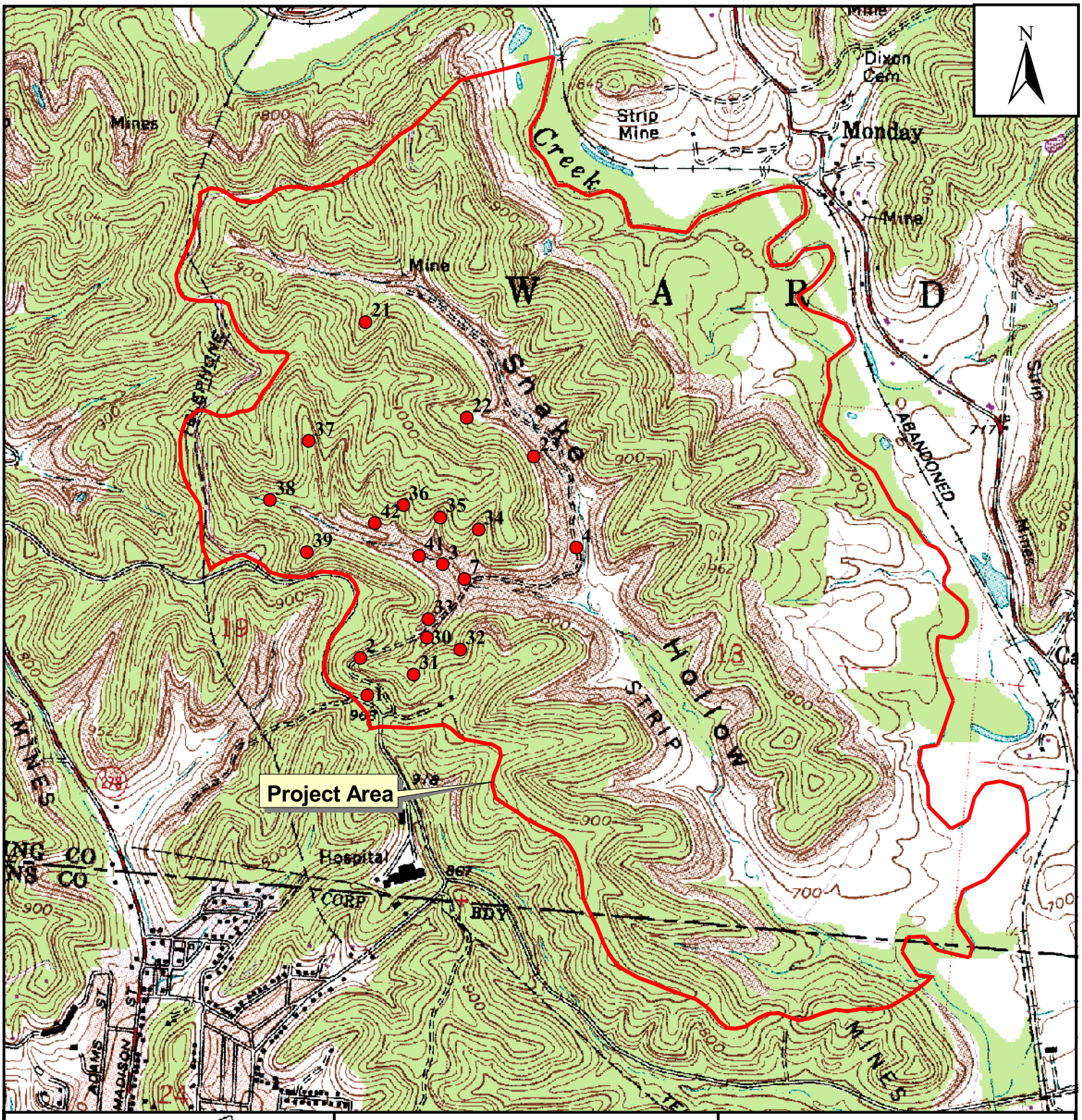


Figure 5. Location of Minimum Scale Alternative Elements Within the Snake Hollow Watershed Restoration Project Area.

Client: U.S. Forest Service

Source: USGS 7.5' Series Topographic Quadrangle, Nelsonville, OH 1961 Revised 1995

Prepared By: NEA

Date: 07/31/02

z:/projects/fs-100/aprs/snake_ea.apr

Implementation of this alternative would significantly reduce the amount of environmental impact when compared to the Full Scale alternative, but would not disturb significantly less land than the Moderate Scale alternative (Stachler and Farley 2002). Implementation of this alternative would result in the least amount of reduction in AMD (Table 2), erosion, and sedimentation compared to the Full Scale and Moderate Scale alternatives.

3.0 AFFECTED ENVIRONMENT

3.1 GEOLOGY

The Project area is located in the unglaciated portion of the Allegany Plateau Section of the Appalachian Plateau Physiographic Province (Ohio Department of Natural Resources [ODNR] 1999a). 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 some clay and limestone. These coal seams were accessed and mined through underground vertical mine shafts, horizontal mine entries, and surface 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 area was initially deep mined, where five separate underground mines accounted for the majority of the affected environment. Underground mining in the Project area ceased around 1932. Unmined outcroppings of the Project area were surfaced mined with heavy equipment through the 1960s.

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, there are no active oil and gas wells located in the Project area.

3.2 SOILS

The Project area is contained within the boundaries of the Shelocta-Brownsville-Latham-Steinsburg and the Eden-Bratton-Brushcreek Ohio Soil Regions (ONDR 1999b). The soil series listed for the Project area along the primary Snake Hollow drainage channel is Chagrin silt loam. These well-drained to moderately well-drained soils were formed from materials weathered from acid sedimentary rocks, primarily sandstone, siltstone, and shale. The soils are generally characterized as occurring on areas with slopes greater than 8 percent and bedrock less than 40 inches below the surface, and having a low water table, less than 3 percent organic matter in the upper 10 inches, and less than 27 percent clay in the topsoil (ONDR 1999b).

Serious occurrences of soil erosion are primarily limited to system road use and legal and illegal ORV trail use, especially during excessively wet periods. The current system roads are unmaintained and are in need of reconstruction or redesignation, and ORV trails that traverse gob piles and stream beds accelerate erosion, leaching, and the movement of sediments, dissolved metals, and acidity.

3.3 WATER RESOURCES

There are no designated sole source aquifers located near the Project area (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 shaly sandstone and shale sedimentary bedrock aquifer.

Normal ground water drainage has been severely impacted by historic mining activities in the Project area. Soil structure, geology, and topography have been altered to various degrees throughout the Project area, thereby influencing the direction, volume, and chemical composition of surface and subsurface (near surface) ground water. Historic and abandoned subsurface mines have created subsidences that collect and redirect surface water into subsurface mines, thereby reducing positive drainage. Collected surface water may be temporarily detained in subsurface mines, accumulate dissolved metals and acidity, and immediately or eventually be flushed out during storm events, thereby contributing to AMD in the Project area.

The Project area is located within the boundaries of the USEPA's designated Hocking Watershed. Within the Hocking Watershed, the Project area drains via Snake Hollow Watershed and the western portion of the Monday Creek Watershed into Monday Creek, which in turn flows into the Hocking River. Spring and summer flow rates for the main channel in Snake Hollow range from 8.6 gallon per minute (gpm) to 50 gpm (ATC 2000).

Normal surface water drainage has been severely impacted by historic mining activities in the Project area. Soil structure, geology, and topography have been altered to various degrees throughout the Project area, thereby influencing the direction of flow, volume, and chemical composition of surface water. Several 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 and groundwater. Several of these ponds have been or are currently maintained by beavers (e.g., Sites 7, 8, and 41).

Water quality data collected during the feasibility stages of the Project are summarized in *Phase I Design Feasibility Report* (ATC 2000). Levels of pH ranged from 2.4 to 3.5 for nine sample locations within the Snake Hollow Watershed. Acidity, iron, sulfate, and aluminum loadings were also recorded. Acid loadings and pH level were found to be relatively uninfluenced by flow rates, however, early spring samples were not taken when high flow rates may flush out stagnant waters from underground mines (ATC 2000).

3.4 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) (USFS 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 95 percent of the Project area is mature or maturing second-growth forest. The remaining 5 percent contains 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 are of the oak-hickory forest type, with successional yellow poplar (*Liriodendron tulipifera*) dominating the lowlands. Pine communities dominate some areas and consist of shortleaf pine (*Pinus echinata*) and white pine (*Pinus strobus*). 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 (*Aste*r spp.), and goldenrod (*Solidago* spp.).

Multiflora rose (*Rosa multiflora*) was identified in the Project area, however its distribution is not wide-spread. Multiflora rose is listed as a non-native invasive species for the Wayne NF. It is found in old fields, pastures, roadsides and forests. It can live in a wide range of soil and environmental conditions, but thrives in sunny areas with well-drained soils. In the Project area, it is primarily found in the main drainages growing in the understory of second-growth maturing forests on mine spoil. It is also found on the upland areas around some of the strip mine pits.

Section 3.5 discusses plant species typical to wetlands in the Project area. Sections 3.8 and 3.9 discuss plants that are Federally-listed endangered and threatened species and Regional Forest's Sensitive Species (RFSS) that may occur in the Project area.

3.5 WETLANDS

The majority of the wetlands in the Project area are small and are associated with seeps, creeks, ponds, and mine pits. Based on a review of National Wetland Inventory (NWI) maps, no Federal freshwater wetlands are located in the Project area. However, wetland delineations conducted along reaches within the boundaries of the Snake Hollow Watershed in 1999 found several areas that met USACE criteria for jurisdictional status (ATC 2000). The largest wetland (approximately 2 acres) occurs along the primary drainage channel of the Snake Hollow Watershed and is primarily a result of beaver activity. Small wetlands were also found to be associated with small drainages and seeps. Others were associated with highly acidic strip mine pits and are often dominated with sphagnum moss. Not all areas where proposed alternative elements are located have been surveyed for Federal jurisdictional wetlands.

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*) (ATC 2000).

Several sphagnum moss communities along mine seeps and beaver-created wetlands occur in the Project area (ATC 2000). These communities are often found flourishing in quiet, acid, and sterile water and once established can augment these conditions by releasing additional acids and other substances into the water and efficiently absorb most available minerals. Therefore, sphagnum moss communities present in the Project area are most likely a result of past coal mining activities and the resulting AMD that creates conditions favorable to sphagnum moss growth.

3.6 FISH AND WILDLIFE

The Project area supports several types of aquatic habitats including seeps, creeks, ponds, mine pits, and wetlands. All of these habitats have been identified has having reduced pH levels and high concentrations of dissolved metals (ATC 2000). When pH decreases below 5.0, which is typical of the waters in the Project area, 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, which in turn may lead to a reduction of aquatic invertebrate populations 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 ruts) with higher pH levels than the surrounding aquatic habitats. The four-toed salamander (*Hemidactylium scutatum*) is commonly associated with sphagnum moss dominated habitats which tend to flourish where acid conditions exist.

Few data exist 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 effects 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 mature to mid-successional forested uplands associated with small drainages and/or ponds. Common wildlife species in the Project area include popular games 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 very active along the primary drainage of the Snake Hollow Watershed. Several mine portals in the Project area may provide entranceways to suitable hibernacula for several bat species such as the big brown bat (*Eptesicus fuscus*). In addition, the mature nature and 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 familiarus*), and various flycatchers and warblers. The forest also provides 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 ponds more for resting than foraging due to the lack of aquatic plant and animal foods present as a result of AMD.

Section 3.7 discuss Federally-listed endangered and threatened species, Section 3.8 discusses RFSS, and Section 3.9 discusses MIS that may occur in the Project area.

3.7 FEDERALLY-LISTED ENDANGERED AND THREATENED SPECIES

The United States Department of the Interior, Fish and Wildlife Service (USFWS), through its formal consultation with the Wayne NF regarding implementation of the Forest Plan, identified nine Federally-listed species as being present on or near the Wayne NF (USFS 2001c) (Table 3). No species proposed for listing as Federally endangered or threatened species were identified by the USFWS. No critical habitats for any of the nine listed species were identified by the USFWS as occurring on the Forest.

Table 3. Federally-Listed Endangered and Threatened Species That May Occur in the Wayne National Forest.

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

[a] Status codes: E=Endangered, T=Threatened.
[b] Proposed 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 proposed alternatives. These effect determinations are presented in the Project-specific Biological Evaluation (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, and bald eagle. However, the BE determined that suitable habitat existed in the Project area for the northern wild monkshood, small whorled pogonia, running buffalo clover, American burying beetle, and Indiana bat. Site-specific field surveys for these species were conducted during the summer months of 2002 and are detailed in two reports: *Endangered, Threatened, and Regional*

Forester's Sensitive Species Survey Summary (Northern Ecological Associates, Inc, [NEA] 2002) and *Mine Portal Swarming Survey* (USFS 2002b). The results of these surveys are summarized below.

No individuals of northern wild monkshood, small whorled pogonia, running buffalo clover, or American burying beetle were found to occur in the survey area during surveys preformed in 2002 (NEA 2002).

The Indiana bat (one male) was identified as occurring in the Project area during site-specific swarming surveys conducted in September 2002 (USFS 2002b). Based on this recent capture and the results of previous Indiana bat captures on the Athens and Ironton Ranger Districts, Indiana bats are assumed to be present in all suitable habitat on the Wayne NF (USFS 2001c). Suitable habitats in the form of mine openings (i.e., hibernacula) and mature or maturing second-growth hardwood forests (i.e., foraging and roost sites) are found throughout the Project area.

3.8 REGIONAL FORESTER'S SENSITIVE SPECIES

RFSS 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 34 plant and animal RFSS are proposed or currently identified for the Wayne NF. This list includes 11 plant, four mollusk, four insect, three fish, one reptile, three amphibian, two bird, and six mammal species. These species are listed in Table 4.

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 effect determinations are presented in the Project-specific BE.

The Project's BE determined that suitable habitat exists in the Project area for the juniper sedge, striped gentian, butternut, umbrella magnolia, blue scorpion weed, rock skullcap, timber rattlesnake, green salamander, four-toed salamander, cerulean warbler, Rafinesque's big eared bat, bobcat, evening bat, Allegheny woodrat, and black bear. The potential need for surveys was based on review of recent occurrences, habitat preferences, and mobility of the species. As a result, site-specific field surveys for butternut, umbrella magnolia, rock skullcap, timber rattlesnake, green salamander, four-toed salamander, Rafinesque's big eared bat (with Indiana bat survey), evening bat (with Indian bat survey), Allegheny woodrat, and black bear (den survey) were conducted during the summer months of 2002 and are detailed in the Project's BE.

Site-specific surveys for an additional species, the juniper sedge, will be conducted in the spring of 2003 as a result of the discovery of this species on the Athens District less than 3 miles southeast of the Project area in June of 2002. The remaining 19 species were not carried through the analysis based on the lack of suitable habitat in the Project area and no historical records of occurrence for Athens and Hocking counties.

Table 4. Regional Forester's Sensitive Species Listed for the Wayne National Forest.

Species	Common Name	State Status[a]
Plants		
Carex juniperorum	Juniper sedge	T
Dicanthelium bicknellii (Panicum bicknellii)	Bicknell's panicgrass	T
Gentiana alba	Yellow gentian	T
Gentiana villosa	Striped gentian	E
Juglans cinerea	Butternut	P
Magnolia tripetala	Umbrella magnolia	P
Panicum philadelphicum	Philadelphia panicgrass	T
Phacelia ranunculacea	Blue scorpionweed	E
Platanthera ciliaris	Yellow fringed orchid	T
Scutellaria saxatilis	Rock skullcap	P
Vitis cinerea	Pigeon grape	P
Mollusks		
Obovaria subrotundra	Round hickorynut	No Status
Simponaias ambigua	Salamander mussel	SI
Toxolasma parvus	Liliput	No Status
Villosa lienosa	Little spectaclecase	E
Insects		
Euchloe oympia	Olympia marble	SI
Macromia wabashensis	Wabash river cruiser	No Status
Pyrgus wyandot	Southern grizzled skipper	SI
Speyeria idalia	Regal fritillary	M
Fishes		
Ammocrypta pellucida	Eastern sand darter	No Status
Erimyzon sucetta	Lake chubsucker	No Status
Ichthyomyzon bdellium	Ohio lamprey	E
Reptiles		
Crotalus horridus	Timber rattlesnake	E
Amphibians		
Aneides aeneus	Green salamander	E
Cryptobranchus allegheniensis	Eastern hellbender	E, M
Hemidactylium scutatum[b]	Four-toed salamander	No Status
Birds		
Ammodramus henslowii	Henslow's sparrow	SI, M
Dendroica cerulea[c]	Cerulean warbler	SI, M
Mammals		
Corynorhinus (=Plecotus) rafinesquii	Rafinesque big-eared bat	SI, M
Felis rufus	Bobcat	E
Lutra canadensis	River otter	No Status
Nycticeius humeralis	Evening bat	No Status
Neotoma magister	Allegheny woodrat	E,M
Ursus americanus	Black bear	E

[a]Ohio 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.
[b]Although removed from the Wayne NF's RFSS list, the four-toed salamander is being considered for possible return to the RFSS list because of its recent discovery on the Wayne NF, Ironton Ranger District, approximately 10 miles from Bluegrass Ridge (USFS 2002a).
[c] The cerulean warbler is currently under USFWS review for potential listing (Andrews 2003).

The results of the field surveys are summarized below. No individuals of umbrella magnolia or rock skullcap were found to occur in the survey area. One specimen of butternut was located and was associated with site numbers 25 and 26 (NEA 2002). This butternut was approximately 11 inches in diameter at breast height and about 40 feet tall. It appeared to be in poor condition indicated by a sparse canopy and several dead and dying branches.

No timber rattlesnake individuals, dens, or rookery sites, green salamander individuals, or Allegheny woodrat individuals, nests, or food caches were found to occur in the survey areas. No four-toed salamander individuals were found to occur in sphagnum moss survey areas. Impacted mine openings were found to be unsuitable as potential black bear dens, due to the presence of standing water.

3.9 MANAGEMENT INDICATOR SPECIES

The Forest Service is mandated under 36 CFR 200.3(b)(2) "to administer and manage lands…in accordance with…the National Forest Management Act (NFMA)". The NFMA does not mention MIS or monitoring wildlife populations. Direction for MIS is located in 36 CFR 219.19, which establishes the basis for managing and maintaining viable populations of existing native and desired non-native vertebrate species. It states that for planning purposes a viable population shall be regarded as one which has the estimated numbers, and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area. Specifically, 36 CFR 219.19(a)(6) states "population trends of the management indicator species will be monitored and relationships to habitat changes determined. This monitoring will be done in cooperation with state fish and wildlife agencies to the extent practicable".

The Forest Plan integrates MIS into its planning process consistent with Forest Service Manual (FSM) direction under Resource Integration Requirements pursuant to FSM 1900: 1922.15 items 10 and 11. Specifically, the FSM states:

- 10. Ensure that the set of management indicator species includes Resources Planning Act and regional wildlife and fish indicators and represents all significant forest level wildlife and fish diversity and resource production issues, concerns, and opportunities; and,

- 11. Ensure that management prescriptions will provide for the habitat capability to meet demand for management indicator species and provide access for recreational and commercial uses with minimal disturbance to species use of suitable habitats.

FSM 1900 further requires that the Forest Service "Ensure the plan provides for the kinds, amounts, and distribution of habitat needed for the recovery of threatened and endangered species and needed to maintain viable, well-distributed populations of all existing native and desired non-native species".

Analysis of Project level effects is used to determine an activity's contribution to meeting Forest-wide objectives for providing for well-distributed, viable populations. Management activity effects are examined in light of the existing habitat conditions both within and outside the Wayne NF, and documented population conditions and trends. Table 5 lists the Wayne NF MIS, along with a brief description of the habitat components the MIS represent. A brief description of each species' habitat requirements, life history, and occurrence information follows Table 5. Background information about how these MIS were selected is displayed in Appendix B of the Forest Plan.

Table 5. Management Indicator Species Listed For the Wayne National Forest.

Scientific Name	Common Name	Habitat
Birds		
Aix sponsa	Wood duck	Beaver ponds, oxbows
Bonasa umbellus	Ruffed grouse	Early-successional hardwoods
Dendroica cerulea	Cerulean warbler	Close-canopied, mature/over-mature hardwoods
Dendroica pinus	Pine warbler	Conifers
Dryocopus pileatus	Pileated woodpecker	Mature hardwoods
Geothlypis trichas	Common yellowthroat	Mid-succession shrublands
Rallus limicoal	Virginia rail	Marsh
Sialia sialis	Eastern bluebird	Park like
Spizella pusilla	Field sparrow	Early-successional shrublands
Vireo griseus	White-eyed vireo	Late phase of early-successional shrublands
Amphibians		
Pseudacris triseriata	Western chorus frog	Fishless ponds in fields
Rana sylvatica	Wood frog	Vernal ponds in hardwoods
Fish		
Etheostoma caeruleum	Rainbow darter	Medium streams with riffles
Etheostoma zonale	Banded darter	Large streams with riffles
Lepomis macrochirus	Bluegill	Artificial impoundments
Phoxinus erythrogaster	Southern redbelly dace	Small/intermittent streams
Moxostoma erythrurum	Golden redhorse	Large streams with pools
Notropis ludibundus	Sand shiner	Large streams with sand pools
Notropis umbratilis	Redfin shiner	Medium streams with sand/gravel pools
Percina maculata	Blackside darter	Medium streams with silt pools

Wood Duck (*Aix sponsa*) – The wood duck prefers mature riparian corridors along streams, quiet backwaters of lakes and ponds bordered by large trees, and secluded wooded swamps. Wood ducks nest exclusively in cavities, either natural ones in large trees or in nest boxes. Most nests are near or over water, but some are over 500 feet from water. Nest height ranges from 2 to 3 feet above water in boxes to more than 50 feet in mature trees. The ODNR, Division of Wildlife (ODW) conducts an active banding program on the wood duck. Two of the swim-in brood traps are regularly placed on wooded wetlands on the Wayne NF. Numerous wood duck nest boxes have been placed in various wetlands and along streams on the Wayne NF with great success.

Ruffed Grouse (*Bonasa umbellus*) – The ruffed grouse prefers second growth deciduous woods where dense understories, shrubs, vines, and other tangles provide suitable cover. They prefer extensive tracts but may also occupy isolated woodlots. Nests are located on the ground, usually near woodland edges and clearings. The ruffed grouse occurs in 40 eastern Ohio counties, almost exclusively in southeastern and northeastern Ohio. During the Ohio Breeding Bird Survey approximately 73.5 percent of breeding bird data blocks detecting the ruffed grouse occurred in the unglaciated plateau (Peterjohn and Rice 1991).

Ruffed grouse populations are cyclic in nature, and seem to be independent of habitat changes and hunting pressures. In 1995, a breeding bird inventory was undertaken in 39 stands, ranging in age from 5 to 21 years of age, on all three units of the Wayne NF. Twenty-four detections of ruffed grouse were made in 11 of these stands. Detections were made on all three units. The ruffed grouse was also detected during interior forest bird surveys in seven of the 30 transects. The ODW has been conducting Drumming Count Surveys since 1973. The long-term average of these counts is 20 drumming males heard/100 stops. Drumming counts for 2002 showed a decrease of 9 percent from 2001; the index was 48 percent below the long-term average (ODNR 2002). Other ODW population monitoring surveys show similar population decline. The Squirrel Hunter Grouse Index (number of grouse observed per 1,000 hours of squirrel hunting) showed an 83 percent decrease in grouse flushed compared to 2001. The Grouse Hunter Cooperator results (cooperators who maintain a grouse hunting diary) showed hunters averaged 0.95 flushes per hour in 2001-2002, a figure that was 2 percent lower than the previous year. The 2001 – 2002 flushes per hour figure was 17 percent below the long-term average.

Cerulean Warbler (*Dendroica cerulea*) – The cerulean warbler prefers mature deciduous woodlands. Eastern Ohio is in the core area of this species breeding range. In southeast Ohio, breeding pairs occupy extensive mixed mesophytic forests and floodplain woods. Nests are placed 30 – 60 feet high among the outer branches of tall trees. Cerulean warblers were reported in 50.7 percent of block data during the statewide Breeding Bird Survey and 48.6 percent of these were in the unglaciated plateau. Trend analysis on state data shows that the Ohio population of the cerulean warbler has not shown a significant overall trend of change and detections have remained even and constant for a 30 year period from 1965 to 1995 (Earnst and Andres 1996). Breeding Bird Surveys conducted on the Wayne NF from 1992 – 1994 recorded cerulean warblers at all 30 transects, which were placed in interior hardwood forests. Ceruleans are known to occur throughout all units on the Wayne NF.

Pine Warbler (*Dendroica pinus*) – The pine warbler is restricted to woodlands dominated by pines. In Ohio, the pine warbler prefers mixed woods with a pine canopy and an understory of various deciduous species. However, they may nest in pure pine plantations. Pine warblers occupy mature forests and second growth woods with scattered large pines, and are equally likely to be found within the interiors and along the edges of these habitats. Most pairs are found in large wooded tracts but may also inhabit isolated woodlots. Nests are normally placed 20 – 50 feet high among the outer branches of tall pines. Breeding Bird Surveys conducted on the Wayne NF from 1992 – 1994 recorded very few pine warbler occurrences. However, transects were placed in interior hardwood forests. Out of the 30 transects pine warblers were detected at five and three of the five were on the Ironton District. No pine warblers were detected on the Athens District.

Pileated Woodpecker (*Dryocopus pileatus*) – The pileated woodpecker prefers extensive tracts of mature forests, but may also be found in scattered woodlots and along wooded riparian corridors. Nests are most frequently located in cavities 25 to 50 feet high in large dead deciduous trees. Breeding Bird Surveys in the state show that this bird has increased significantly at 2.4 percent annually and are much more common in the eastern part of the state (Earnst and Andres 1996). Pileated woodpeckers were reported in 54.8 percent of block data during the statewide Breeding Bird Survey and 48.0 percent of these were in the unglaciated plateau (Peterjohn and Rice 1991). Breeding Bird Surveys conducted on the Wayne NF from 1992 through 1994 recorded pileated woodpeckers at all 30 transects, which were placed in interior hardwood forests.

Common Yellowthroat (*Geothlypis trichas*) – The common yellowthroat prefers early to mid-succession habitats. It inhabits dense herbaceous vegetation with scattered brushy thickets and small saplings in damp or wet locations. Most breeding pairs inhabit old fields, corridors along fencerows and streams, woodland edges and openings, and the margins of ponds and marshes. Nests are either on the ground under dense herbaceous cover, or at heights of less than 1 foot attached to shrubs and clumps of grasses. Common yellowthroats are abundant in Ohio with 99.9 percent of the Ohio Breeding Bird Survey blocks reporting detection of the species. The unglaciated plateau was the second most abundant region in Ohio (27.8 percent) reporting this species (Peterson and Rice 1991). During Wayne NF survey efforts within earlier successional habitat (as described in the white-eyed vireo section), only five of 39 sampled areas had common yellowthroats detected with all but one detection being on the Ironton District. This low number may be due to the limited amount of available aquatic habitat located along the transects. Earnst and Andres (1996) report the common yellowthroat as being more than twice as common in eastern Ohio than the western part of the state.

Virginia Rail (*Rallus limicoal*) – The Virginia rail prefers dense marshy vegetation. They occupy shallow marshes dominated by cattails or other tall emergent vegetation. Although the Virginia rail is not known to occur in southeastern Ohio, it represents species that do.

Eastern Bluebird (*Sialia sialis*) – The eastern bluebird inhabits open country, such as large grassy pastures, fields, and rights-of-way along roads bordered by fencerows and woodland edges. They also occupy weedy fallow fields, but avoid woodland interiors. Eastern bluebirds nest exclusively in cavities, primarily bird boxes, but they also use woodpecker holes and natural

cavities in fence posts and trees. The preferred bird box height is 3 to 5 feet; most nests in natural cavities are less than 10 feet high. Bluebirds were detected in 85.2 percent of the Breeding Bird Survey blocks and 32.3 percent of these were found on the unglaciated plateau, which had an average of 6.1 individuals detected per route. This was the highest detection rate per route in the state (Peterjohn and Rice 1991). The eastern bluebird is common and widely distributed in the state and population levels appear to be stable after a decline in the population due to the severe winters of 1976 through 1978 (Earnst and Andres 1996). Eastern bluebird boxes are erected and maintained in appropriate habitats on the Athens and Ironton districts.

Field Sparrow (*Spizella pusilla*) – The field sparrow occupies a wide variety of brushy successional habitats, such as old fields and cutover hillsides where herbaceous vegetation is interspersed with brushy tangles and scattered small saplings. They inhabit brushy pastures, woodland edges and openings with shrubby undergrowth, and narrow brushy corridors along fencerows, roadsides, railroads, and streams adjacent to open fields. Nests are generally placed 1 to 3 feet high in shrubs and small saplings. Field sparrows were recorded on 99.5 percent of the Ohio Breeding Bird Survey blocks reporting detection of the species. Approximately, 80.8 percent of these detections were listed as confirmed breeding. Every block surveyed in the unglaciated plateau had field sparrows detected (Peterjohn and Rice 1991). Even with the high detection rate, Earnst and Andres (1996) state that the field sparrow is on an annual decline of 1.2 percent. This is thought to be a result of habitat loss due to intensive agricultural practices and to maturation of the eastern Ohio forests. It should also be noted that the severe winters of 1976 and 1977 may have contributed to their decline, but populations were dropping before this event. In 1995, a breeding bird inventory was undertaken in 39 stands, ranging in age from 5 to 21 years of age, on all three districts of the Wayne NF. Thirty-four detections of field sparrows were made in nine of these stands. Detections were made on the Ironton District only.

White-eyed Vireo (*Vireo griseus*) – The white-eyed vireo prefers the late-phase of early successional habitats. It inhabits shrubby habitats such as deciduous scrub, old fields, abandoned pastures, regenerating clearcuts or other heavily logged areas, drainage and streamside thickets, forest edges, and reclaimed strip mines. Nests are usually placed 6 feet high or less in dense bushes. White-eyed vireos were reported in 66.4 percent of block data during the statewide Breeding Bird Survey and 41.5 percent of these were in the unglaciated plateau. Trend analysis on state data for the years of 1965 through 1995 show a rise in the average number of individuals detected per route. More birds per route are detected in the southeastern unglaciated plateau than the rest of the state (Earnst and Andres 1996). In 1995, a breeding bird inventory was undertaken in 39 stands, ranging in age from 5 to 21 years of age, on all three units of the Wayne NF. Eighty-five detections of white-eyed vireos were made in 21 of these stands. The majority of detections were made on the Ironton District.

Western Chorus Frog (*Pseudacris triseriata*) – The western chorus frog can be found in a variety of habitats including marshes, meadows, swales, and other open areas. Breeding occurs in early spring in the edges of shallow ponds, flooded swales, ditches, wooded swamps, and flooded fields. They usually remain close to breeding grounds throughout the year, hiding from predators (and hibernating also) beneath logs, rocks, leaf litter, and in loose soil or animal burrows. Frog and toad calling surveys are conducted within various wetland areas on the

Wayne NF. This frog has been heard calling from one wetland on the Athens District and has not been detected during calling surveys on the Ironton Unit.

Wood Frog (*Rana sylvatica*) – The wood frog is most commonly found in moist woodlands during the summer. They hibernate under stones, stumps, and leaf litter in the winter. Breeding occurs in very early spring in woodland ponds. Numerous sites on the Wayne NF have been identified as wood frog breeding habitat areas, in part from the annual frog and toad calling surveys.

Rainbow Darter *(Etheostoma caeruleum)* – Moderate streams and small rivers with long swift riffles, clear water, and sand or gravel bottoms provide the preferred habitat for the rainbow darter. Its food source is primarily aquatic insects such as Diptera, and Trichoptera larvae, as well as Plecoptera naiads. They may also eat Coleoptera and Odonata larvae, small crayfish, and the eggs of other minnows, especially the white sucker. Rainbow darters spawn between the months of March through June. They spawn in swift riffles above sand and gravel. Most darters, especially rainbows, are sensitive to pollution, and therefore only occur in streams and watersheds that have moderately low pollution content. The rainbow darter has been collected from a few 5th level watersheds in the Wayne NF. Its natural distribution across the Wayne NF is not as widespread as other MIS, and AMD has limited its distribution in some other parts of the Wayne NF.

Banded Darter (*Etheostoma zonale*) – The banded darter typically inhabits clear high gradient streams with strong current flow. It tends to live in riffles that are rocky with algae covered boulders and currents strong enough to prevent silt deposition. Aquatic plants, accumulations of leaves, sticks, and other organic debris provide perfect cover for the banded darter. The diet of the banded darter consists primarily of immature aquatic insects. Spawning for this darter usually occurs from mid April into June and possibly as late as July. Spawning generally occurs in moderate to high gradient riffles where there is an abundance of algae and aquatic moss on stones and boulders. Females deposit their eggs on this plant growth and tend to move downstream to deep water for the winter. The banded darter has been collected from some of the 5th level watersheds in the Wayne NF. Its natural distribution across the Wayne NF is not as widespread as other MIS, and AMD has limited its distribution in some other parts of the Wayne NF.

Bluegill (*Lepomis macrochirus*) – The preferred habitat of the bluegill is slow or stagnant clear water containing small amounts of suspended clayey silts, with bottoms consisting of sand, gravel, or soft muck containing organic debris with scattered beds of aquatic vegetation. Some examples are lakes, ponds, sloughs, reservoirs, and moderately deep stream pools. The diet of the bluegill consists primarily of insects, insect larvae, small fish, fish eggs, and plant material. Spawning for the bluegill in Ohio usually occurs in mid-May to mid-June, when water temperature reaches 65 – 70 degrees Fahrenheit. Nests are commonly made in water depths of 1 – 4 feet on sand or gravel bottoms. They may also be constructed on other bottom materials as well as heavily vegetated areas. The bluegill has been collected from every 5th level watershed in the Wayne NF.

Golden Redhorse (*Moxostoma erythrurum*) – The golden redhorse lives in riffles, runs, and pools of streams over mud to rock bottoms. They also may live in large rivers and occasionally lakes. Food sources of the redhorse consist of Trichoptera, Ephemeroptera, Copepoda, mollusks, Hemiptera and other items. Algae make up the smallest portion of the redhorse diet. The redhorse spawns between the months of May and July when the water temperatures rise to between 60 and 70 degrees Fahrenheit. Swift riffles are chosen by the redhorse for spawning, however, no nest construction has been observed. The golden redhorse has been collected from most 5th level watersheds in the Wayne NF, however AMD has limited its distribution in some parts of the Wayne NF.

Sand Shiner (*Notropis ludibundus*) – The sand shiner inhabits pools and runs of creeks with sand and or gravel bottoms. It has also been found in large rivers as well as sandy lake areas. Typically the spawning season of the sand shiner occurs from late May to mid August. Sand shiners have a generalized diet consisting of aquatic insects, small crustaceans, and plant material. The sand shiner has been collected from some of the 5th level watersheds in the Wayne NF. Its natural distribution across the Wayne NF is not as widespread as other MIS, and AMD has limited its distribution in some other parts of the Wayne NF.

Redfin Shiner (*Notropis umbratilis*) **–** Redfin shiners live in streams of all sizes with pools flowing slow to moderate over sand, gravel, or rock, often with aquatic vegetation. Redfin shiners tend to spawn from late spring through mid to late summer. The redfin spawns over sunfish nests, which usually consist of sand and gravel. They are attracted to these nests by the scent of a fluid released by the sunfishes during spawning. The redfin shiner has been collected from most 5th level watersheds in the Wayne NF, however AMD has limited its distribution in some parts of the Wayne NF.

Blackside Darter (*Percina maculata*) **–** The blackside darter generally lives in pools of creeks and small rivers with slow moving current and bottoms consisting of gravel and sand. This darter's primary food source is small crustaceans and aquatic insects. Spawning for the blackside occurs within the months of May and June. The blackside darter has not been collected in Lake Vesuvius or any stream flowing in or out of the lake. The blackside darter has been collected from most 5th level watersheds in the Wayne NF, however AMD has limited its distribution in some parts of the Wayne NF.

Southern Redbelly Dace (*Phoxinus erythrogaster*) **–** The primary habitat of the southern redbelly dace is clear slow moving streams with long pools. These streams generally contain wooded undercut banks and are not subjected to frequent flooding. Undercut banks are desired for safety and shade. Unlike many other species of minnows the redbelly will school in the middle of the channel when frightened, especially if the cut banks are not present. The primary food source of the dace is algae and other plant debris, however they also eat aquatic insects, and small shellfish. The redbelly spawns in the spring and early summer in swift riffles over gravel bottom nests of other minnows. The southern redbelly dace has been collected from every 5th level watershed in the Wayne NF.

3.10 LAND USE

The entire Project area is within the proclamation boundaries of the Wayne NF and is directly managed by the Forest Service. Approximately 95 percent of the Project area is mature or maturing second-growth forest. The remaining 5 percent contains upland brush, emergent and scrub-shrub wetlands, roads, trails, exposed coal refuse piles, 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 where five separate underground mines account for the majority of the affected environment. Underground mining in the Project area ceased around 1932. Unmined outcroppings in the Project area were surface mined with heavy equipment through the 1940s.

Current major land uses in the Project area include those associated with timber harvest and recreational activities such as ORV trail use and hunting (Section 3.11 discusses recreation). 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.

3.11 RECREATION

The primary recreational uses in the Project area are ORV trail use and hunting. Other uses include hiking, biking, camping, and firewood, mushroom, and ginseng collecting. A small portion of the Monday Creek ORV area traverses 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.

Of the 65.0 miles of ORV trials in Management Area 3.2, 5.0 miles are within the boundaries of the Project area. Under Management Area 3.2 prescriptions for ORV use, ORV trails will average 6.4 miles per square mile when all trails are in place (Forest Plan, 4-98). Also, the Forest Service will not promote a policy of keeping old, unsurfaced roads open in this management area and may designate these roads as ORV trails in the future.

Game species, primarily deer, wild turkey, ruffed grouse, and squirrel are hunted seasonally. Peaks in deer, 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. Other uses such as hiking can occur throughout the year.

3.12 VISUAL AND AESTHETIC RESOURCES

The Project area primarily consists of continuous, mature to maturing second-growth, hardwood forest. Forest roads and trails, gob piles, wetlands, and occasional clear cuts in early successional stage represent the only interruptions to, or fragmentation of, the forest canopy. The continuous canopy and mature nature of the majority of the forest provide visitors with scenic terrain that is complimented with a mosaic of 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 most of the mine spoil and relief changes. Historic mining has also altered the color of stream and pond substrates to various shades of orange and red. Although the exposed gob piles in the Project area offer ORV recreation, they clearly are not natural openings and may be view by some as scars on the landscape.

3.13 SOCIOECONOMICS

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 2002). 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 2002). The unemployment rate in the county in 2000 was estimated at 8.7 percent of the civilian work force which was the seventh highest of the 88 counties in Ohio (Ohio Department of Development 2002). 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 provided by the Wayne NF contribute to state and local tax revenues as a result of the purchase of goods and services.

3.14 CULTURAL RESOURCES

A review of the files indicates that the eastern portion of the Project area was surveyed for heritage resources in 1991 and in 1997 and the western portion of the Project area was investigated for heritage resources on December 19, 2002. Due to historical mining practices throughout the area, no heritage resources were discovered and none probably exist (Reese 2003).

3.15 AIR QUALITY AND NOISE

The Clean Air Act as 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 are 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 and the occasional train siren and low flying aircraft. Other noises may include those associated with equipment used in timber harvest operations such as chainsaws, skidders, and haul trucks. A nearby shooting range and hunters in the area also contribute the occasional gunshot to the array of artificial noises.

4.0 ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVES

4.1 GEOLOGY

Construction of any of the four action alternatives should not materially alter the geological conditions of the Project area. The primary effects from construction would include disturbances to the existing topography in areas where borrow would be needed, channels would be constructed and reconstructed, and where existing gob piles would be stabilized or pulled away from waterways. These permanent alterations are expected to restore the severely disturbed topography in portions of the Project area to a more natural condition and are viewed as beneficial outcomes of each action alternative. No alternative would require blasting. None of the four action alternatives is expected to negatively impact the geology of the Project area. Under the No Action alternative, return of the landscape to a more natural condition would not occur.

4.2 SOILS

Construction of any of the four action alternatives should not materially alter the soil condition of the Project area. The most significant effects of each action alternative include the potential increase in soil erosion (due to exposure to water and wind), loss of soil productivity (due to compaction), damage to soil structure, loss of fertility by mixing of topsoil and subsoil horizons, and displacement of soil from proposed borrow areas. However, the increase in soil erosion due to the disturbance of the soil substrate would be temporary and would be minimized through the implementation of Forest-wide standards and guidelines concerning soil erosion and sedimentation control. Loss of soil productivity through compaction also would be reduced by following Forest-wide standards and guidelines and by siting temporary roads along old logging roads that have been previously subjected to compaction wherever practicable. The majority of borrow that would be needed for channel construction and reconstruction would be obtained from historic mine spoil, thereby reducing the potential for mixing topsoil and subsoil mixing and loss of soil structure and fertility. The Forest Service would implement Forest-wide standards and guidelines to mitigate the temporary impacts to soil resources caused during construction of the selected alternative (see Section 6.0).

Overall, each action alternative is expected to benefit the soils structure in the Project area by decreasing the amount of soil erosion through the stabilization of gob piles, closing of subsidences, channel reconstruction, improvements to system roads, and pond maintenance. Implementation of the Moderate and Minimum Scale alternatives would result in less of a reduction in soil erosion when compared to the proposed action or Full Scale Without Steel Slag Treatment alternative. None of the four action alternatives is expected to result in any significant, long-term negative impact on soils of the Project area.

Under the No Action alternative, the erosion of soils is expected to continue around exposed gob piles that are in direct contact with stream channels and along roads that are currently unmaintained and degrading. Only the temporary increases in erosion due to the movement of

soils associated with system road reconstruction, temporary road construction, and channel construction and reconstruction would be avoided through implementation of the No Action alternative.

4.3 WATER RESOURCES

Normal ground water and surface water drainage has been severely impacted by historic mining activities in the Project area. Soil structure, geology, and topography have been altered to various degrees throughout the Project area, thereby influencing the direction, volume, and chemical composition of surface and groundwater. Each of the four action alternatives is designed to correct the water quality problem in the Project area caused by AMD. Implementation of any of the four action alternatives would require construction and reconstruction of channels, stabilization of gob piles, subsidence closure, and drainage of ponds to direct surface waters away from contamination sources, increase positive drainage, and treat acidic surface waters through the use of limestone and/or steel slag. The Forest Service would implement Forest-wide standards and guidelines to mitigate the temporary impacts to water resources caused during construction of the selected alternative (see Section 6.0).

The greatest benefit, measured in AMD reduction potential, is realized under implementation of the proposed action or Full Scale Without Steel Slag Treatment alternative (Table 2). AMD reduction potentials are lower for the Moderate and Minimum Scale alternatives in comparison to the proposed action and Full Scale Without Steel Slag Treatment alternative (Table 2).

Under the No Action alternative, surface and ground water would continue to be exposed to AMD producing materials and the water quality problem in the Project area would remain uncorrected. Discharge of AMD into the Snake Hollow and Monday Creek watersheds would continue. Only the temporary increases in sedimentation and turbidity of surface waters due to the movement of soils associated with system road reconstruction, temporary road construction, and channel construction and reconstruction would be avoided through implementation of the No Action alternative. These temporary impacts are expected to be greatest for the proposed action or Full Scale Without Steel Slag Treatment alternative because these actions would involve the greatest land disturbance.

4.4 VEGETATION

The primary impact of construction of any of the four action alternatives on vegetation would be the temporary and permanent alteration of vegetative cover as a result of borrow area construction, system road reconstruction, temporary road construction, channel reconstruction, channel construction, and subsidence closure.

Temporary impacts would occur where vegetation would need to be cleared to provide borrow material or gain access to or perform the remedial action at each site. One of the five borrow areas is sited at a coal refuse pile and would not require tree removal. However, the other four borrow areas would require tree removal within mature to maturing second-growth hardwood forest at acreages of 0.07, 0.45, 0.61, and 0.64. Table 6 summarizes the acreage impacts to forested habitats as a result of temporary road construction, and channel construction and

reconstruction for each of the four action alternatives. The impacts associated with temporary road construction, and channel construction and reconstruction would be linear in shape and interspersed throughout the Project area (Figure 2).

Table 6. Temporary Acreage Impacts to Forested Habitat as a Result of Temporary Road Construction, and Channel Construction and Reconstruction for Each of the Four Action Alternatives.

	Alternative				
Alternative Element	**No Action**	**Proposed Action**	**Full Scale Without Steel Slag Treatment**	**Moderate Scale**	**Minimum Scale**
Borrow Area Construction and Use	0	2	2	1	1
Temporary Road Construction and Use	0	6	6	6	3
Channel Reconstruction	0	24	24	17	11
Channel Construction	0	4	4	4	4
Subsidence Closures	0	1	1	1	1
Total	**0**	**37**	**37**	**29**	**20**

Upon completion of construction of any of the four action alternatives, vegetation in temporarily impacted areas would be allowed to revert to pre-construction conditions. The amount of time required for complete recovery of vegetation to pre-construction levels would vary significantly and could take over 50 years for forested areas. However, it should only take 2 to 3 years for herbaceous and shrub cover to occupy disturbed areas. Additionally, the small openings created by implementation of any of the four-action alternatives will not significantly change the nature of the forest in the watershed. Temporary impacts would be minimized through the implementation of Forest-wide standards and guidelines concerning the protection of water and soil resources (see Section 6.0). The rate of revegetation reestablishment on these disturbed areas would depend on a number of factors, such as local climate, soil type, previous vegetation type, planted seed source, and existing seed source.

Land disturbance and alteration of the vegetation composition could increase the risk of introduction of non-native invasive species in the Project area. Non-native invasive species pose a threat to plant and animal community health and diversity. Because 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 non-native invasive species 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 non-native invasive species into the Project area. If these non-native invasive species are allowed to establish, they could easily compromise habitat quality, and thus jeopardize any existing or future populations of rare species in the Project area. A non-native invasive species risk assessment and control measures are provided in Section 6.3. Because of the limited presence of non-native invasive species in the Project area, implementation of any of the four action alternatives and the best management practices identified in Section 6.3 would reduce the potential threat of non-native invasive species establishment to a level that is not undue or significant.

Permanent impacts to vegetation would occur where vegetation would need to be cleared and maintained along system roads that impede the movement of construction equipment or present a safety hazard. These permanent impacts are expected to be approximately equal for all four of the action alternatives.

Under the No Action alternative, there would be no disturbance to vegetation in the Project area. The maximum difference between the alternative with the greatest impact to vegetation and the No Action alternative would be 37 acres (Table 6).

4.5 WETLANDS

In general, the implementation of any of the four action alternatives would not result in the loss of wetlands in the Project area. Although several ponds are proposed to be drained, wetlands are not typically associated with these ponds due to their steep sided topography, which results in an abrupt transition from upland to open water. Similarly, wetlands are not typically associated with the stream channels that would be reconstructed due to their steep sided banks. Additionally, none of the four action alternatives would result in the loss or partial loss of the large wetland that occurs along the primary tributary of the Snake Hollow Watershed. Where temporary roads would cross wetlands, Forest-wide standards and guidelines would be implemented to minimize their disturbance and ensure their restoration.

Because AMD creates acidic conditions favorable to sphagnum moss growth, the sphagnum moss communities present in the Project area are most likely a result of past coal mining activities. All four action alternatives are designed to improve the water quality in the Project area by increasing surface water pH levels. These increased pH levels would most likely result in the loss of the majority of sphagnum moss communities associated with some of the remedial sites (e.g., the drainage associated with Sites 25, 26, 27, 29; Figure 2). Although the community structure of these wetland areas is expected to be permanently altered, wetland vegetation is still expected to dominate these areas and wetland soils and hydrology are expected to remain unaltered.

Staging and borrow areas are sited greater than 50 feet from wetland areas and the siting of all temporary roads would avoid wetlands wherever practicable. If temporary roads are sited across

wetlands to gain access to remedial sites, Forest-wide standards and guidelines for minimizing wetland disturbance would be followed (see Section 6.0).

With the exception of sphagnum moss, wetland flora and fauna are expected to benefit greatly from the improved water quality as a result of implementation of any of the four action alternatives. In addition, wetland surface areas may increase as a result of greater volumes of water occurring at the surface rather than being diverted into subsidence cavities. Implementation of the proposed action or Full Scale Without Steel Slag Treatment alternative would offer the greatest benefit to wetland water quality, as measured in AMD reduction potential (Table 2).

Under the No Action alternative, the loss of sphagnum moss communities would not occur, but the existing water quality problem would remain uncorrected and the continued loss of surface water to subsidence cavities and blocked channels may eventually result in the permanent loss of downstream wetlands.

4.6 FISH AND WILDLIFE

Impacts on aquatic wildlife resources resulting from construction can include sedimentation and turbidity, and the temporary and permanent alteration of stream cover. Turbidity resulting from suspension of sediments during in-stream construction or erosion caused by adjacent excavation activities could reduce light penetration and photosynthetic oxygen production that could adversely affect the benthic, fish, and amphibian community. However, elevated turbidity levels would be relatively high for only short periods of time and for short distances downstream. Some stream habitat and aquatic wildlife would be permanently lost as channels are reconstructed to increase positive drainage, but this loss is expected to be offset by the creation of additional channels in close proximity to those affected through channel reconstruction.

The estimated forested acreage impacts of channel construction and reconstruction for each of the four action alternatives are provided in Table 6. Implementation of the proposed action or Full Scale Without Steel Slag alternative would disturb 28 acres as a result of channel reconstruction and construction activities. For comparison, 21 and 15 acres would be disturbed for the Moderate and Minimum Scale alternatives, respectively.

Implementation of any of the four action alternatives would result in the temporary and permanent alteration of terrestrial wildlife habitat, as well as direct impacts on wildlife such as disturbance, displacement, and mortality. Long-term impacts on wildlife habitat would include alteration of forested habitat through the clearing of trees and shrubs for borrow area construction, system road reconstruction, temporary road construction, and channel construction and reconstruction activities. These clearing activities would reduce cover, nesting, and foraging habitat for some wildlife. However, some wildlife displaced by construction would return to the newly disturbed area and adjacent, undisturbed habitats soon after completion of construction. Less mobile species of small mammals, reptiles, amphibians, as well as nesting birds, may be permanently affected by construction activities due to direct mortality or permanent displacement. Mortality would be caused by trampling of the soils and down and dead material. Clearing of vegetation that may contain nests or cavities where animals would seek shelter may

also result in mortality of wildlife. However, the overall impact on wildlife from tree clearing, both temporary and permanent, would not be significant due to the relatively small size, linear shape, interspersed locations of disturbance, the availability of large amounts of adjacent, undisturbed habitat, and the short duration of construction. The temporary acreage impacts to forested wildlife habitat as a result of implementation of each of the four action alternatives are presented in Table 6.

Other permanent impacts may result from the drainage of ponds/mine pits. Loss of these aquatic habitats may affect several species of wildlife, such as aquatic invertebrates, amphibians, reptiles, waterfowl, wading birds, bats, and other mammals that may use these ponds/mine pits for drinking or feeding. However, because the ponds are very acidic, their value to these wildlife species could be considered low. In addition, beaver activity in the Project area is currently creating ponds and would continue to do so after Project completion. These beaver ponds would occur in more natural areas than some of those proposed to be permanently and temporarily drained (i.e., mine pits at Sites 29, 51, and 53).

Drainage of these acid contributing ponds and the resulting improvement in water quality in the Project area would be considered beneficial to wildlife occurring in the Project area. The improved water quality also would provide higher quality wetland and aquatic habitats downstream from the pond drainage sites. These habitat improvements are expected to increase the abundance and diversity of aquatic and wetland wildlife in the Project area. The estimated acreage of ponds to be drained for each of the four action alternatives are provided in Table 2. Implementation of the proposed action or Full Scale Without Steel Slag alternative would drain a total of approximately 5 acres of ponds. For comparison, 2 and 1 acres of ponds would be drained for the Moderate and Minimum Scale alternatives, respectively.

Although there are clear benefits (e.g., increase positive drainage) derived from the proposed temporary and permanent pond/mine pit drainages, potential impacts to the Federally-listed Indiana bat (see Section 4.7) as a result of these proposed actions were determined to be too great by the USFWS and Forest Service biologist. Therefore, mitigation measures were developed regarding these pond/mine pit drainages (see Section 6.5.3).

None of the four action alternatives are expected to have a significant adverse impact on terrestrial or aquatic wildlife or their habitats. The improvement of the overall water quality through the reduction in AMD as a result of implementation of any of the four action alternatives is expected to increase the abundance and diversity of aquatic and terrestrial wildlife in the Project area. The greatest benefit, measured in AMD reduction potential, is realized under implementation of the proposed action or Full Scale Without Steel Slag Treatment alternative (Table 2). AMD reduction potentials are lower for the Moderate and Minimum Scale alternatives in comparison to the proposed action and Full Scale Without Steel Slag Treatment alternative (Table 2).

Under the No Action alternative, there would be no direct disturbance to terrestrial and aquatic wildlife or their habitats. There would be no permanent displacement or mortality to wildlife species. However, the habitat suitability for aquatic species would continue to remain poor due to the acidic conditions of surface waters. As a result, many terrestrial species that rely on

aquatic habitats for cover and as a food source would continue to experience the reduced habitat quality of the Project area.

4.7 FEDERALLY-LISTED ENDANGERED AND THREATENED SPECIES

The Project's BE determined that because site-specific surveys were conducted and Forest-wide standards and guidelines would be followed regarding the protection of potential habitat, implementation of the any of the four action alternatives would not adversely affect the northern wild monkshood, small whorled pogonia, running buffalo clover, or American burying beetle. A summary of the Project's BE affect determinations regarding the Indiana bat is provided below in Section 4.7.1.

Under the No Action alternative, the existing conditions would remain unchanged. No trees would need to be cleared and no incidental take of Indiana bat individuals or Indiana bat habitat would occur. However, when compared to the No Action alternative, implementation of any of the four action alternatives is expected to benefit the Indiana bat through habitat improvement. The improved water quality and erosion control is expected to increase the abundance and diversity of invertebrates in the Project area, therefore improving feeding opportunities for the Indiana bat.

Based on these evaluations and mitigation measures (outline in Section 4.7.1), implementation of any of the four action alternatives would not contribute to the loss of viability of any of the Federally-listed endangered and threatened species listed in Table 4. The Project's BE, which details the above findings and mitigation measures, is being submitted concurrently with the availability of this EA to the USFWS, Reynoldsburg Field Office, Reynoldsburg, Ohio, for their review and comment. USFWS then has 90 days to concur with the BE or issue a Project-specific Biological Opinion (BO).

4.7.1 Indiana Bat

Population Effects Analysis

The Indiana bat (one male) was identified as occurring in the Project area during site-specific swarming surveys conducted in September 2002 (USFS 2002b). Based on this recent capture and the results of previous Indiana bat captures on the Athens and Ironton Ranger Districts, Indiana bats are assumed to be present in all suitable habitat on the Wayne NF (USFS 2001c). Suitable habitats in the form of mine openings (i.e., hibernacula) and mature hardwood forests (i.e., foraging and roost sites) are found throughout the Project area. However, due to the minimal vegetation clearing and land disturbance associated with waste coal pile stabilization and isolation, limestone treatment, and steel slag treatment, a No Effect determination was made on populations of Indiana bat as a result of implementation these proposed activities.

A Likely to Adversely Affect determination was made for populations of Indiana bat for activities that would involve the removal of potential roost trees. Such activities include staging area construction, borrow area construction, road reconstruction, temporary road construction, channel reconstruction, and channel construction. A Likely to Adversely Affect determination

was made for populations of Indiana bat for pond drainage and maintenance activities because of the potential for the removal of foraging resources.

It was also determined that reasonably foreseeable actions in, or in the vicinity of, the Project area, such as recreational facility/trail construction, the Big Four Hollow Restoration Project, Nelsonville–U.S. Route 33 Bypass, and communication tower and access road, would Likely Adversely Affect populations of Indiana bat and could be viewed as cumulative impacts (see Section 5.0). Construction activities collectively occurring in the Project area and adjacent lands associated with Forest Service and non-Forest Service projects may decrease the amount of potential habitat available for the Indiana bat in the future, due to the removal of vegetation from the construction site or disturbance around hibernacula. However, Forest-wide standards and guidelines would be followed for Forest Service projects and state and Federal laws and regulations exist for the non-Forest Service projects, which would reduce these impacts.

Habitat Effects Analysis

Impacts to foraging and roosting habitat from road reconstruction, temporary road construction, channel construction, and channel reconstruction should be minimal due to the linear shape and interspersed distribution of the associated impacts (Table 1, Figure 2). Borrow area construction would have the greatest impact on Indiana bat habitat because these activities would result in the removal of contiguous blocks of upland forest. However, the largest of the five areas that would require forest clearing is only 0.78 acres in size. These impacts could be considered minor because they would occur within a 1,200-acre Project area that is primarily mature to maturing second-growth hardwood forest. Additionally, the proposed pond drainages would remove potential foraging habitat, however the existing ponds are highly acidic and do not support large numbers of invertebrates. Improvements to the water quality in the Project area as a result of implementation of the any of the four action alternatives is likely to compensate for the loss of these ponds. Also, the four action alternatives are not expected to have an effect on beaver activity in the Project area and the creation of ponds would continue to occur after Project completion. Because of the expected impacts of staging area construction, borrow area construction, road reconstruction, temporary road construction, channel construction, channel reconstruction, and pond drainage activities a Likely to Adversely Affect Determination was made for Indiana bat habitat in the Project area.

The closing of underground entrances is conducted on the Wayne NF to protect human safety and improve water quality through reducing AMD. These openings are dangerous but offer unique habitat features for the Indiana bat. Backfilling and obstruction of the openings prevents bats and other wildlife species from utilizing the underground feature. This type of closure can have a direct impact on bats, depending on the time of year this type of closure is implemented, by entombing bats within the underground structure. This type of closure also can indirectly affect Indiana bats by changing the airflow, temperature, and humidity at the opening or possibly other connecting openings in close proximity, rendering the openings unsuitable for bat use. The Wayne NF also closes some of these openings by fitting them with gates and/or fencing which ensures human safety and also allows for continued use of the underground structure by the Indiana bat. Currently, there are seven bat-friendly gates on underground mines on the Wayne NF; none of these are located in the Project area.

All four action alternatives would close one mine portal (Table 1, Figure 2; Site 30). The portal was surveyed for potential bat use during surveys conducted in September 2002. The portal is located where two drainages merge and appears to have been created after the collapse of the mine roof. The opening is small (approximately 2 feet wide by 1 foot in height), and it becomes even smaller inside where a large slab of rock blocks part of it. The drainages involved apparently carry relatively large volumes of water during rain events. Some water appears to be captured by the opening, as evidenced by vegetative debris around the entrance. Based on the size and shape of the opening, it is unlikely that the mine portal proposed to be closed is used by bats (Schultes 2002). Therefore, a Not Likely to Adversely Affect Indiana bat populations and habitat determination was made with regard to the closing of this entrance.

Incidental Take Compliance

Sections 4(d) and 9 of the ESA prohibit the take of Federally-listed endangered and threatened species without special exemption. Under the terms of Section 7(b)(4) and Section 7(o)(2) of the ESA, taking that is incidental to and not intended as part of the agency action is not considered to be a prohibited taking under the ESA, provided that such taking is in compliance with the Terms and Conditions of the incidental take statement.

The Wayne NF has a continuing duty to regulate the activity covered by this incidental take statement. If the Wayne NF fails to assume and implement the Terms and Conditions, the protective coverage of Section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Wayne NF must report the progress of the action and its impact on the species to the USFWS as specified in the incidental take statement (50 Code of Federal Regulations [CFR] §402.14(i)(3)).

Staging area construction, temporary road construction, borrow area construction, channel construction, channel reconstruction, subsidence closure, and mine portal closure would have the greatest impact on the Indiana bat through tree clearing. It is anticipated that system road reconstruction (i.e., improvement of existing roads) would require the removal of only a few trees along existing road banks that impede the movement of construction equipment or present a safety hazard. Implementation of these activities is expected to total approximately 37 acres and individual impacts would be small or linear in shape, and occur at various locations throughout Project area.

One mine entrance would be closed as a result of implementation of the selected alternative. The Forest Plan BO incidental take statement allows 250 acres for closure of underground entrances. Pond drainage is not an activity considered in the Forest Plan Biological Assessment (BA) or BO, therefore no incidental take limits were presented by the USFWS. However, during a site visit, the USFWS made several recommendations regarding activities at several pond sites in the Project area (see Section 6.6.3).

Mitigation

Because of the determination that some of the activities associated with the four action alternatives are Likely to Adversely Affect populations and habitat of the Indiana bat, mitigation measures to minimize potential adverse effects would be implemented. These mitigation measures involve the Terms and Conditions as outlined in the Forest Plan BO and Project-specific mitigation measures developed specifically for activities associated with the four action alternatives. These Terms and Conditions and Project-specific mitigation measures are detailed below.

The majority of the clearing activities are sited through a large contiguous block of mature to maturing second-growth hardwood forest that characterizes the 1,200-acre Project area. Because of this and the linear shape (i.e., temporary road construction) and small size (i.e., borrow area construction) of impacts, implementation of the selected project alternative should not effect the tree species/size per acre or the maintenance of at least 60 percent canopy cover requirements as outlined in the Forest Plan BO.

The following Terms and Conditions as stated Forest Plan BO would be implemented to minimize the incidental take of individual Indiana bats and offer protection to Indiana bat habitat in the Project area:

1. Construction activities would not occur within 0.25 mile of known Indiana bat hibernacula.

2. Siting of all Project activities would avoid dead or dying (less than 10 percent live canopy) shagbark hickory and shellbark hickory trees over 6 inches dbh to the maximum extent practicable.

3. Siting of all Project activities would avoid all live trees, of any species, over 6 inches dbh that are hollow, have major splits, or have broken tops to the maximum extent practicable.

4. If dead or dying shagbark hickory and shellbark hickory, or live trees (as described above) over 6 inches dbh cannot be avoided, then removal of these trees would only occur during the hibernation season when bats are not utilizing these potential roost trees (October 15 to April 15).

5. Dead or dying shagbark hickory and shellbark hickory, or live trees (as described above) over 6 inches dbh can be removed with no time constraints if they are determined to be hazard trees.

In addition to the above Terms and Conditions, the following Project-specific measures would be implemented to minimize the incidental take of individuals and offer protection to Indiana bat habitat in the area where an Indiana bat was captured during swarming surveys conducted in September 2002. These measures were developed during discussions between the Wayne NF personnel and USFWS Reynoldsburg Field Office personnel. These measures were recommended by the USFWS upon their review of the Project's alternatives.

1. The construction and use of Borrow Area 4 (see Figure 2) would require undesirable tree clearing in the area of a potential Indiana bat hibernacula, therefore the construction of Borrow Area 4 would be removed from the selected project alternative.

2. Reconstruction of the channel at Site 36 (see Figure 2) would require undesirable tree clearing and cause undesirable disturbance in the area of a potential Indiana bat hibernacula, therefore activities proposed for Site 36 would not be carried out for the selected project alternative.

3. The pond at Site 7 (see Figure 2) is proposed to be permanently drained. However, it is a bat foraging site (USFS 2002b). Therefore, the pond would be temporarily drained to allow for reconstruction of Township Road 387 under the implemented action. In addition, the pond would be drained outside of the fall swarming period (August 15 to October 15). The pond would be reconstructed to approximately its original depth and surface area to the maximum extent practicable upon completion of road reconstruction activities.

4. The ephemeral pond below Site 38 will be maintained by a limestone berm.

5. The pond/mine pit at Site 51 is proposed to be temporarily drained and the pond/mine pit at Site 53 is proposed to be permanently drained. However, Indiana bat surveys have not been conducted at these sites, therefore the ponds/mine pits at Sites 51 and 53 will only be temporarily drained to allow for road reconstruction. In addition, these ponds/mine pits only would be drained outside of the fall swarming period (August 15 to October 15). The ponds/mine pits would be reconstructed to approximately their original depth and surface area to the maximum extent practicable upon completion of remedial activities.

6. All potential roost trees in the drainages associated with Sites 3, 7, and 34 through 42 and along sited temporary roads would be marked by Forest Service biologists prior to construction activities. These trees would then be avoided to the maximum extent practicable. Potential roost trees are dead or dying (less than 10 percent live canopy) shagbark hickory and shellbark hickory trees over 6 inches dbh and all live trees, of any species, over 6 inches dbh that are hollow, have major splits, or have broken tops.

7. All potential roost trees around the mine portal closure site (Site 31) would be marked and avoided to the maximum extent practicable. Potential roost trees are dead or

dying (less than 10 percent live canopy) shagbark hickory and shellbark hickory trees over 6 inches dbh and all live trees, of any species, over 6 inches dbh that are hollow, have major splits, or have broken tops.

Conclusion

The Indiana bat and its habitat could be adversely affected by implementation of activities associated with any of the four action alternatives; however upon implementation of the Terms and Conditions and Project-specific mitigation measures outlined above, the continued existence of the Indiana bat will not be jeopardized.

4.8 REGIONAL FORESTER'S SENSITIVE SPECIES

Because the likelihood of the striped gentian or blue scorpionweed occurring in the Project area is very low given their current known distributions, implementation of any of the four action alternatives would not likely impact these species. Also, because site-specific surveys did not find individuals of the umbrella magnolia, rock skullcap, timber rattlesnake, green salamander, four-toed salamander, Rafinesque's big eared bat (with Indiana bat survey), evening bat (with Indian bat survey), and Allegheny woodrat in the Project area, implementation of any of the four action alternatives should not contribute to the loss of viability of these species or cause them to move toward Federal listing.

The juniper sedge is only known to occur in Adams, Lawrence, Brown, Highland, and Pike counties. Additionally, a population was found in Athens County less than 3 miles southeast of the Project area in June 2002 (Larson 2003). As a result of these findings, a survey of potential habitat in the Project area, specifically semi-open second-growth woodlands occurring in the areas of disturbance, is scheduled during the spring of 2003 (Larson 2003). The survey will be conducted during the juniper sedge's flowering period between mid April and early May. However, most known populations of the juniper sedge have been observed on soils derived from dolomite or limestone parent material. The Project area's geology is predominantly shale, sandstone, or siltstone at bedrock. Therefore, the juniper sedge is unlikely to occur in the Project area. Because of the unfavorable soil conditions and assuming that the sedge is not present in the Project area due to unfavorable soil conditions, implementation of the proposed action should not contribute to the loss of viability of the juniper sedge or cause it to move toward Federal listing. However, on the chance that the juniper sedge is discovered during spring surveys, the impact assessment would be reanalyzed and appropriate mitigations implemented.

One individual of butternut was located in the Project area during site-specific surveys conducted in May 2002. Protection measures for this butternut are presented in the Project's BE. No butternuts will be cut during construction of the selected alternative. Thus, implementation of the proposed action should not contribute to the loss of viability of the butternut or cause it to become a candidate for Federal listing.

The four-toed salamander was removed from the Wayne NF RFSS list. However, because of its recent discovery in a spring approximately 10 miles from Bluegrass Ridge on the Ironton Ranger District (USFS 2002a), it may return to the Wayne NF RFSS list. The four-toed salamander is

commonly associated with sphagnum moss dominated habitats which tend to flourish where acid conditions exist. Because improving the water quality (i.e., increasing the pH) would likely eradicate sphagnum communities in portions of the Project area, efforts were made to survey this community type for the four-toed salamander to determine if any mitigation measures would be necessary. Individuals of the four-toed salamander were not identified as occurring in any of the sphagnum moss communities that would be directly impacted by the Project during surveys conducted in September 2002. The Project's BE concluded that the Project should not contribute to the loss of viability of the four-toed salamander or cause it to become a candidate for Federal listing.

One potential black bear den site was located in the Project area (adjacent to site 36; Figure 2), however the potential den site would not be closed or impacted by any of the four action alternatives. Thus, implementation of the proposed action should not contribute to the loss of viability of the black bear or cause it to become a candidate for Federal listing.

Based on these evaluations, implementation of any of the four action alternatives and mitigation measures should not contribute to the loss of viability any of the RFSS listed in Table 5.

Under the No Action alternative, impacts to potential habitat would be avoided for any of the species listed in Table 5. However, the water quality problem in the Project area would continue to prevent or inhibit colonization of aquatic and terrestrial habitats by several of species listed in Table 5.

4.9 MANAGEMENT INDICATOR SPECIES

Because the water quality in the Project area would be greatly improved with implementation of any of the four action alternatives, significant adverse impacts to the 20 MIS are not expected. Some tree clearing would be required and forest interior species like the pileated woodpecker or cerulean warbler may be impacted through forest fragmentation. However, the largest continuous block that would require forest clearing is only 0.78 acres in size and would be needed for construction of Borrow Area 2 (Table 2). The majority of the impacts are small, are linear in shape, and would occur at remedial sites distributed throughout the Project area (Table 1; Figures 2 – 5). Therefore, the increase in forest fragmentation due to implementation of any of the four action alternatives could be considered minor because they would total 37 acres and occur throughout a 1,200-acre Project area. Additionally, these minor impacts are expected to be offset by the improved water quality, which is expected to increase the abundance and diversity of all wildlife species in the Project area. In particular, implementation of any of the four action alternatives would reduce AMD in the Project area. Decreasing the metal ion concentrations and increasing the pH in Project area ponds and streams would create suitable habitat conditions for the western chorus frog and wood frog, as well as fish species.

The greatest benefit to MIS species, measured in AMD reduction potential (Table 2), would be realized with implementation of the Full Scale or Full Scale Without Steel Slag Treatment alternatives when compared to the lesser scale alternatives. Under the No Action alternative, the water quality problem in the Project area would remain uncorrected and the potential for occupation of the Project area by several of the MIS species in the future would remain low.

4.10 LAND USE

Regardless of implementation of the No Action alternative or any of the four action alternatives, the Project area will continue to be managed under the prescriptions of Management Area 3.2. The temporary clearing of land for borrow areas, temporary road construction, channel construction and reconstruction, and subsidence closure under any of the four action alternatives would have no negative impacts on land use in the Project area.

4.11 RECREATION

One of the primary concerns regarding impacts of implementation of the any of the four action alternatives on recreation is the temporary disturbance to hikers, ORV users, campers, hunters, and sightseers, from the disruption and noise caused by construction equipment. Because construction of any of the alternatives would generally be scheduled during spring, summer, and/or fall when these activities are at their peak, this impact to a large extent is unavoidable. Proposed mitigation includes construction-timing restrictions (avoidance of construction during peak use periods), posting of construction bulletins at visitor centers and road and trail entrances, and temporary closure of access roads and ORV and hiking trails. Roads and trails would be closed when the presence of construction equipment or the construction activities pose a safety hazard to potential forest users. None of the four action alternatives would reduce or increase the mileage, or alter the current routes, of the ORV trails that currently exist in the Project area.

Because the proposed action and the Full Scale Without Steel Slag Treatment alternative would occur over a larger area (Figures 2 and 3), contain the most remedial action sites (Table 2), and would require the longest construction period, these alternatives would have the greatest impact on recreational use of the Project area. Similarly, the Moderate Scale alternative would have a greater impact on recreational use than the Minimum Scale alternative, but not greater than the proposed action or Full Scale Without Steel Slag Treatment alternative (Figures 4 and 5; Table 2).

Under the No Action alternative, recreational resources would be unaffected. Forest users would experience the condition of the Project area as is, without the temporary disruptions caused by the presence of, and noise caused by, construction equipment. However, recreational use may increase as a result of implementation of any of the four action alternatives when compared to the No Action alternative. The increase in diversity and abundance of flora and fauna as a result of implementation of any of the four action alternatives could increase recreational use by increasing fishing, hunting, and wildlife viewing opportunities.

4.12 VISUAL AND AESTHETIC RESOURCES

Potential impacts on visual resources associated with construction of any of the four action alternatives primarily result from the alteration of terrain and vegetation patterns due to borrow area construction, temporary road construction, channel construction and reconstruction, subsidence closure and pond drainage (see Section 4.4). However, impacts due to the removal of vegetation would be temporary, linear in shape, and interspersed throughout the Project area and

would not significantly alter the continuous canopy that provides visitors to the Project area with a scenic terrain. Approximately 37 acres of vegetation would need to be cleared under implementation of the proposed action and Full Scale Without Steel Slag Treatment. For comparison, approximately 29 and 20 acres would need to be cleared under the Moderate Scale and Minimum Scale alternatives, respectively.

Additionally, impacts to the scenic terrain may result from the lining of channels and ponds with limestone and/or steel slag, which could be viewed as unnatural. This impact is expected to be temporary, because leaf litter and other forest debris would quickly cover limestone or steel slag lined channels and ponds after the first growing season following construction.

The improvement of the water quality in the Project area is expected to enhance the overall visual and aesthetic appeal of the Project area to all potential users. Water quality improvements are expected to reduce water discoloration and increase the abundance and diversity of wildlife in the Project area. Because the proposed action and the Full Scale Without Steel Slag Treatment alternative would occur over the largest extent, contain the most remedial action sites, and would take the longest to construct, these alternatives would have the greatest impact on visual and aesthetic resources of the Project area. Similarly, the Moderate Scale alternative would have a greater impact on visual and aesthetic resources than the Minimum Scale, but not greater than the proposed action or Full Scale Without Steel Slag Treatment alternative.

Under the No Action alternative, visual and aesthetic resources would be unaffected. Forest users would experience the condition of the Project area as is, with no interruptions in the forest canopy caused by the removal of forest vegetation. However, the AMD problem would continue to alter the normal coloration of Project area waters, which is considered to be visually and aesthetically unpleasing.

4.13 SOCIOECONOMICS

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 provided by the Wayne NF contribute to state and local tax revenues as a result of the purchase of goods and services. None of the proposed action alternatives would have an effect on the purchase of goods and service by Wayne NF visitors.

Short-term benefits to the local economy would be realized in the expenditures of the construction payroll. During construction, some portion of the construction payroll would be spent locally for the purchase of housing, food, gasoline, and entertainment. Sales tax would also be paid on all goods and services purchased with construction payroll monies and for locally purchased construction materials.

Implementation of any of the four action alternatives or the No Action alternative is not expected to negatively affect the current population, housing, economy, or tourism condition of Hocking County.

4.14 CULTURAL RESOURCES

The Wayne NF prepared a Cultural Heritage Assessment for the Project. Mandy Reese, Wayne NF Archaeological Technician, reviewed documentation of heritage resource surveys within the Project area. Ms. Reese determined that proposed Project alternatives would not affect any historic properties and work should be allowed to proceed as planned. A copy of the memorandum documenting these findings can be found in the Project file. Under the No Action alternative, cultural resources in the Project area would be unaffected.

4.15 AIR QUALITY AND NOISE

Construction of any of the four action alternatives is expected to temporarily affect local air quality in the Project area. The operation of construction equipment would be the primary source of emissions of air pollutants. Because emissions would be localized and temporary, air quality in the Project area is not expected to be significantly affected and would continue to meet USEPA standards.

Construction of any of the four action alternatives is expected to result in a temporary increase in local noise levels. Increased noise levels would primarily be produced from the operation and movement construction equipment and noise levels would vary depending number and type of equipment required during each construction phase. Typical equipment used would include dump trucks for hauling limestone and/or steel slag, backhoes for channel construction and reconstruction, and chain saws for vegetation clearing.

Because the Project area is isolated from residential and commercial areas and the location of the remedial action sites are primarily in steep sided drainages, individuals exposed to the increased noise levels would be limited to those residing along the primary roads used to haul equipment and materials into the Project area. Some hikers and other Wayne NF visitors may experience the increased noise levels, however the Wayne NF would minimize visitor use of the Project area through the use of notification bulletins posted at visitor centers and road and trail entrances.

Under the No Action alternative, air quality and noise levels in the Project area would be unaffected.

5.0 CUMULATIVE IMPACTS

The President's CEQ defines a cumulative impact as "an impact on the environment [that] results from the incremental impact of the action [under review] when added to other past, present, and reasonably foreseeable future action (RFFAs). Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." NEPA requires agencies to give more consideration to alternatives and mitigation for actions that would have significant impacts than for actions that would not cause or contribute to significant impacts.

5.1 REASONABLY FORESEEABLE FUTURE ACTIONS

RFFAs evaluated in the Forest Plan EIS are provided in Table 7. RFFAs in the vicinity of the Project area and not evaluated in the Forest Plan EIS include the reroute and expansion of U.S. Route 33, the Big Four Hollow Watershed Restoration Project, a helicopter landing pad, and a communication tower and access road (Table 3).

Table 7. Reasonably Foreseeable Future Actions in Addition to Project Related Activities.

Reasonably Foreseeable Future Action	Planned	Not Planned
Forest Activities Evaluated in the Forest Plan EIS		
Timber Management	X	
Reforestation	X	
Prescribed Fire	X	
Creation of Wildlife Openings	X	
Live Stock Grazing[a]		X
Land Exchange/Purchase[a]		X
Roads Construction, Maintenance, and Use	X	
Recreational Facility/Trail Construction and Use	X	
Mineral Development[a]		X
Construction of Lakes/Ponds/Marshes	X	
Pesticide and Herbicide Use[a]		X
Agricultural Permits and Utility Corridors[a]		X
Activities/Projects Not Evaluated in Forest Plan EIS		
Helicopter Landing Pad	X	
Big Four Hollow Restoration Project	X	
Communication Tower and Access Road[b]	X	
Nelsonville–U.S. Route 33 Bypass[b]	X	

[a] Permitted but not planned in the Project area.
[b] Non-Forest Service activities.
Source: USFS 1988; Prescriptions for Management Area 3.2, USFS 2001b.

5.1.1 Forest Activities Evaluated in the Forest Plan EIS

Environmental effects of activities planned in the Project area, such as timber management and prescribed fire (Table 7), have been evaluated in the Forest Plan EIS, and the effects of these activities on Federally-listed threatened and endangered species have been evaluated in the Forest Plan BA and BO. These evaluations take into consideration the implementation of applicable Forest-wide standards and guidelines and avoidance and mitigation measures, and concluded that implementation of these activities would not result in significant adverse impacts on environmental resources. Because the largest scale alternative would only impact 37 acres, it is unlikely that implementation of this Project would have significant cumulative effect when considering these planned actions.

5.1.2 Activities/Projects Not Evaluated in Forest Plan EIS

Unlike those actions discussed in Section 5.1.1, implementation of this Project may have a cumulative impact on environmental resources, when considering actions not evaluated in the Forest Plan EIS, but planned in or within the vicinity of the Project. These RFFAs are described below and are carried through the cumulative effects analysis presented in Section 5.2.

Helicopter Landing Pad

Currently an open area on a gob pile at Site 9 (see Figure 2) is a designated emergency helicopter-landing pad. However, the area is not level and plans to level the gob pile and construct a hardened landing pad are being considered by the Forest Service. Construction of the helicopter landing pad would require minimal tree clearing because construction would be limited to an exposed gob pile with little vegetation.

Big Four Hollow Watershed Restoration Project

This Big Four Hollow Watershed Restoration Project and this Project respond to Forest Plan direction to protect and enhance water quality. The Big Four Hollow Watershed Restoration Project falls within the Monday Creek Watershed and is located in southwestern Hocking County, near the Village of Longstreth along Hocking County road 24 and Ward Township road 277. The purpose of the project is to correct several water quality problems in the Big Four Hollow Watershed. These 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 the Monday Creek Watershed. By addressing these problems, substantial and significant improvement to the water quality in both Big Four Hollow and Monday Creek would be achieved. The Big Four Hollow Watershed Restoration Project is similar in scope and purpose and need to this Project, however it would occur over a much smaller scale. Less than 20 acres of vegetation would be disturbed as result of its construction.

Communication Tower and Access Road

The communication tower will be located north of the prison and west of the water tower, outside of the Snake Hollow Watershed. It will require approximately 700 feet of new road of which 250 feet would be on Wayne NF owned land. The tower will be 280 feet tall and would disturb about 0.2 acre. It will be used as part of a statewide emergency communication network. Construction is scheduled for the summer of 2003.

Nelsonville–U.S. Route 33 Bypass Project

Although the final route for the Nelsonville–U.S. Route 33 Bypass Project has not been determined, it will likely impact Wayne NF owned land. The route will be within the Hocking River Watershed, which is south of and adjacent to the Snake Hollow and Monday Creek watersheds. The proposed bypass project will require the disturbance of a substantial amount land adjacent to the Project area.

5.2 CUMULATIVE EFFECTS ON RESOURCES

Cumulative effects associated with past, present, and RFFAs not evaluated in the Forest Plan EIS and within or in the vicinity of the Project area are summarized in this section by resource area, including geology, soils, water resources, biological resources, land use, recreation, visual resources, socioeconomics, cultural resources, air quality, and noise. This section addresses the summarized cumulative effects, whereas "no effect" issues are not addressed.

5.2.1 Geology

Past mining activities have severely impacted the geology of the area of influence due to the removal and movement of materials. Because the four action alternatives and the RFFAs would not significantly impact the geology of the region, there would be no cumulative impacts associated with implementation of any of these alternatives.

5.2.2 Soils

The implementation of past, present, and RFFAs in the region of influence likely would have minor short-term indirect and long-term direct impacts on soils. Earth moving associated with construction activities may result in temporary, indirect soil erosion and sedimentation. However, Forest-wide standards and guidelines would be followed for Forest Service projects, and state and Federal laws and regulations exist for the non-Forest Service projects, regarding water and soil protection measures during earth moving activities. The mitigation measures would reduce potential temporary erosion and sedimentation effects to a level that is not undue or significant. The 37 acres of land disturbance associated with the largest scale action, combined with other actions (e.g., Big Four Hollow Watershed Restoration Project) in the vicinity of the Project area, represents a long-term, direct, beneficial impact on topography and associated soils by restoring natural drainages.

5.2.3 Water Resources

The implementation of past, present, and RFFAs in the Project area likely would have no direct or indirect significant impacts on groundwater resources. Cumulatively, these actions would result in a potential temporary, minor, adverse impact on surface waters due to potential soil erosion during construction activities, primarily associated with construction of the Big Four Hollow Watershed Restoration Project and the Nelsonville–U.S. Route 33 Bypass Project. However, Forest-wide standards and guidelines would be followed for Forest Service projects and state and Federal laws, and regulations exist for the non-Forest Service projects regarding water and soil protection measures during earth moving activities. These mitigation measures would reduce potential temporary erosion and sedimentation effects to a level that is not undue or significant. Both the proposed Project and the Big Four Hollow Watershed Restoration Project would combine to cumulatively enhance the water quality in the Monday Creek Watershed.

5.2.4 Vegetation

The implementation of past, present, and RFFAs in the region of influence would increase the potential for short-term and long-term adverse impacts on vegetation, including the long-term direct loss or conversion of common vegetation types. The Big Four Hollow Watershed Restoration Project is similar in scope and purpose and need to this Project, however it would occur over a much smaller scale. Less than 20 acres of vegetation would be disturbed as result of its construction. Therefore, construction of the Big Four Hollow Watershed Restoration Project would not significantly contribute to cumulative impacts to vegetation. Also, construction of the helicopter landing pad is not expected to significantly contribute to the cumulative impacts to vegetation, because minimal tree clearing would be required and construction would be limited to an exposed gob pile.

The construction of the proposed Nelsonville–U.S. Route 33 Bypass Project would impact a much larger area. The bypass is sited through Wayne NF and could result in the removal of mature forest. The greatest impacts of any of the four action alternatives is 37 acres of land and therefore would not significantly contribute to impacts associated with the much larger scale bypass project. The acreage and forest types impacted by the proposed Nelsonville–U.S. Route 33 Bypass Project and communication tower and access road project are indeterminable at this time. However, construction of the Nelsonville–U.S. Route 33 Bypass Project would undoubtedly receive Federal funding and a NEPA EIS would be required that would evaluate the impacts to vegetation in general. As a result, implementation of past, present, and RFFAs in the Project area would result in minor beneficial and adverse cumulative impacts on vegetation.

5.2.5 Wetlands

If construction of any of the four action alternatives and any of the RFFAs results in the anticipated impacts to jurisdictional wetlands, permits and approvals would be required from the United States Army Corps of Engineers. The permit processes would involve evaluation of impacts, avoidance and minimization measures, and mitigation measures for unavoidable impacts. Therefore, no significant adverse cumulative impacts to wetlands are anticipated.

5.2.6 Fish and Wildlife

Implementation of any of the four action alternatives would greatly improve water quality, and thereby is expected to increase the abundance and diversity of fish and wildlife. Similar positive effects of the Big Four Hollow Watershed Restoration Project on fish and wildlife are expected and would result in cumulative benefit in the Project area. Impacts to fish and wildlife species as a result of non-Forest Service RFFAs would be less likely evaluated and would be difficult to determine. However, construction of the Nelsonville–U.S. Route 33 Bypass Project would undoubtedly receive Federal funding and a NEPA EIS would be required that would evaluate the impacts to fish and wildlife in general. As a result, implementation of past, present, and RFFAs in the Project area would result in minor beneficial and adverse cumulative impacts on fish and wildlife.

5.2.7 Federally-Listed Endangered and Threatened Species

It was determined that RFFAs in and near the Project area, the Big Four Hollow Watershed Restoration Project, Nelsonville–U.S. Route 33 Bypass Project, and communication tower and access road, would Likely Adversely Affect populations of Indiana bat and could be viewed as cumulative impacts. Construction activities occurring in the Project area and adjacent lands associated with Forest Service and non-Forest Service projects (Table 7), may decrease the amount of potential habitat available for the Indiana bat in the future, due to the removal of vegetation from the construction site or disturbance around hibernacula. However, Forest-wide standards and guidelines would be followed for Forest Service projects and state and Federal laws and regulations exist for the non-Forest Service projects, which would reduce these impacts.

Cumulative impacts associated with RFFAs presented in Table 7 are expected to be well within the limits of the Forest Plan BO incidental take statement. Recreation facility/trail construction in the Project area is anticipated to require minimal tree clearing. The Big Four Hollow Watershed Restoration Project involves activities similar to the four action alternatives but over a much smaller area and would involve less than 20 acres of tree removal and no mine portal closures. The construction of the proposed Nelsonville–U.S. Route 33 Bypass Project would impact a much larger area, and the reroute is sited through Wayne NF and could result in the removal of several acres of mature forest. However, because the greatest impacts of any of the four action alternatives is on 37 acres of land, the cumulative affect of the Nelsonville–U.S. Route 33 Bypass Project could be considered insignificant. The acreage and forest types impacted by the proposed Nelsonville–U.S. Route 33 Bypass Project and communication tower and access road project are indeterminable at this time. In addition, construction of the Nelsonville–U.S. Route 33 Bypass Project would undoubtedly receive Federal funding and a NEPA EIS would be required that would evaluate the impacts Federally-listed endangered and threatened species.

See Section 6.0 for a discussion of Forest-wide standard and guidelines, Forest Plan BO Terms and Conditions, and Project-specific mitigation measures that would be implemented to reduce

the cumulative effects of construction of any of the four action alternatives on soil and water resources and threatened and endangered species.

5.2.8 Regional Forester's Sensitive Species

Implementation of any of the four action alternatives and mitigation measures should not contribute to the loss of viability of RFSS or cause them to move toward Federal listing. An evaluation of impacts to RFSS would be required of all proposed Forest Service RFFAs. Impacts to RFSS as a result of non-Forest Service RFFAs would be less likely evaluated, however many species on the Wayne NF RFSS list are afforded some protection from the State of Ohio. Because this Project's largest scale alterative is only expected to impact 37 acres of land, the cumulative effects from implementation of any past, present, and RFFAs could be considered insignificant.

5.2.9 Management Indicator Species

For this Project, because the water quality in the Project area would be greatly improved with implementation of any of the four action alternatives, negative impacts to the Wayne NF's 20 MIS are not expected. An evaluation of impacts to MIS would be required of all proposed Forest Service RFFAs. Impacts to MIS as a result of non-Forest Service RFFAs would be less likely evaluated and would be difficult to determine. However, construction of the Nelsonville–U.S. Route 33 Bypass Project would undoubtedly receive Federal funding and a NEPA EIS would be required that would evaluate the impacts to wildlife in general. As a result, implementation of past, present, and RFFAs in the Project area would result in minor beneficial and adverse cumulative impacts on MIS.

5.2.10 Land Use

Generally, existing land uses in the Project Area are consistent with uses identified in the Forest Plan for Management Area 3.2 (Forest Plan), and any proposed development or redevelopment would be required to be consistent with land uses allowed in accordance with the Forest Plan. Therefore, adequate controls are in place to ensure any future developments are consistent with Wayne NF goal and objectives.

5.2.11 Recreation

The implementation of past, present, and RFFAs in the region of influence likely would result in long-term direct impacts on recreation resources, both adverse and beneficial. Implementation of the communication tower and access road project and Nelsonville–U.S. Route 33 Bypass Project would each result in long-term, minor, adverse impacts on recreational resources. However, existing recreation resources would be enhanced in the long-term by the implementation of the Project and the Big Four Hollow Watershed Restoration Project as a result of the improved water quality.

5.2.12 Visual and Aesthetic Resources

The implementation of past, present, and RFFAs in the region of influence likely would result in long-term direct impacts on visual resources, both adverse and beneficial. Implementation of the communication tower and access road project and Nelsonville–U.S. Route 33 Bypass Project would each result in long-term, minor, adverse impacts on visual resources by converting natural landscapes to trail or paved surfaces, a tower structure, and permanently cleared rights-of-way. However, existing visual and aesthetic resources would be enhanced in the long-term by the implementation of the Project and the Big Four Hollow Watershed Restoration Project as a result of the improved water quality.

The construction of the proposed Nelsonville–U.S. Route 33 Bypass Project would result in the greatest impact on visual aesthetic resources in the region influence. The acreage and forest types impacted by the proposed Nelsonville–U.S. Rouse 33 Bypass Project and communication tower and access road project are indeterminable at this time. However, because the greatest impact of any of the four action alternatives is 37 acres of land, the cumulative effects of the Nelsonville–U.S. Route 33 Bypass Project could be considered insignificant.

5.2.13 Socioeconomics

Employment of construction contractors needed to complete all past, present, and RFFAs would result in a minor temporary beneficial impact to socioeconomic resources within Hocking County. Once these actions are complete, the employment of contractors would not be necessary and the temporary employment benefit would cease.

5.2.14 Cultural Resources

Generally, any development would be required to comply with the National Historic Preservation Act for the protection of properties listed or eligible for listing on the National Register of Historic Places as well as State Historic Preservation Office recommendations. As a result, no undue adverse cumulative impacts on cultural resources are anticipated.

5.2.15 Air Quality and Noise

The implementation of past, present, and RFFAs in the Project area likely would have temporary adverse direct and indirect impacts on the local and regional air quality. All actions may result in increased direct emissions of exhaust and fugitive dust from construction machinery and activities. However, temporary construction emissions generally would be minor and confined primarily to individual project sites. Cumulatively, these temporary emissions of pollutants likely would not exceed EPA standards.

The implementation of past, present, and RFFAs in the project area likely would have temporary, direct and indirect, adverse impacts on noise in the region of influence. These actions would result in temporary increased noise during construction and any required blasting activities. Cumulatively, adverse noise impacts on recreational and residential activities would be reduced

to a level that is not undue or significant by performing external or exterior construction and blasting activities only during daylight, weekday hours.

6.0 GUIDELINES AND MITIGATION SUMMARY

6.1 FOREST-WIDE STANDARDS AND GUIDELINES

Sections 4.8 and 5.0 specify that Forest-wide standards and guidelines will be followed to ensure that implementation of the selected alternative would have no effect or would not likely have significant effects on soils, water resources, vegetation, wetlands, and Federally-listed endangered and threatened species (with implementation of Terms and Conditions; see Section 6.5.2). Twenty standards and guidelines were determined to be applicable to construction of the selected alternative (Appendix A). Section 6.2 outlines the specific application of the Forest-wide standards and guidelines as they pertain to construction of the selected alternative.

Several sections of the Forest Plan discuss standard protection and mitigation measures for soil and water during and after the disturbance of upland, riparian, and in-stream substrates. Therefore, the soil and water protection measures most applicable to the Project activities are listed below as reference to the Forest Plan by the section, subsection, and beginning page number.

2500 Water and Soil Resource Management (4-28)
- Stream Crossings (4-36)
- Removal of Material From Streams (4-37)
- Disturbed Areas (4-37)
- * In order to implement the selected alternative, several standards and guidelines involving the protection of water and soil resources would need to be disregarded in order to achieve Project goals. Special consideration was given to the actions associated with the Project (i.e., disturbance of stream channels, pond drainage), because the negative effects associated with disturbance would be outweighed by the benefits derived from watershed restoration.

7700 Transportation System (4-57)
- Protection and/or Mitigation Measures for Road Construction (4-60)

6.2 DISTURBED AREA RESEEDING SPECIFICATIONS AND MONITORING

A seed mix, approved by the Forest botanist, consisting of non-persistent grasses and native forest herbs would be used to revegetate all disturbed areas. Monitoring of all disturbed areas would be carried out for a period of 3 to 5 years after construction to determine successful restoration. Monitoring would use vegetative cover, presence of non-native invasive species, level of illegal ORV use, and signs of erosion as indicators of success.

6.3 NON-NATIVE INVASIVE SPECIES RISK ASSESSMENT AND MONITORING

Under Executive Order 13112, Federal agencies whose action may affect the status of invasive species shall not authorize, fund, or carry out actions that are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere unless the agency had determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species.

Non-native invasive species pose a threat to plant and animal community health and diversity. Because 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 non-native invasive species 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 non-native invasive species into the Project area. If these non-native invasive species are allowed to establish, they could easily compromise habitat quality, and thus jeopardize any existing or future populations of rare species in the Project area.

The Wayne NF currently maintains a list of noxious and invasive plant species of concern. Consistent with Executive Order 13112, this list would be used in conjunction with the Forest Service's *Guide to Noxious Weed Prevention Practices* (USFS 2001b) to prevent the introduction and spread of noxious and invasive plant species in the Project area as a result of construction of any of the four action alternatives.

Multiflora rose (*Rosa multiflora*) was identified in the Project area, however its distribution is not wide-spread and areas of its occurrence would be avoided to the maximum extent prudent and practicable. Because the Project area is relatively free of non-native invasive species, the primary risk to native species would be from the introduction of non-native invasive species from an outside source. Therefore the general weed prevention practices for site-disturbing projects that control the introduction of non-natives invasive species as listed in the *Guide to Noxious Weed Prevention Practices* would be followed. The practices controlling the introduction of non-native invasive species are listed below.

Practice 5 – Determine the need for and, when appropriate, identify sites where equipment can be cleaned. Clean equipment before entering National Forest System lands; a Forest Officer, in coordination with the Unit Invasive Species Coordinator, needs to approve use of on-Forest cleaning sites in advance. This practice does not apply to service vehicles traveling frequently in and out of the Project area that will remain on the roadway. Seeds and plant parts need to be collected when practical and incinerated. Remove mud, dirt, and plant parts from Project equipment before moving it into the Project area.

Practice 13 – Retain native vegetation in and around Project activities to the maximum extent possible consistent with project objectives.

Practice 14 – Minimize soil disturbance to the extent practical, consistent with Project objectives.

Practice 15 – Revegetate disturbed soil (except travelways on surfaced projects) in a manner that optimizes plant establishment for that specific site. Define for the Project what constitutes disturbed soil and objectives for plant cover revegetation.

Practice 16 – Revegetation may include topsoil replacement, planting, seeding, fertilization, liming, and weed-free mulching as necessary. Use native material where appropriate and feasible. Use certified weed-free or weed-seed-free hay or straw where certified materials are required and/or are reasonably available. Always use certified materials in areas closed by administrative order; refer to Appendix 3 (of the *Guide to Noxious Weed Prevention Practices*) for a sample closure order. Where practical, stockpile weed seed-free topsoil and replace it on disturbed areas (e.g., road embankments or landings).

Post construction monitoring of disturbed areas would be implemented to ensure the introduction of non-native invasive species has not occurred (see Section 6.2).

6.4 TEMPORARY ACCESS ROAD CLOSURE AND MONITORING

Illegal use of temporary access roads by ORVs could have a negative impact on sensitive species or their habitat in the Project area. The illegal use of these temporary roads by ORVs would result in soil compaction and erosion, which may contribute to increased sedimentation and runoff to streams. In addition, revegetation efforts would be severely disrupted and revegetation would need to be carried out until the areas are restored.

According to the Forest Plan all constructed temporary roads would be closed and revegetated upon Project completion (USFS 1988). Only permanent, natural appearing closure devices such as vegetated earth berms, tree tops, or stumps will be used to close temporary roads to motorized traffic until they have been successfully revegetated. Once revegetation is complete, the closure device will depend on several factors including the level of illegal ORV use.

Illegal ORV use would be monitored, along with vegetation monitoring, after construction of the Project (see Section 6.2). Any illegal ORV use detected during post-construction monitoring would be reported to the Forest Protection Officer, who would increase patrol in the area and issue citations when necessary.

6.5 MITIGATION

Tree clearing and pond drainage activities associated with implementation of any of the four action alternatives would potentially result in incidental take of Indiana bat individuals and impact Indiana bat habitat. As a result, mitigation measures would be necessary to minimize the incidental take of Indiana bat and offer protection to its habitat.

The Forest Plan BO presents reasonable and prudent measures necessary and appropriate to minimize the take of Indiana bats. The following sections outline the Forest Plan BO Terms and Conditions and Project-specific mitigation measures that would be followed to minimize potential adverse effects of implementation of the selected alternatives on the Indiana bat and its habitat.

6.5.1 Forest Plan BO Terms and Conditions

The majority of the clearing activities would take place within a large contiguous block of mature hardwood forest that characterizes the 1,200-acre Project area. Because of this and the linear shape (i.e., temporary road construction) and small size (i.e., borrow area construction) of impacts, implementation of the selected project alternative should not effect the tree species/size per acre or the maintenance of at least 60 percent canopy cover requirements as outlined in the Forest Plan BO.

The following Terms and Conditions as stated Forest Plan BO would be implemented to minimize the incidental take of individuals and offer protection to Indiana bat habitat in the Project area:

1. Construction activities would not occur within 0.25 mile of known Indiana bat hibernacula.

2. Siting of all Project activities would avoid dead or dying (less than 10 percent live canopy) shagbark hickory and shellbark hickory trees over 6 inches dbh to the maximum extent practicable.

3. Siting of all Project activities would avoid all live trees, of any species, over 6 inches dbh that are hollow, have major splits, or have broken tops to the maximum extent practicable.

4. If dead or dying shagbark hickory and shellbark hickory, or live trees (as described above) over 6 inches dbh cannot be avoided, then removal of these trees would only occur during the hibernation season when bats are not utilizing these potential roost trees (October 15 to April 15).

5. Dead or dying shagbark hickory and shellbark hickory, or live trees (as described above) over 6 inches dbh can be removed with no time constraints if they are determined to be hazard trees.

6.5.2 Project-Specific Mitigation Measures

In addition to the above Terms and Conditions, the following Project-specific measures would be implemented to minimize the incidental take of individuals and offer protection to Indiana bat habitat in the area where an Indiana bat was captured during swarming surveys conducted in September 2002. These measures were developed during discussions between the Wayne NF personnel and USFWS Reynoldsburg Field Office personnel. These measures were recommended by the USFWS upon their review of the Project's alternatives.

1. The construction and use of Borrow Area 4 (see Figure 2) would require undesirable tree clearing in the area of a potential Indiana bat hibernacula, therefore the construction of Borrow Area 4 would be removed from the selected project alternative.

2. Reconstruction of the channel at Site 36 (see Figure 2) would require undesirable tree clearing and cause undesirable disturbance in the area of a potential Indiana bat hibernacula, therefore activities proposed for Site 36 would not be carried out for the selected project alternative.

3. The pond at Site 7 (see Figure 2) is proposed to be permanently drained. However, it is a bat foraging site (USFS 2002b). Therefore, the pond would be temporarily drained to allow for reconstruction of Township Road 387 under the implemented action. In addition, the pond would be drained outside of the fall swarming period (August 15 to October 15). The pond would be reconstructed to approximately its original depth and surface area to the maximum extent practicable upon completion of road reconstruction activities.

4. The ephemeral pond below Site 38 will be maintained by a limestone berm.

5. The pond/mine pit at Site 51 is proposed to be temporarily drained and the pond/mine pit at Site 53 is proposed to be permanently drained. However, Indiana bat surveys have not been conducted at these sites, therefore the ponds/mine pits at Sites 51 and 53 will only be temporarily drained to allow for road reconstruction. In addition, these ponds/mine pits would be only drained outside of the fall swarming period (August 15 to October 15). The ponds/mine pits would be reconstructed to approximately their original depth and surface area to the maximum extent practicable upon completion of remedial activities.

6. All potential roost trees in the drainages associated with Sites 3, 7, and 34 through 42 and along sited temporary roads would be marked by Forest Service biologists prior to construction activities. These trees would then be avoided to the maximum extent practicable. Potential roost trees are dead or dying (less than 10 percent live canopy) shagbark hickory and shellbark hickory trees over 6 inches dbh and all live trees, of any species, over 6 inches dbh that are hollow, have major splits, or have broken tops.

7. All potential roost trees around the mine portal closure site (Site 31) would be marked and avoided to the maximum extent practicable. Potential roost trees are dead or dying (less than 10 percent live canopy) shagbark hickory and shellbark hickory trees over 6

inches dbh and all live trees, of any species, over 6 inches dbh that are hollow, have major splits, or have broken tops.

7.0 LIST OF PREPARERS

Table 8. List of Preparers

Name	Position	Role in EA Preparation
U.S. Forest Service, Wayne National Forest		
Ted King	NEPA Specialist	Interdisciplinary Team Leader
Lynda Andrews	Wildlife Biologist	Wildlife, Management Indicator Species, Endangered and Threatened Species (Animals), Regional Sensitive Species (Animals), Threatened and Endangered Species (Mitigation)
Mike Grebeck	Recreation Technician	Recreation
Erin Larson	Forest Botanist	Endangered and Threatened Species (plants), Regional Sensitive Species (Plants), Non-Native Invasive Species Control and Monitoring, Off-Road Vehicles Control and Monitoring
Mike Nicklow	Environmental Engineer	Project Design, Alternatives
Steve Marchi	Forest Engineer	Project Design, Alternatives
Mandy Reese	Archaeological Technician	Cultural Resources, Alternatives
Pam Stachler	Hydrologist	AMD Reduction Analysis, Alternatives
Northern Ecological Associates, Inc.		
Stephen Compton	Principal	Project Manager, Principal Review
Brad Schaeffer	Associate Scientist	Purpose and Need, Alternatives, Geology, Soils, Water Resources, Vegetation Wetlands, Wildlife, Management Indicator Species, Endangered and Threatened Species, Regional Sensitive Species, Cumulative Impacts, Forest-Wide Standards and Guidelines, Compliance with Federal Laws and Regulations.
Natasha Snyder	Senior Planner	Land Use, Recreation, Visual and Aesthetics, Recreation, Socioeconomics, Air Quality and Noise
Stewart Eldridge	Senior Archaeologist	Cultural Resources
Jack Wu	Associate Scientist	Fish
Karla Hyde	Associate Scientist	GIS Analyst, Figure Preparation
Beth Stuba	Technical Editor	Document Review

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APPENDIX A

Wayne National Forest Standards and Guidelines Applicable to Construction of the Selected Alternative for the Snake Hollow Watershed Restoration Project

Wayne National Forest Standards and Guidelines Applicable to Construction of the Selected Alternative for the Snake Hollow Watershed Restoration Project
Native species will be favored when restoring disturbed areas or providing vegetative screening.
Forest Service road construction and management will conform to the appropriate Recreation Opportunity Spectrum (ROS) Class. Efforts will be made to have county and township road construction to conform to ROS classes.
Unlicensed ORVs will be permitted only on designated ORV trails. State licensed ORVs will be permitted on trails and town, county, state, and Federal roads open to public motorized use. (Management Areas 2.3, 3.2, and 3.4)
Activities will be managed to maintain or enhance water quality.
Stabilize disturbed areas. Give priority to stabilization of areas discharging soil into water courses, especially to municipal watersheds and recreation impoundment watersheds.
Disturbed areas will be stabilized to reduce soil discharge to water courses. Heavily disturbed areas including borrow pits and mineral developments will be restored to meet management objectives. Waterbodies may be created when surface runoff and soil conditions permit.
Best Management Practices will be employed to protect and enhance riparian resources and values.
A minimum 100-foot "special attention" zone will be considered for riparian areas of unknown resources.
Filterstrips will be established for riparian areas to prohibit sediments and nutrients from entering stream habitats.
Where earth-disturbing activities such as road and trail construction, log yarding areas, and oil and gas drilling expose mineral soil, filterstrips will be required on all intermittent and perennial streams. Filterstrips will normally be required for all lakes, ponds, and perennial flowing natural springs. Activities may occur closer to the 100-foot special attention zone along these waters only if effective sediment control practices are installed to minimize any detrimental effects. These practices include placement of straw bales in ditch lines and small drainages, leaving berms in road embankments during construction, diversion ditches, hand placement of slash and unmerchantable logs across slopes and trails, installation of check dams in ditch lines, and excavation of sediment detention basins.
Roads, trails, and log skidding will not be allowed within streambeds and will only be allowed across streams at designated crossings.
Standard mitigating measures will be used for soil and water resource protection when a stream will be crossed by a construction project.
Sensitivity of specific riparian sites is calculated taking into account soil erodibility, soil drainage, aquatic life sensitivity, and when mineral and oil extraction is being considered, soil acidity. These values will be used to determine the minimum filterstrip width at each of the sites.
Permission to remove materials from streams will not be granted unless adverse impacts to soil, water, wildlife, and other resources can either be eliminated, or minimized and mitigated.

Wayne National Forest Standards and Guidelines Applicable to Construction of the Selected Alternative for the Snake Hollow Watershed Restoration Project
All proposals to remove streambed materials will be reviewed for compliance with Section 404 of the Clean Water Act. The State has recognized the Federal regulation of these activities and does not require State review and approval of: • Excavation of deep holes in stream channels to improve wildlife habitat. • Incidental excavation operation for culverts, bridges, fords, dams, or other new or existing facilities. • Restoration of a more natural or stable stream channel that has been filled by sediment from strip mines or other land disturbing activities. • Removal of materials from sediment basins that have been installed to trap sediment coming from some upstream activity. • Removal of material from sand and gravel bars or from floodplains for bridge or culvert backfill or road surfacing as a replacement for expensive, processed crushed stone.
Exposed soil will be protected from erosion and loss by surface water control, sediment controls, or revegetation.
National Forest responsibilities noted in recovery plans for threatened or endangered species will be carried out.
Vegetation management will be prohibited within 50 feet of rock shelters of naturally occurring, large rock faces or outcrops unless it is designed to enhance the site for a threatened or endangered species.
Standard protection and mitigation measures for soil, water, visual, and other resources during and after road construction will be required.
Seeding and mulching is the most efficient and cost effective resource protection measure that can be applied to disturbed soil. Unless otherwise addressed in a site-specific environmental analysis, all areas (1) on which the vegetation or other protective ground cover has been removed by road construction, and (2) on which enough of the soil surface containing roots, seeds, and nutrients has been removed that natural revegetation or protection cannot be expected to occur in one growing season, shall be seeded and mulched in accordance with: • The small (less than 3 feet high) vertical or nearly vertical slopes that occasionally occur do not have to be seeded and mulched. • All areas disturbed by road construction, except for riding surfaces, shall be mulched prior to any extended (exceeding 6 weeks) winter shutdown period.

ENVIRONMENTAL ASSESSMENT

Wayne National Forest
Snake Hollow Watershed Restoration Project

Task Order No.: 43-56A1-1-0177

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