THE ORPHAN WELLS
AND ABANDONED
MINES PROJECT
Environmental Assessment

WAYNE NATIONAL FOREST:
ATHENS RANGER DISTRICT & IRONTON RANGER DISTRICT

Athens, Gallia, Hocking, Jackson, Lawrence, Monroe, Morgan, Noble, Perry, Scioto, Vinton, and Washington Counties, Ohio

December, 2021
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Chapter 1. Purpose and Need for Action

Introduction

The Wayne National Forest (WNF) has prepared an Environmental Assessment (EA) for the Orphan Wells and Abandoned Mines Project. The project is forest-wide and could be implemented on National Forest System lands in any of the twelve Ohio counties that make up the Wayne. This EA was drafted in compliance with the National Environmental Policy Act (NEPA) and other relevant laws and regulations. The purpose of this EA is to inform the decision-maker and the public of the impacts that may occur as a result of the project. Additional documentation can be found in the project record located at the Forest headquarters in Nelsonville, Ohio. A final decision is anticipated in early 2022.

This EA is organized into three chapters:

Chapter 1 – Purpose and Need for Action: Chapter 1 describes the conditions that currently exist and explains why action is needed to change those conditions. Information is included on the proposed action and the process that was used to gather input from the public.

Chapter 2 – Alternatives: Chapter 2 gives a detailed description of the proposed action that was developed to meet the project purpose and need.

Chapter 3 – Effects: Chapter 3 describes the environmental effects that may occur as a result of the project. Effects described are reasonably foreseeable and have a reasonably close causal relationship to the proposed action or alternatives.

Background

Since the 1800’s, Ohio’s natural resources have contributed to the nation’s industrial development. In that time, over 400 million barrels of oil, 3.6 billion tons of coal, and trillions of cubic feet of natural gas have been extracted from the State [EIA(a) 2021; USDA FS 2020b; EIA(b) 2021].

Figure 1 - This scene, photographed outside Murray City in 1940, was once a common sight in Southeast Ohio. The foreground shows a large pile of gob, or waste rock from coal mining. A coal tipple, used to load the coal for transport, is visible behind the gob. USDA photo by Leland J. Prater.
Regulation of oil and gas development and mining did not begin in earnest until the mid-twentieth century. Decades of unregulated resource extraction had a lasting impact in Southeast Ohio and on the Wayne National Forest. The effects are visible in the form of orphan wells, which are non-producing oil and gas wells that have been abandoned, with no party accountable for costs to plug the well. Abandoned mines are often evident by openings that remain on the surface or subsidence that is created when underground excavations collapse.

Figure 2 - Two miners near Carbondale, Ohio unload oak logs to be used as mine props. These props support the ceiling of underground coal mines, but when mines are abandoned, the supports can eventually collapse, causing subsidence. USDA photo by Leland J. Prater.

Abandoned mines and orphan wells cause environmental, health, and safety concerns. Openings to abandoned underground mines can pose fall or entrapment hazards. They are extremely hazardous to enter, with unknown poisonous gas content and little to no stability. Stream captures, or water draining into mine openings, can become acidic and accumulate dissolved metals before re-entering surface flows, severely impacting water quality. Orphan wells can contaminate soil and water with leaking oil and brine, and may also emit methane, a greenhouse gas that contributes to climate change.

Figure 3 - Gas bubbles that have moved up the well bore are visible on this orphan well in Washington County, Ohio. Bubbling fluids can indicate a methane leak (Groom 2020). USDA photo by Wayne National Forest Minerals Staff.
The recently passed Infrastructure Investment and Jobs Act (Pub. L. 117-58) emphasized the importance of reclamation of legacy mining and drilling on Federal lands and authorized appropriations of $4.7 billion to plug, remediate, and reclaim orphaned wells while also creating new jobs and curbing greenhouse gas emissions and pollution. Another $11.3 billion was authorized for the Abandoned Mine Land Reclamation Fund. These provisions from the Infrastructure Investment and Jobs Act mirror the intent of a recent executive order directed at tackling climate change, which noted that “plugging leaks in oil and gas wells and reclaiming abandoned mine land can create well-paying union jobs in coal, oil, and gas communities while restoring natural assets, revitalizing recreation economies, and curbing methane emissions.” (EO 14008).

Figure 4 - Orphaned and abandoned wells, like the one pictured here on the Marietta Unit of the Wayne National Forest, are no longer producing and there are no parties that can be held responsible for plugging and rehabilitating the site. Here the pumpjack was left onsite. USDA photo by Wayne National Forest Minerals Staff.

The Forest Service is responsible for managing natural resources on the surface of National Forest System lands, providing for use, access, and design criteria to protect natural resources during management activities. Two other government agencies play a key role in addressing orphan wells and abandoned mines on the Wayne. The Ohio Department of Natural Resources (ODNR) is a State agency that operates the Orphan Well Program and the Abandoned Mine Lands Reclamation Programs to take on these challenges throughout the State. The Bureau of Land Management (BLM) is a Federal agency within the U.S. Department of Interior that administers federally owned minerals and helps coordinate reclamation and plugging operations. Both BLM and ODNR typically prioritize their remediation work on the Wayne based on the severity of environmental, health, and safety risks and available funding.

Purpose and Need for the Proposed Action
For many years, the Wayne National Forest has worked with ODNR and BLM to close mine openings and stream captures and to plug orphan wells. These activities have been addressed individually or in small batches through separate decisions under the National Environmental Policy Act (NEPA).
Years of experience with this case-by-case approach have shown that effects of these activities are consistent and predictable across the Forest. Project sites are similar in that each of them has been subject to past disturbance.

However, the timing and location of specific proposals is more difficult to predict because it varies based on available funding and the existence of other high priority remediation projects. While many abandoned mines and wells on the Forest have been identified, the scale of past resource development means that there are almost certainly undiscovered sites that could pose a threat to safety or the environment. New cases of mine subsidence still occur periodically.

There is an ongoing need to address the environmental, health, and safety effects associated with abandoned mines and orphan wells on the Wayne National Forest, and to facilitate use and access by ODNR and BLM to complete this work, especially in light of recent legislation authorizing appropriations for this work over the next several years. The purpose of this project is to meet that need through a more comprehensive and responsive approach. This decision would be Forest-wide, and account for a range of potential actions on the surface of National Forest System lands that could support remediation of these sites by ODNR, BLM, or other parties. This would position the Wayne and its State and Federal partners to respond more quickly as safety issues arise, priority sites are identified, and as funding becomes increasingly available.

The purpose and need for this project aligns with the Wayne’s 2006 Land and Resource Management Plan (Forest Plan), which guides project implementation on the Forest (USDA FS 2006a). The Forest Plan includes goals and objectives for the management of the Wayne. Forest Plan goals are broad statements of desired characteristics to be maintained or achieved. Objectives are more concrete and measurable statements that help to chart a path toward the goals. The Orphan Wells and Abandoned Mines Project would help move the Wayne closer to the following Forest Plan goals:

- **Goal 1.2**: Emphasize public and employee safety as a fundamental agency value in all work activities and facilities.
- **Goal 2.1**: Restore water quality and soil productivity to improve health of watersheds impaired by past land use practices and mining activities. Manage activities on NFS lands to maintain or enhance water quality and soil productivity.
  - **Objective 2.1c**: Restore positive drainage in watersheds where surface runoff is restricted topographically and drains into underground mine complexes.
- **Goal 10.2**: While respecting privately held mineral rights, negotiate operating terms and conditions and mitigation measures to protect other Forest resources.
  - **Objective 10.2b**: Restore lands disturbed by minerals exploration and production when the minerals activity is completed.
  - **Objective 10.2c**: Plug wells when production ceases.
- **Goal 18.2**: Prevent contamination of National Forest soil, water, and air resources. Manage and mitigate known contaminated sites to protect public health and Forest resources.

To better meet the project purpose and need, as well as Forest Plan Goals and Objectives, the proposed action includes a proposed project-specific plan amendment that would exempt the project from four Forest Plan standards. The proposed project-specific plan amendment is discussed in greater detail below.
Proposed Action Summary
The proposed action, which is discussed in greater detail in Chapter 2, would authorize surface actions necessary to complete three types of work on the Wayne National Forest: orphan well plugging, mine safety closures, and stream capture re-routes. This work would be authorized Forest-wide. The proposed action also includes a project-specific amendment of four Forest Plan standards.

Potentially Affected Environment
Land-Use History and Current Condition
Mining and oil and gas extraction left lasting and widespread impacts on the landscape of Southeast Ohio and the Wayne National Forest. It is estimated that 19,000 orphan oil and gas wells exist statewide, with hundreds likely located on the Wayne [ODNR, Lowe; Pers. Comm. Yeager, C., Wayne NF 2021]. Nearly 22,000 acres of the Wayne National Forest experienced sub-surface mining, primarily in the Athens Unit (USDA FS 2020b). Nearly 20,000 acres of the Forest was subject to surface mining, with an even split between the Athens Unit and the Ironton Ranger District (USDA FS 2020b). Orphan wells, unsafe mine features and stream captures, and other legacies of past resource extraction continue to influence the current condition of the Wayne National Forest. The following maps help to illustrate the distribution of past resource extraction across the three management Units of the Wayne. Note that the maps depict current oil and gas wells, not orphan wells. Because not all existing orphan wells have been discovered and mapped, the depiction of current wells is intended to convey the density of oil and gas development, which can be expected to roughly correlate with the number of orphan wells.

Figure 5 - While the Marietta Unit experienced virtually no historic mining, it has traditionally been the primary target for oil and gas development. Oil and gas wells are widespread throughout the Unit.
Figure 6 - Of the three management units of the Wayne, the Athens Unit was subject to the most widespread historic resource extraction. Surface and sub-surface mining, along with drilling for oil and gas has occurred across much of the Unit.

Figure 7 - Oil and gas development has been much less prevalent on the Ironton Ranger District and has primarily occurred on private lands. Though not as extensive as Athens, the District did see thousands of acres of past mining, particularly west of State Route 93.
**Orphan Wells**

Orphan wells can negatively impact soil, water, and air quality. Oil, gas, or brine can leach into groundwater or flow onto the surface and contaminate soils and surface water (Boettner 2021). Some orphan wells leak methane, a powerful greenhouse gas that contributes to climate change. One recent study suggests that orphan wells in Ohio, and throughout the Appalachian Basin tend to emit more methane, probably because these wells are generally older, predating modern well plugging practices and requirements (Townsend-Small et al. 2016). Often, orphan wells are associated with other issues such as discarded equipment and materials such as pumpjacks or gathering lines.

![Image of abandoned wellhead](http://example.com/image.jpg)

*Figure 8 - Hydrocarbon leak from an abandoned wellhead on the Marietta Unit, contaminating the soil and preventing plant growth. USDA photo by Wayne National Forest Minerals Staff.*

Orphan wells are most commonly found on the Athens Ranger District of the Wayne National Forest, and particularly in the Marietta Unit. The counties making up the Marietta Unit have a long history of oil and gas development, with the first oil well drilled in Washington County in 1860 (USDA FS 2020b). And although they are less common on the Ironton Ranger District, both Districts and all three management units of the Forest do have orphan wells.

Oil and gas development can be categorized as ‘conventional’ or ‘unconventional’. Conventional wells are shallow, vertical wells that were drilled in Southeast Ohio decades before the establishment of the WNF, and at varying rates ever since (USDA FS 2020b). Unconventional wells access deep mineral-producing formations through horizontal drilling and high-volume hydraulic fracturing, commonly known as fracking (USDA FS 2020b). These wells have been drilled throughout eastern Ohio, and on private lands within the proclamation boundary of the Wayne, but they have not been drilled from pads located on lands managed by the Forest Service (USDA FS 2020b). While any type of oil and gas well could be orphaned and abandoned, the orphan wells on the Wayne National Forest are all conventional...
vertical wells, typically reaching depths of around 1,500 feet, and occasionally up to around 3,000 feet (Pers. Comm. Yeager, C., Wayne NF 2021).

Unsafe Mine Features and Stream Captures
Widespread mining in Southeast Ohio, and throughout the Appalachian Basin, has resulted in a suite of problems that are collectively known as issues of Abandoned Mine Lands (AML). These issues can include hazardous highwalls, blocked stream channels, mine openings and subsidence holes, stream captures, and acid mine drainage. These features can be found on both districts of the Wayne National Forest, but they are much more common in the Athens Unit, where 29% of the acreage was subject to sub-surface mining. Remnants of surface mining like highwalls are common on both the Ironton Ranger District and the Athens Unit, each of which saw nearly 10,000 acres of surface mining (USDA FS 2020b).

Multiple different types of mine openings occur on the Wayne National Forest, and all of them have the potential to pose a safety hazard. Some openings are simply old portals that allowed access for workers and were never closed. These openings are often horizontal and located in the side of a hill. People may wander into these openings to explore, only to be trapped by a collapse or overcome by poison gases (ODNR 2011). Vertical openings such as air shafts or subsidence holes can also cause falls and entrapment.

Stream captures occur when subsidence or some other earth movement allows surface water to drain into underground voids that resulted from sub-surface mining. Stream captures can be a safety concern because the erosive action of the water can carve out very large pits that pose fall or entrapment hazards. Stream captures also alter normal surface water flows and affect components of the ecosystem that rely on that water. Finally, stream captures often result in acid mine drainage, which occurs when rocks containing sulfide minerals are exposed to air and water. Water that enters a stream capture subsidence may then resurface through a seep or other discharge carrying a load of dissolved metals and a lower pH. Pollution from acid mine drainage kills aquatic organisms and can make some sections of stream completely uninhabitable (USDA FS 2020b).

Other Legacies of Past Resource Extraction
In addition to orphan wells, stream captures, and other unsafe mine openings, which are the primary target of this project, past resource extraction caused other impacts that continue to affect the forest. For example, soil disturbance that occurred at the time of drilling or mining may manifest itself today in impaired soil productivity and function. That same soil disturbance may also have resulted in the destruction of archaeological and other heritage resources.

Another distinctive feature of past mining is the presence of gob piles, which are accumulations of waste rock from coal mining. These features retard plant growth and can contribute to acid mine drainage. Mining also resulted in the creation of artificial ponds, which can accumulate acidic water (USDA FS 2020b).
In some cases, revegetation efforts following resource extraction have resulted in persistently altered plant communities consisting of non-native invasive plants (NNIS) (Cavender et al. 2014). This is especially true of surface mining where plants were selected for revegetation based on their ability to survive in the harsh soil conditions of a reclaimed mine site.

Another impact of past resource extraction that is still quite visible on the Wayne is legacy roads. Oil and gas wells and mines require access routes to move workers, equipment, and materials, and the Wayne is still crisscrossed with old haul roads and oil and gas roads. Some of these roads were abandoned and have slowly revegetated, though their footprint is still detectable. Others were adopted as roads or trails for other purposes. In some cases, these old roads have attracted unauthorized off-highway vehicle
(OHV) use, which results in ongoing adverse effects on soil, water, and other resources. Where these roads are still used, they tend to facilitate the introduction of NNIS plants that crowd out desirable native species. Often, these old roads still exist on the ground and provide suitable access for plugging and other remediation efforts.

Finally, one of the most visible reminders of past land use on the Wayne is the presence of equipment or infrastructure that was abandoned along with the well or the mine. Oil storage tanks and gathering lines, pumpjacks, and even an oil derrick are among the items that remain on the Wayne today.

The Wayne has been working with partners for years to address these issues, and many sites have been remediated and cleaned up. However, the extent of past resource use was so great that much work remains. All these issues help to illustrate the fact that the Wayne National Forest is a place with an extensive history of resource extraction that still shapes the present condition of the Forest. Of course, the extent of past disturbance varies substantially across the landscape, but because this project is focused on addressing issues related to past mining and drilling, it would largely be implemented in places that were in some way impacted by this past use.

In addition to ongoing effects from past land uses, the Wayne National Forest is subject to ongoing and reasonably foreseeable future actions that have the potential to affect Forest resources. These are discussed in greater detail below.

**Ongoing and Reasonably Foreseeable Actions**

Because this project would occur forest-wide, the proposed action would be implemented within the context of all ongoing and reasonably foreseeable activities occurring in and near the Wayne National Forest. These activities include:

- Current and future herbicide treatments of NNIS
- Issuance and reauthorization of special use permits
- Use of prescribed fire in pre-approved project areas, including the construction and maintenance of fireline, which is a linear feature through the woods, cleared down to mineral soil to check the spread of fire.
- Non-commercial timber stand improvement, including herbicide or mechanical mid-story control and crop tree release in pre-approved project areas. Crop tree release is a silvicultural technique to remove competing trees and increase the vigor of selected ‘crop trees’.
- Timber harvest, including the construction of roads, skid trails, and landings
- Construction of the Baileys Trail System
- Forest-wide trail re-routes, reconstruction, and closure of unauthorized trails under the System Trail Adaptation, Relocation, and Reconstruction (STARR) project
- Trail and recreation site maintenance, including brushing, mowing, and removing hazard trees
- Installation of the Vesuvius waterline
- Utility corridor maintenance
- Road system maintenance
- Oil and gas production and maintenance of existing oil and gas infrastructure
In addition, similar actions may occur on adjacent private land that is intermixed with National Forest System lands. Ongoing and reasonably foreseeable activities on adjacent private lands include timber harvest, land clearing, farming, construction, and oil and gas development.

**Decision Framework**

The Forest Supervisor is the Responsible Official for the Orphan Wells and Abandoned Mines Project. In that role, the Forest Supervisor will make two decisions. The first decision is to select an alternative for the Orphan Wells and Abandoned Mines Project. This decision may include protection measures known as design criteria and mitigation measures in addition to standards and guidelines from the Forest Plan. The scope of this decision is confined to a reasonable range of alternatives that would meet the identified purpose and need. This project is subject to the pre-decisional administrative review process described in 36 CFR 218, subparts A and B.

The second decision that the Forest Supervisor will make is whether to approve a project-specific amendment to the Forest Plan that would exempt the Orphan Wells and Abandoned Mines Project from four Forest Plan standards. This project-specific amendment is part of the proposed action and is discussed in greater detail below. The proposed project-specific plan amendment is also subject to the pre-decisional administrative review process described in 36 CFR 218, subparts A and B.

The Forest Supervisor will rely on the analysis contained in this EA to select an alternative and to determine whether there would be a significant impact associated the alternative, or with the proposed project-specific amendment, which is included in the proposed action.

**Public Involvement – Agencies and Persons Consulted**

The Orphan Wells and Abandoned Mines Project was listed on the Schedule of Proposed Actions (SOPA) on August 10, 2021. That same day, a scoping newsletter was distributed by email to about 90 individuals and organizations that had expressed prior interest in similar projects. The scoping newsletter described the project and requested feedback by September 10, 2021. The Wayne received one comment on the project, which offered a broad statement of support.

Records of agencies and persons contacted or consulted on the Orphan Wells and Abandoned Mines Project are available in the project record. Government agencies include the US Fish and Wildlife Service, the Ohio Historic Preservation Office, Ohio Department of Natural Resources, and local County Commissioners. Representatives of tribal governments were also contacted regarding the project.

**Issues**

Public scoping did not point to any issues with the Orphan Wells and Abandoned Mines Project.

**Chapter 2. Proposed Action**

**Formulation of Alternatives**

Forest Service NEPA regulations and directives require an Environmental Assessment to include a proposed action and alternative(s) (36 CFR 220.7(b)(2)). No specific number of alternatives is required, and when there are “no unresolved conflicts concerning alternative uses of available resources...the EA need only analyze the proposed action and proceed without consideration of additional alternatives.” (36 CFR 220.7(b)(2)(i)). “When scoping indicates an agreement about the proposed action, there is no need to develop additional alternatives” (FSH 1909.15, Ch. 10, Sec. 14). Additionally, the regulations
provide that “the EA may document consideration of a no-action alternative through the effects analysis by contrasting the impacts of the proposed action and any alternative(s) with the current condition and expected future condition if the proposed action were not implemented” (36 CFR 220.7(b)(2)(ii). As the directives explain, “a stand-alone no action alternative is not required. However, the effects of taking no action should correlate closely with the purpose and need” (FSH 1909.15, Ch. 40, Sec. 41.22).

As described in the purpose and need and potentially affected environment sections above, the existing condition resulting from past mining and oil and gas development is causing several undesirable effects. If the Forest does not act, these effects would continue, but the effects of the proposed action described below would not occur.

**Description of Alternative(s) Considered in Detail**

**Alternative 1: The Proposed Action**

The proposed action would authorize surface operations necessary to accomplish three categories of activities: Safety closures, stream capture re-routes, and orphan well plugging. These actions could occur forest-wide.

As a surface-management agency, the Wayne National Forest’s focus is on the surface effects of the work. Expertise and regulatory authority over sub-surface actions rests with ODNR or BLM.

All three categories of activities involve similar work that would be authorized by this decision. This includes:

- Construction of temporary road or trail, reconstruction of Forest system roads, or authorization of overland travel to access the worksite.
  - Many sites are served by old roads or road footprints, which can be used to minimize new surface disturbance.
- Temporary staging areas for equipment or materials
- Site clearing (including tree removal) and earth moving around the worksite
- Re-grading, restoring surface contour, and revegetating with appropriate species
- Rehabilitation of access routes, including old access roads that are no longer needed
- Maintenance of completed pluggings, closures, or stream capture re-routes

Other practices are more specific to the particular category of action and are addressed in detail below.

**Safety Closures**

Safety closures seal off surface access to underground mines. Closures may be needed at one or more mine openings within an area and could include horizontal or vertical openings that are man-made or a result of a partial mine collapse. Openings can be sealed by bat gate installation, foam, or natural materials such as on-site borrow or off-site fill, capped with concrete and rebar, or other similar methods. This category of action could also include earth-moving necessary to restore the surface contour of dangerous mining features such as highwalls.
Figure 11 - A bat gate on the Athens Unit allows bats to fly in and out of the mine opening while preventing people from venturing into the unsafe sub-surface mine. USDA Photo by Wayne National Forest Minerals Staff.

Stream Capture Re-Routes
Stream capture re-routes are similar to safety closures but address mine features that receive surface water flow during at least some of the year. These sites may or may not have developed openings, but they serve as entry points for water to the underground mine void, where acid mine drainage is generated. This action would close the opening, redirect the water back to the surface, and reshape the surface to ensure reconnection to existing streams.

Figure 12 - Pictured is a stream capture subsidence in the Wayne National Forest that has since been plugged. USDA photo by Wayne NF Watershed Restoration Team.
Additional surface activities associated with this category include re-routing sections of stream channel and installing impermeable liners to avoid infiltration into the mine. Installation of culverts or similar features to accommodate increased surface flow may also be necessary. Stream capture closures and re-routes typically require a larger cleared area so that equipment can operate along the length of the reconstructed channel.

Typically, stream capture re-routes are a low maintenance method to improve water quality and address safety concerns. However, occasionally maintenance work could be needed, for example if earth and water movement cause undercutting of the liner and create the potential for a new stream capture.

Both safety closures and stream capture re-routes typically take 2-5 weeks, depending on complexity of the work, and they could take 2-3 months if unforeseen conditions are discovered once excavations begin.

Figure 13 - A trackhoe is used to unspool plastic liner along a reconstructed channel. The liner helps to keep the water on the surface. USDA photo by Wayne NF Watershed Restoration Team.

Orphan Well Plugging

Orphan wells are typically plugged by filling the borehole with concrete and capping it near the surface. This prevents oil, gas, salt water, or other fluids and vapors from escaping into the atmosphere, ground, or water. It is often necessary to re-drill the borehole and clear out obstructions before the well can be plugged. This could require grading around the site to create a flat space for a drill rig, often known as a well pad. Re-drilling the borehole may also require the use of drilling fluids, and would result in the production of cuttings, which are pieces of solid material removed from the borehole. Fluids and cuttings would be temporarily stored at the well pad. All fluids would be stored in a closed loop system,
and dry cuttings would be stored in a lined pit or tank. Upon completion of the plugging, fluids and cuttings would be removed from the site and properly recycled or disposed. If present, contaminated soils and abandoned equipment would also be removed from the site for proper disposal.

A well plugging typically takes 2-3 weeks but can take longer (2-3 months) if unforeseen conditions are encountered.

**Estimated Extent of Surface Disturbance**

To support the effects analysis of the proposed action, the interdisciplinary team carefully considered available information, past experience on the Wayne, and local knowledge to develop an estimate of surface disturbance, including vegetation clearing and soil disturbance associated with the proposed action. The development of these estimates should not be seen as a limit on the footprint of any particular site. Estimates were created to give a sense of the scope and scale of what is being considered, but any consideration of whether a proposed well plugging, safety closure, or stream capture re-route falls within this analysis should be guided by the effects of the proposal instead of relying on the size of the footprint. Each well plugging, safety closure, or stream capture re-route will be reviewed by interdisciplinary specialists who, rather than relying on a strict per-site size limit, can use their expertise and experience to judge whether the proposal would be consistent with this analysis.

On average, each orphan well is expected to require about 1.6 acres of disturbance while abandoned mine closures would average about 3.6 acres, though each individual site would vary, and in some cases could exceed these estimates. These estimates include all actions necessary to safely complete the work, including temporary access roads, staging, and any other necessary vegetation clearing or ground disturbance. Over the next 15-20 years, it is anticipated that 200 orphan wells could be plugged, and 100 abandoned mine sites closed. This would result in approximately 680 acres of disturbance over the next 15-20 years (Table 1). Additional information regarding these disturbance estimates, and their rationale is available in the project record.

*Table 1 - Estimated surface disturbance footprint*

<table>
<thead>
<tr>
<th>Type of Project</th>
<th>Estimated disturbance per project site (acres)</th>
<th>Estimated number of project sites</th>
<th>Estimated total surface disturbance (acres)</th>
<th>Estimated time-frame (years)</th>
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<td>200</td>
<td>320</td>
<td>15-20</td>
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<tr>
<td>Mine safety closures and stream capture closures</td>
<td>3.6</td>
<td>100</td>
<td>360</td>
<td>15-20</td>
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<td><strong>Project Total</strong></td>
<td><strong>N/A</strong></td>
<td><strong>300</strong></td>
<td><strong>680</strong></td>
<td><strong>15-20</strong></td>
</tr>
</tbody>
</table>

*Project-Specific Plan Amendment and Forest Plan Compliance*

The proposed action also includes a project-specific plan amendment that would exempt the Orphan Wells and Abandoned Mines Project from four different Forest Plan Standards. This amendment would apply only to this project, and the standards would still apply to other projects on the Forest.

Two of the standards that would be amended apply forest-wide:
**SFW-TES-10:** During the non-hibernation season (April 15th-September 15th), do not cut, unless they are a safety hazard:

- Trees of any species 6 inches dbh or more that are hollow, have major splits, or have broken tops that provide maternity habitat.
- Snags 6 inches dbh or more that have Indiana bat roost tree characteristics. Consider any tree with less than 10 percent live canopy to be a snag.

When removal of hazard trees is necessary in a recreation area during the non-hibernation season (e.g., developed recreation sites, access roads, trails), conduct emergence surveys at the identified hazard trees that possess the characteristics identified above, and at any hazard trees that possess large areas of loose bark providing maternity habitat.

**SFW-TES-32:** Protect and improve occupied Regional Forester sensitive species habitat.

The other two standards that would be amended apply only to a specific management area. In this case the two management areas are ‘Future Old Forest’ (FOF) and ‘Future Old Forest with Mineral Activity’ (FOFM). Each of these management areas include an identical standard:

**S-FOF-VEG-1 & S-FOFM-VEG-1:** Cut trees only when necessary for public safety (e.g., trees posing hazards along roads or trails).

The purpose of this project-specific plan amendment is to exempt the project from these four standards so that it can be implemented consistent with the Forest Plan. The proposed action would, in some circumstances, allow summer cutting of trees with maternity or roost tree characteristics. In some cases, it would also authorize project implementation in occupied Regional Forester sensitive species habitat.

Finally, the proposed action would allow trees to be cut within the FOF and FOFM management areas to implement the project, even if it is not ‘necessary for public safety’, although any of the proposed activities would support long-term public safety by completing safety closures, re-routing stream captures, and plugging orphan wells. The rationale for these actions is addressed in this EA below. The project-specific amendment allows the proposed action to be implemented as described while remaining in compliance with the Forest Plan.

In addition to the project-specific plan amendment of these four standards, the proposed action includes a departure from two Forest Plan guidelines:

- **GFW-ARR-23:** Avoid adverse impacts to ephemeral wetlands during ground-disturbing activities.
- **GFW-TES-6:** Conduct pre-gating and post-gating mist net surveys at mines where bat-friendly gates are installed.

The Forest Plan allows projects to make an exception to guidelines when rationale is provided (USDA FS 2006a). The rationale for these guideline departures is discussed further below.

With the project-specific plan amendment and the departure from guidelines disclosed with rationale, the proposed action would be implemented in full compliance with the Wayne’s Forest Plan. Further details about relevant Forest Plan direction are included in the draft implementation guide, attached as Appendix A.
Project Design Criteria

In addition to compliance with the Forest Plan as described above, the proposed action includes design criteria that were developed by the interdisciplinary team to reduce or eliminate effects to resources. These design criteria are additional protection measures beyond what is required by the Forest Plan. Many of these design criteria were developed by specialists to ensure that resources that could be affected by the proposed project-specific amendment or guideline departures would still be adequately protected. Design criteria are part of the proposed action and are non-discretionary. In contrast, mitigation measures, which are recommended by specialists, could lessen effects but may not always be implemented. These design criteria and mitigation measures have been assembled into a draft implementation guide that interdisciplinary specialists could use to help ensure that the project is implemented consistent with the analysis and with all Forest Plan direction and design criteria. The draft implementation guide is attached to this document as Appendix A.

Project design criteria include:

- **Watershed**
  - If impacts to wetlands are deemed necessary for individual projects, the impacted wetlands will be restored to the extent possible after the project is completed.

- **Plants**
  - If any federally listed plant species is found within a 100-foot buffer of the project site during site-specific surveys, modify the proposal to avoid federally listed plants by 100+ feet or suspend the proposal and consider separate NEPA analysis and consultation with US Fish and Wildlife Service.
  - If a high-risk RFSS plant species (as defined in the Botany Biological Evaluation) is found during site-specific surveys, the botanist will evaluate the impacts to determine whether the proposal could lead to a loss of viability. The botanist may recommend alternative measures that would not lead to loss of viability. If a loss of viability of the species cannot be avoided, additional NEPA analysis would be required before proceeding.
  - If any lower-risk RFSS plant species (as defined in the Botany Biological Evaluation) is found during site-specific surveys, project implementation design will be altered to the extent practical to minimize impacts. This could include flag and avoid, transplanting, or other measures, but a loss of the population may be unavoidable. Loss of viability of low-risk RFSS species would not occur.
  - To reduce the likelihood of introductions and invasions of NNIS, it is required that all equipment be cleaned of all vegetation debris and soil before entering the action area. In this case, equipment refers to all wheeled or tracked equipment such as skidders, bulldozers, feller-bunchers, forwarders, skid-steers, excavators, and all-terrain vehicles (ATV)/utility terrain vehicles (UTV). Equipment that leaves the action area must arrive clean before it can be used again.

- **Wildlife**
  - Within ¼ mile of known Indiana and northern long-eared bat hibernation and fall swarming sites: prevent or strongly discourage unauthorized use or access post-project by minimizing construction of and closing and rehabilitating any temporary road needed for project access.
Work within ¼ mile of known Indiana and northern long-eared bat hibernation and fall swarming sites will be performed in summer when the likelihood of disturbing, harming, or entombing bats in belowground habitats is the lowest. Bat-friendly gates and orphan well plugging should occur from May 1 through August 15, and back-filling any mines with bat-suitable openings should occur from May 15 through July 31.

Any mine openings proposed for closure will be assessed for bat suitability using established criteria and, if needed, visual or acoustic fall swarming surveys will be conducted (SFW-TES-5). Mine suitability determinations and, if warranted, survey results will be provided to the USFWS prior to implementing closures, with the intent to cooperatively identify the appropriate closure method to be used at any given mine site.

Any tree identified as potential maternity habitat for Indiana or NLE bats will be removed outside the non-volant period (i.e., will not be removed in June-July) or will first require emergence surveys following the USFWS protocol to ensure it is not currently occupied. If no bats are observed using the tree, cut it down immediately or at least within 24 hours, and the project can proceed.

- If bats are observed using the tree, contact USFWS and delay tree removal according to the following criteria:
  - Option 1: Wait until after August 15th, repeat emergence survey(s), and only remove the tree after no bats are observed using the tree.
  - Option 2: Wait until after October 1st, but before April 1st to remove the tree. If within ¼ mile of a known hibernation or fall swarming site, wait until after November 15th but before April 1st to remove the tree.

GFW-TES-9 requires retention of >6″ shagbark and shellbark hickories, except to protect human safety or to avoid adverse impacts to steep slopes, erodible soils, floodplains or wetlands. If an excepted shagbark or shellbark hickory displays characteristics suitable for sheltering a maternity colony (e.g., lots of exceptionally flaky bark), pup season removal (June or July) will be avoided, or emergence surveys performed.

Round hickorynut mussel: To avoid or reduce mortality or destruction of aquatic habitat, a biologist will review suitability and occupancy of perennial streams during site-specific planning. If the work site falls within Symmes Creek watershed or known round hickorynut habitat, advice will be provided on how best to avoid adverse impacts such as erosion, sedimentation, and increased in-stream temperatures. This could include measures such as:

- Restricting project work in occupied habitat during the critical reproductive period (late spring-early summer) to reduce impacts on reproductive success.
- Limited tree clearing to sustain canopy cover within riparian corridor to reduce impact on in-stream water temperatures.

To protect Henslow’s sparrow, avoid placement of access, staging areas, or other activities within known, occupied reclaimed strip-mine grasslands during May through mid-August, and when absolutely necessary, situate them to the edges of open grassland to minimize impacts, or re-use already disturbed sites, such as existing access. Replant disturbed sites with appropriate grasses and forbs.

To avoid or reduce direct mortality of rattlesnakes or destruction of known den sites and other important habitat features, a biologist will review designated sensitive areas
during site-specific planning. If the work site falls within a rattlesnake sensitive area, advice will be provided on how best to avoid adverse impacts. This could include using such measures as:

- Plan project work within summer habitat to occur during the timeframe that rattlesnakes are inactive and underground: October 1 to April 1. If this conflicts with avoidance measures for other species, other actions may be taken to meet the intent, such as employing snake monitors during project activities to fence off work sites, actively check work sites for snakes prior to starting activities each day, or similar actions to avoid detrimental encounters.

- Plan project work that may impact den habitat to avoid the den and nearby basking and transient habitat and consider timing restrictions to protect snakes during vulnerable periods or snake monitors to avoid encounters with snakes.

- To avoid or reduce direct mortality of RFSS salamanders or destruction of known habitat, a biologist will review designated known habitat during site-specific planning. If the work site falls within a known four-toed, mud, or green salamander site, advice will be provided on how to best avoid adverse impacts. This could include using such measures as:
  - Limiting work within and around known, occupied wetland habitat during spring reproductive period to reduce mortality of four-toed salamanders.
  - Limiting and selective tree removal within 100 feet of rock face to reduce impacts on green salamander microhabitat.
  - Strategic placement of treetops in green salamander project sites that require tree removal to provide alternative habitat.
  - Avoiding springs known to contain mud or four-toed salamanders.

- To avoid or reduce mortality of aquatic RFSS or destruction of suitable aquatic habitat, a biologist will review suitability and occupancy of perennial streams during site-specific planning. If the work site falls within known, occupied aquatic RFSS habitat, advice will be provided on how best to avoid adverse impacts including erosion and sedimentation of stream habitat. This could include using such measures as:
  - Request placement of large woody debris in low gradient streams to prevent down-cutting or entrenchment.
  - Limited tree clearing to sustain canopy cover within riparian corridor to reduce impact on in-stream water temperatures.

- To avoid or reduce mortality or destruction of RFSS butterfly habitat, a biologist will review habitat suitability and known occurrences during site-specific planning. If the work site falls within known or occupied habitat, an evaluation will be conducted on how best to avoid adverse impacts. This could include such measures as:
  - Relocating access, staging, or borrow areas to avoid suitable or occupied habitat.
  - Clearing trees selectively near known Northern metalmark habitat to protect or enhance the ‘dappled sunlight’ feature that is representative of occupied habitat in the Wayne.

- Heritage
Alternatives Considered but Eliminated from Detailed Analysis

Alternative with No Plan Amendment or Guideline Departure

As described above, the proposed action includes a departure from two guidelines and a project-specific amendment that would exempt the Orphan Wells and Abandoned Mines Project from four different Forest Plan standards. The interdisciplinary team also considered an alternative that would not require a project-specific amendment or guideline departures and would be implemented in full compliance with the Forest Plan. The team chose not to pursue this alternative further because it would be less effective in meeting the project’s purpose and need and because the proposed action would lead to improved project results while still ensuring protection of resources.

One key factor that influenced the decision not to pursue an alternative without plan amendments is the fixed location of orphan wells and AML sites. Often, when the Wayne National Forest plans projects, the location of the proposed action is flexible and can be adjusted to avoid impacts to sensitive resources. In the case of orphan wells and abandoned mines, the location of the feature to be addressed is fixed in place. There may be some degree of flexibility on the placement of access routes and other features, but the action must occur at the site of the well or the mining feature.

In addition, there is specific rationale for each Forest Plan component subject to amendment or departure.

*SFW-TES-10*

“During the non-hibernation season (April 15th-September 15th), do not cut, unless they are a safety hazard:

- Trees of any species 6 inches dbh or more that are hollow, have major splits, or have broken tops that provide maternity habitat.
- Snags 6 inches dbh or more that have Indiana bat roost tree characteristics. Consider any tree with less than 10 percent live canopy to be a snag.

When removal of hazard trees is necessary in a recreation area during the non-hibernation season (e.g., developed recreation sites, access roads, trails), conduct emergence surveys at the identified hazard trees that possess the characteristics identified above, and at any hazard trees that possess large areas of loose bark providing maternity habitat.”

This standard is intended to prevent harm to Indiana bats that are using trees for roosting or raising their young. Because it is difficult to detect whether a bat is using a tree, this standard restricts cutting trees that may be suitable to the bat hibernation period when Indiana bats are in their belowground...
hibernacula and not likely to be found in trees across the landscape. The proposed action includes a project-specific amendment of this standard to help make the project more operationally feasible. Qualified contractors capable of completing this type of work are limited, and seasonal cutting restrictions have caused backlogs as contractors must fit multiple projects into a compressed time period. It is anticipated that increased funding may accelerate the pace of these projects in the coming years, which could add to these backlogs. Without the proposed amendment, the Forest would be unlikely to meet the project’s need to scale up the number of orphan wells plugged and abandoned mine features closed.

Furthermore, mine closure work at bat-suitable openings and well pluggings within one-quarter mile mine buffers should occur in summer when bats are least likely to be present to avoid disturbing or entombing bats during the spring emergence, swarming, or hibernating periods. It is not feasible to split contracts across the year to require tree-felling in the winter and mine closures in the summer. The proposed action, which includes the amendment of this standard, would create the flexibility to allow work in the summer when necessary to accomplish important environmental health and safety objectives. The proposed action also includes several design criteria developed in close coordination with US Fish and Wildlife Service to avoid and minimize effects to bats in lieu of protecting every potentially suitable roost tree. These project design criteria focus on the most vulnerable habitats and times of year.

*SFW-TES-32*

“Protect and improve occupied Regional Forester sensitive species habitat.”

This standard aims to protect Regional Forester Sensitive Species (RFSS) by preventing harm to their occupied habitats. However, as stated above, orphan wells and abandoned mines are fixed in place and it may not be possible to avoid impacts to occupied RFSS habitat. In many cases, project implementation could result in improved habitat for RFSS, especially in the long-term. However, full habitat protection, especially in the short-term, may not always be compatible with the proposed action.

Implementing the project in compliance with this standard could mean that in some cases dangerous mine features or pollution-emitting orphan wells could not be addressed in occupied RFSS habitat because the actions necessary to plug the well or close the mine feature would affect the habitat, even if those effects were minor or short-term. This inflexible approach would limit the ability to meet the purpose and need of the project forest-wide, wherever orphan wells and abandoned mines are present.

The proposed action, including the project-specific plan amendment, creates more flexibility while maintaining protections for RFSS. This is accomplished through the other Forest Plan direction, along with project design criteria that would halt project implementation or require further NEPA analysis if well plugging or mine closure actions threatened to cause serious harm to RFSS or their habitat. The Botany and Wildlife Biological Evaluations, as well as the effects analysis in Chapter 3 provide further information on how these design criteria would be applied to prevent serious adverse effects to RFSS while still meeting the environmental health and safety needs of the project.

*S-FOF-VEG-1 and S-FOFM-VEG-1*

“Cut trees only when necessary for public safety (e.g., trees posing hazards along roads or trails).”
The purpose of these two standards is to help meet the Desired Future Condition of two management areas, both of which seek to provide “mostly old forest that change[s] only as a result of natural disturbances and natural succession” (USDA FS 2006b). The desired condition of both management areas is to comprise “extensive stands of old-growth upland central hardwoods...[that] contain trees of varying sizes but are visually dominated by large, mature trees” (USDA FS 2006a). Avoiding tree cutting except when necessary for public safety helps to ensure these old forest conditions. However, because orphan wells and abandoned mine features occur across the Forest without regard to management area, adhering to this standard would restrict the ability to meet the project purpose and need. Of course, these standards do contain an exception for public safety, and much of the work included in the proposed action is intended to improve public safety, which means that much of the tree cutting that would occur in these management areas would still comply with the standards. But the plan amendment would avoid any uncertainty during implementation as to whether the cutting is truly necessary for public safety and would simply allow trees to be cut in the FOF and FOFM management areas to implement the proposed action.

While this amendment would likely result in the removal of some larger trees and would affect the process of natural succession, it would occur at a very small scale within the context of the management area. Individual project sites are estimated to require only a few acres of disturbance, and the entire proposed action would likely result in about 680 acres forest-wide over a 15-20 year period. Together, the FOF and FOFM management areas occupy nearly 27,000 acres, and even if all project actions were implemented exclusively in these two management areas, it would only impact roughly 2.5% of the management areas. In addition, when operationally feasible, larger trees can sometimes be retained within the project areas, as seen in figure 14.

Figure 14 - This photograph of the Roy Plant stream capture re-route that was recently completed on the Wayne helps to illustrate how larger trees can sometimes be retained within the worksite.
Furthermore, the proposed action also helps to meet desired conditions of these management areas, particularly FOF, by rehabilitating sites associated with past industrial use. Removing old equipment and rehabilitating access roads helps to create a management area that is more natural, and free from the signs of human presence (USDA FS 2006c). For these reasons, the interdisciplinary team concluded that an alternative that did not include a project-specific amendment of these standards would be less effective in meeting the project purpose and need with little gains in reduced effects.

**GFW-TES-6**

“Conduct pre-gating and post-gating mist net surveys at mines where bat-friendly gates are installed.”

Pre- and post-gating mistnet surveys are intended to help verify that bat-friendly gates are working as intended and do not cause bats to avoid or abandon a hibernaculum. When the guideline was included in the Forest Plan, knowledge of bat gate effects was limited. Over the years, Wayne National Forest wildlife biologists have collected pre- and post- data on bat response to bat gates in several locations in the Wayne. The data has indicated that bats initially react hesitantly to the novelty of a new gate but within a couple of years activity returns to normal and sometimes increases (USDA FS 2012b). Pre-gating surveys provide useful information about whether bats are currently using a mine opening and whether a bat-friendly gate is warranted, but post-gating surveys may not be as critical given the current knowledge on how bats react. Personnel permitted to conduct mistnet surveys are limited, and the surveys can only be conducted during a short window in fall. WNF staff intend to conduct observational surveys, and possibly mistnet surveys when feasible, but it may not be possible to conduct the post-gating surveys for every bat gate closure.

**GFW-ARR-23**

“Avoid adverse impacts to ephemeral wetlands during ground-disturbing activities.”

This guideline prohibits adverse impacts to ephemeral wetlands during ground-disturbing activities. In many cases, projects implemented on the Forest can be modified to avoid features such as ephemeral wetlands. However, orphan wells and abandoned mine features are fixed in place. While adverse impacts to ephemeral wetlands would be avoided wherever possible, in some cases it may not be an option. In these circumstances, the proposed action includes a design criteria requiring that impacted wetlands will be restored to the extent possible after the project is completed. Orphan wells and abandoned mine features cause adverse environmental impacts, and project implementation may ultimately result in improved habitat quality. Potential adverse effects under the existing condition, coupled with project design criteria to restore ephemeral wetlands following implementation, caused the interdisciplinary team to conclude that a guideline departure was preferable to a full-compliance alternative that could prevent well plugging or abandoned mine work even when implementation could improve habitat quality in the long-term.

**Chapter 3. Effects**

**Phased-Surveys**

The Orphan Wells and Abandoned Mines Project would use a phased approach to surveys, which means that the effects analysis in this chapter was completed prior to field surveys. Under the phased approach, site-specific reviews or surveys would be conducted in the proposed treatment areas after
analysis, but prior to implementation. This creates flexibility to address orphan wells and abandoned mine features as they are identified. It also means that surveys can be more indicative of current conditions because they will be conducted closer in time to the actual project implementation, which could span about 15-20 years.

Resource specialists rely on their professional judgement, past observations from other projects, and knowledge of forest resources to conduct analysis prior to completion of field surveys. To account for the variety of potential effects associated with a forest-wide project, specialists may assume that some effects will occur, or that sensitive resources are present – even though this may not be the case for each individual project. They also account for the possibility that resources could be encountered during project implementation that were not discovered during pre-implementation surveys.

Next, specialists analyze the effects that could occur to those resources if they are present during project implementation. Then, specialists identify any protection measures that may be necessary to eliminate or reduce impacts. Project design criteria have been included in the proposed action to help minimize effects if certain resource conditions are present, and mitigation measures have been recommended to help minimize effects. If the proposed action were approved, interdisciplinary specialists would consider each proposed well plugging, safety closure, or stream capture re-route prior to implementation to ensure that it is consistent with the proposed action and the effects described in this chapter.

Project-Specific Amendment
As described in Chapter 2, the Proposed Action includes the project-specific plan amendment that would exempt the Orphan Wells and Abandoned Mines Project from four Forest Plan standards. The effects analysis in this chapter accounts for each element of the proposed action, including the project-specific plan amendment. Where greater detail is necessary, effects related to the proposed amendment will be addressed separately.

Watershed
Scope of Analysis
The information in this section is, in part, a summary of the rationale and analysis contained in the Watershed Specialist Report, which was prepared for the Orphan Wells and Abandoned Mines Project and is available in the project record upon request.

Potential effects to watershed resources from the proposed action that are addressed in detail in this EA are soil erosion leading to sedimentation in waterbodies, effects to floodplain functionality from detrimental soil compaction within the floodplains, and degradation of natural wetland function caused by filling. Sedimentation and soil erosion are short-term effects and have different spatial and temporal boundaries for analysis than floodplain detrimental soil compaction and wetland filling, which are longer-term to permanent (unless otherwise restored).

In addition, due to the nature of orphan well plugging operations, it is unlikely, but possible that accidental spills of drilling and other fluids could occur during implementation. However, spill prevention and contingency plans, as required by law and by Forest Plan standards SFW-MIN-2, 3, 4, and 5 will be in place to both minimize the chances of a spill, and to cleanup and minimize the spread should a spill occur. If the proposed action were not implemented, there would be no risk of a plugging-related spill,
however, unplugged orphan wells could leak oil or brine and cause ongoing impacts to water resources. Because of the prevention and mitigation measures in place, combined with the low risk of occurrence, this potential effect was not identified as a key issue and is not analyzed in detail in this EA.

*Soil Erosion and Stream Sedimentation*

**Spatial and Temporal Analysis Boundary and Rationale**

Sedimentation from erosion off the proposed activities can only be reliably detectable downstream to the next confluence for streams. The spatial boundary for sedimentation is thus set from where a stream is adjacent to any of the proposed activities, down to its next confluence. For other waterbodies such as lakes, ponds, and wetlands, the spatial boundary would be the waterbody itself.

The temporal boundary for erosion and sedimentation is one to two years after project implementation. This is the time needed to allow for vegetation to regrow to a point where it provides the necessary ground cover to prevent erosion from the exposed and disturbed soils from becoming sedimentation in waterbodies.

*Floodplain Detrimental Soil Compaction*

**Spatial and Temporal Analysis Boundary and Rationale**

Soil compaction is confined directly beneath where disturbance occurs, so the spatial boundary would simply be the size of the proposed activities located within floodplains.

Detrimental disturbance refers to soil so impacted it is not expected to return to a naturally functioning condition within a reasonable time (approximately 20 years) (Page-Dumroese et al. 2009). Soil specialists estimate detrimental disturbance based on professional opinion and local conditions and focus on the soil’s ability to recover its natural functioning properties over time. The temporal boundary for detrimental soil compaction is set at a minimum of 20 years.

*Wetland Fill*

**Spatial and Temporal Analysis Boundary and Rationale**

Filling in of parts of wetlands may be necessary when a proposed project is adjacent to a wetland or to provide access to sites. This impact is confined to where the disturbance occurs, so the spatial boundary would be the size of the proposed fills.

Filling in wetlands creates a permanent impact, unless restored. Project design criteria require the restoration, to the extent possible, of impacted wetlands after completion of all treatment activities related to that specific project. Both artificial and natural wetlands occur on the Wayne National Forest, and many of the larger wetlands were artificially constructed. These artificial wetlands have never functioned like a natural wetland, and the filling in and subsequent restoration of these artificial wetlands would be a matter of simply rebuilding the impacted areas. The temporal boundary in these cases would be around 1-2 years post-restoration activity, the time needed to allow the planted vegetation to re-establish.

Natural wetlands, on the other hand, can take anywhere from decades, centuries, to millennia for their natural functions to fully return after they are impacted, then preliminarily restored via the decompaction of the soils and the reintroduction of wetland vegetation and essential hydrology. This preliminary restoration restarts the long-term process of vegetation, hydrology, and soils interacting to
slowly recover natural wetland function. Most natural wetlands on the Wayne National Forest are small and can generally be avoided.

Assumptions and Methodology
For the purposes of this analysis, it is assumed that: (a) departure from implementation of Forest Plan Standards & Guidelines will only occur as documented in the Environmental Assessment; (b) all project design criteria will be followed during project implementation; (c) mitigation measures will be followed during project implementation, or will be separately reviewed, modified, approved or denied, and documented on a case-by-case basis; and (d) Best Management Practices (BMPs) will be properly implemented, including Forest Plan Standards and Guidelines, except as discussed in Chapter 2, and recommendations outlined in “BMPs for Oil and Gas Well Site Construction” (ODNR 2013) and, where it applies, “BMPs for Erosion Control for Logging Practices in Ohio” (OSU Extension 2004).

The projects proposed under this decision are not exempt from Sections 402 and 404 of the Clean Water Act, and the project would be implemented in compliance with all laws and regulations. All necessary permits would be obtained prior to implementation.

Executive Order 11990 requires federal agencies to avoid to the extent possible the long and short-term adverse impacts associated with destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative. Wetlands are defined by this order as, “. . . areas inundated by surface or ground water with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction.” As described in Chapter 2, the proposed action includes a design criteria requiring that if impacts to wetlands are deemed necessary for individual projects, the impacted wetlands are restored to the extent possible after completion of all treatment activities. Impacts to all wetlands, but especially natural wetlands, would only occur when no other practicable alternative exists.

Executive Order 11988 requires federal agencies to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative.

The following mitigation measures are recommended when individual projects proposed under this decision are located within floodplains:

- Use timber or composite or slash mats wherever possible.
- Where the use of mats is not possible, and when conditions are dry, rip or subsoil compacted areas such as temporary roads and staging areas down to 15 inches upon completion of the project.
  - Rip or subsoil at least 70% of each feature (temporary road or staging area) in four to six equipment passes, approaching from a different direction each time to more uniformly break up the compacted soils.
  - Features that are specifically designed to be compacted as part of the project, and not just to access the site, such as the closures of subsidence holes and stream captures, are exempt from ripping or subsoiling.
- Remove any berms created and return the impacted areas to grade (re-contoured) to prevent interference of lateral flow during a flood.
Affected Environment
Subsidence holes and abandoned mine openings, stream captures, and orphan wells are scattered throughout the Wayne National Forest. These features on the landscape are either immediate or potential threats to watershed resources. If left alone, the immediate threats would continually impact watershed resources while the potential threats could eventually do so as well. The proposed action would remove these threats and improve the conditions of watershed resources on the Wayne National Forest.

Under current conditions, when water enters underground mines, it reacts with the materials there and causes Acid Mine Drainage (AMD), which later returns to the surface and degrades water quality. The proposed stream capture re-routes would prevent surface water from entering underground mines. Preventing the generation of AMD helps improve overall water quality. Stream capture re-routes also restores the natural surface flow of the stream, improving surface hydrologic function.

Unplugged orphan wells can allow oil, gas, salt water, or other fluids and vapors to escape into the atmosphere, ground, or water. When these substances escape the wells and leak into nearby waterbodies, it degrades water quality and can harm both the environment and the public. Plugging these orphan wells would prevent them from causing harm.

Many of the existing old roadbeds that may be reconstructed as temporary access roads currently are adversely impacting watershed resources, including some that are bisecting floodplains, and some damming or diverting streams due to failed crossing structures or poor location. Reconstruction of these old roadbeds, and their subsequent removal or restoration, would help mitigate their current impacts.

Effects Discussion
The proposed action has the potential to contribute to sedimentation in nearby waterbodies through erosion caused by exposed soil and other soil disturbance during implementation. Forest Plan Standards & Guidelines and State BMP recommendations would be employed to minimize adverse effects. Effective BMPs include, but are not limited to, maintaining filterstrips at their recommended widths along ephemeral, intermittent, and perennial waterbodies, or where not possible, employing other erosion control measures such as silt fences, fiber rolls, and straw bales, along with seeding and mulching of the exposed bare soils post-activity.

Temporary roads and staging areas would need to be constructed or reconstructed to access work sites. These actions have the potential to cause detrimental soil compaction, and when conducted within floodplains, could impact the natural functions of a floodplain. Soil compaction reduces the extent to which water can be absorbed and move through soils. This impacts the hydrologic connection between floodplain and river, inhibiting lateral flow during flood events, or reducing the overall size of the floodplain. Mitigation measures have been recommended to either minimize or restore detrimental soil compaction in floodplains. There may be situations where the identified mitigation measures are not feasible, and those would be separately reviewed, modified if needed, approved or denied, and documented on a case-by-case basis. Individual projects will go through a design and implementation process that is intended to accomplish project goals and be protective of water resources. In addition, where they are located in floodplains, the rehabilitation of old access roads that are no longer needed, which is included in the proposed action, could help to improve floodplain function.
It may be necessary to fill in parts of wetlands when a proposed project is adjacent to a wetland or to access certain sites, which would impact the function and efficacy of the affected wetland. Wetlands serve as filters for surface water that passes through them, and they help improve water quality. On the Wayne National Forest, some wetlands were created specifically to treat and filter acid mine drainage. The proposed action also includes a departure from Forest Plan guideline GFW-ARR-23 (“Avoid adverse impacts to ephemeral wetlands during ground-disturbing activities.”) However, project design criteria require wetlands to be restored to the extent possible if impacts should occur.

Ongoing and reasonably foreseeable actions described earlier in Chapter 2, when combined with this proposed action, may have the potential to cause additional effects to watershed resources, but the adverse effects of this project are expected to be short-term and reversible and should not cause or add to a trend of degradation of water resources. It is disclosed in this analysis that a natural wetland might be impacted. However, even with the departure from guideline GFW-ARR-23, the design criteria and mitigation measures put in place to minimize long-term adverse impacts are expected to perform as intended. The proposed action itself is expected to yield long-term benefits to watershed resources.

The proposed project-specific amendment is not expected to result in any effects to watershed resources beyond the general effects of the proposed action.

**Soil**

**Scope of Analysis**
The information in this section is, in part, a summary of the rationale and analysis contained in the Soil Resources Specialist Report, which was prepared for the Orphan Wells and Abandoned Mines Project and is available in the project record upon request.

Potential effects to soil resources from the proposed action that are addressed in detail in this EA are erosion, rutting, displacement, and compaction. Erosion is when soil is mobilized and suspended via natural agents such as water and wind, and it is accelerated where ground cover vegetation is sparse or removed. Rutting is when a depression or groove is worn into a road or path by the travel of wheels. Displacement is where the topsoil has been removed primarily by machinery and is mixed with the subsoil. Compaction is the compression of soil particles into a smaller volume, which reduces the size of pore space available for air and water. While preliminary ground cover generally reestablishes within a year or two post-project to help arrest soil erosion rates, the other impacts to soils generally have longer-term effects as it takes time for lost soils to redevelop and impacted soils to recover.

**Spatial and Temporal Boundaries**
The spatial boundary for soil resource analysis is approximately 100 feet from the edge of all proposed activities. Including temporary roads, work sites and staging areas. Most soil impacts occur only over limited spatial extent (point impacts), with impacts such as compaction, rutting, and displacement confined to the soil directly beneath where the disturbance occurs. Soil erosion does occur readily on freshly disturbed sloped landscapes, but the application of BMPs, as well as existing ground cover on adjacent undisturbed lands would minimize the extent of the soil erosion and generally prevent it from traveling further than 100 feet.

Though preliminary ground cover usually reestablishes within a year or two post-project, the time needed to allow for other impacts such as compaction, rutting, and displacement to recover could take up to two decades. Additionally, there’s a separate detrimental soil disturbance condition, which refers
to soils so impacted it is not expected to return to a naturally functioning condition within a reasonable time (approximately 20 years). Soil specialists estimate detrimental disturbance based on professional opinion and local conditions and focus on the soil's ability to recover its natural functioning properties over time (Page-Dumroese et al. 2009).

Assumptions and Methodology
For the purposes of this analysis, it is assumed that: (a) departure from implementation of Forest Plan Standards & Guidelines will only occur as documented in the Environmental Assessment; (b) all project design criteria will be followed during project implementation; (c) mitigation measures will be followed during project implementation, or will be separately reviewed, modified, approved or denied, and documented on a case-by-case basis; and (d) Best Management Practices (BMPs) will be properly implemented, including Forest Plan Standards and Guidelines, except as discussed in Chapter 2, and recommendations outlined in “BMPs for Oil and Gas Well Site Construction” (ODNR 2013) and, where it applies, “BMPs for Erosion Control for Logging Practices in Ohio” (OSU Extension 2004).

The same mitigations discussed in the watershed effects analysis apply to the soil effects analysis.

Affected Environment
Subsidence holes and abandoned mine openings, stream captures, and orphan wells are scattered throughout the Wayne National Forest. These features on the landscape mostly pose an immediate or potential threat to other resources. Due to past mining practices, existing system and non-system roads and roadbeds, as well as oil and gas well pads and other features, there are many areas throughout the Wayne National Forest with previously impacted soils. The proposed action would often utilize these previously impacted areas, but there would inevitably be some new adverse impacts to soil resources.

Effects Discussion
The proposed actions have the potential to erode soil by removing ground cover vegetation and exposing the bare mineral soils below during implementation. Forest Plan Standards & Guidelines and State BMP recommendations would be employed to minimize adverse effects. Effective BMPs include employing erosion control measures such as seeding and mulching of the exposed bare soils post-activity.

The proposed actions have the potential to compact, rut, and displace soils with the use of heavy machinery during implementation. Repeated passes over the same areas could further result in detrimental soil compaction. However, most disturbances would at least be surgically restored and revegetated following completion of each individual project, which would minimize and help kickstart the natural recovery process of the soils for most of these impacts, except where the design specifically calls for deliberate soil compaction, such as at stream captures reroutes where the surface mine openings are capped and filled over, and at the various open mine safety closures. In high value areas such as floodplains and wetlands, design criteria and mitigation measures are in place to further minimize or restore to the extent possible impacts to these resources.

As described above, because of past and current land uses, many project sites may already contain impacted soils. When possible, these impacted sites would be used for implementation to avoid new disturbance, but new soil disturbance is inevitable. However, with the implementation of the design criteria, mitigation measures, as well as standard BMPs, these impacts are expected to be minimized.
Ongoing and reasonably foreseeable actions described earlier in Chapter 2, when combined with this proposed action, may have the potential to cause additional effects to soil resources, but the adverse effects of this project are expected to be minimized.

Finally, the proposed project-specific amendment is not expected to result in any effects to soil resources beyond the general effects of the proposed action.

Plants
The information in this section is, in part, a summary of the rationale and analysis contained in the Biological Assessment for plants or habitats subject to the Endangered Species Act (ESA) and the Biological Evaluation for Regional Forester Sensitive Species (plants), both of which were prepared for the Orphan Wells and Abandoned Mines Project and are available in the project record upon request.

Scope of Analysis
The primary issues analyzed were project effects on federally listed plants and RFSS plants and their habitats. Federally listed plants are protected by the Endangered Species Act (ESA), while RFSS plants are administratively designated and not subject to the ESA. Collectively, these two categories will be referred to as ‘at-risk plants’. Because the project applies Forest-wide, all at-risk plants with known or potential habitat on the Wayne were analyzed during preparation of this EA. The list of species analyzed can be found in the Biological Assessment and Biological Evaluation.

In these two documents, the botanist determined that the proposed action may affect, but is not likely to adversely affect, the habitat of all three federally listed plant species. Likewise, the botanist found that for all RFSS plants, the proposed action may impact individuals but is unlikely to cause a trend toward federal listing or loss of viability.

Spatial and Temporal Boundaries
The spatial boundary selected for analysis will be the approximately 244,500 acres of the Wayne National Forest land because not all orphan wells, mines, or stream capture site locations are known and could potentially occur anywhere on forest land or areas immediately adjacent to perennial, ephemeral, or intermittent streams. The expected extent of effects would be approximately 100’ from the ground disturbance area associated with each well plugging or mine closure.

The temporal boundary for effects analysis will be +35 years from the anticipated implementation date. Based on the current availability of qualified contractors, past project time frames, and financial and other resource limitations, the interdisciplinary team anticipates that around 10-12 wells can reasonably be plugged per year, taking 15-20 years to plug 200 wells. The average amount of time it takes for woody vegetation to reestablish after cutting is 15 years. 20 years to implement all actions plus 15 years after the last action for woody vegetation to establish is 35 years.

Assumptions and Methodology
Project design criteria and analysis of the proposed action accounts for a distinction between RFSS flora with a single known population or population center as opposed to those with multiple known populations. Some RFSS occur as single populations or single population centers on the Wayne National Forest. In some cases, these are the largest known populations in Ohio and may represent the only known population in Ohio. These species, and those that have been removed from Federal listing in the last five years are at a higher risk of losing viability or trending toward federal listing. Conversely, RFSS
flora that are more numerous on the Wayne or are dispersed spatially from a single population center are less likely to have adverse impacts because they have more populations and likely a higher genetic diversity among them. These ‘high risk’ versus ‘low risk’ RFSS are listed in the Biological Evaluation and in Table 2 below.

Table 2 - High and Low Risk RFSS as Described in the Biological Evaluation

<table>
<thead>
<tr>
<th>RFSS Species Risk Level</th>
<th>Species Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Risk RFSS</td>
<td>Sparse-lobed grape fern (Botrychium biteminatum); Rock skullcap (Scutellaria saxatilis); Butternut (Juglans cinerea); Pinxter flower (Rhododendron periclymenoides); Juniper sedge (Carex juniperorum); White fringetree (Chionanthus virginicus); Plain gentian (Gentiana alba); Small white snakeroot (Ageratina aromatic); Littleflower alumroot (Heuchera parviflora)</td>
</tr>
<tr>
<td>High Risk RFSS</td>
<td>Deam’s threeseed mercury (Acalypha deamii); Striped gentian (Gentiana villosa); Coville’s phacelia (Phacelia covilleii); Running buffalo clover (Trifolium stoloniferum); Canadian milkvetch (Astragalus canadensis); Fern-leaf false foxglove (Aureolaria pedicularia); Carolina thistle (Cirsium carolinianum); Wild pea (Lathyrus venosus); Pale beardtongue (Penstemon pallidus); Yellow-fringed orchid (Platanthera ciliaris) Procession flower (Polygala incarnata); Blackseed speargrass (Piptochaetium avenaceum); Large sedge (Carex gigantea); Louisiana sedge (Carex louisianaca); Appalachian quillwort (Isoetes engelmannii); Campylostelium moss (Campylostelium saxicola); Dichelyma moss (Dichelyma capillaceum); Balsam groundsel (Packera paupercula)</td>
</tr>
</tbody>
</table>

This analysis is based on the assumption that:

- All design criteria would be followed.
- Measurable impacts would only occur within a 100’ buffer outside of the proposed ground disturbance area for each site. Therefore, surveys for at-risk plants will be limited to this area.
- Future botanical surveys would occur in areas of suitable habitat once proposals are submitted and would be accomplished during the growing season when plants are identifiable.
- Unknown low-risk RFSS populations are not crucial to genetic diversity and hence, species viability for the known populations across the Forest. Similarly, it is assumed that unknown low-risk RFSS populations are not a keystone in gene flow among populations.
Affected Environment
The project area consists of all Wayne National Forest lands and waterways. Habitats could include any
that are found within the Dry Oak Forest, Dry-Mesic Mixed Hardwood Forest, and Rolling Bottomlands
Mixed Hardwood Forest land type classes that encompass the Wayne National Forest ecological units
such as dry oak openings, mixed mesophytic forest, wetlands, and riparian forests (USFS, 2020).

Not all orphan wells, mine openings, and stream capture areas are known, as new features are often
found. Orphan wells and abandoned mine features would occur in previously disturbed locations and
the level of disturbance is dependent on how much use each site has received and how much time has
passed since initial development. The state of each site, position, distance to roads, among other
variables, likely varies widely.

Effects Discussion
The proposed action could affect individual at-risk plants or their habitat. Project design criteria require
that if any federally listed plant species is found within a 100’ buffer of the project site during site-
specific surveys, the proposal must be modified to avoid the plant by 100+ feet. If avoidance is not
possible, the project will be suspended and would require separate NEPA analysis and consultation with
US Fish and Wildlife Service to proceed. Because of this design criteria, individual federally listed plants
would not be subject to direct injury due to project actions, except in the unlikely scenario that federally
listed plants are not found during growing season surveys and are inadvertently harmed by project
implementation. Because the possibility of any direct effects is sufficiently remote, the probability of
these direct effects is considered discountable.

RFSS plants are also protected by project design criteria, but project implementation would not
necessarily be halted when RFSS plants are present. Therefore, the proposed action could result in
mortality of RFSS plants from crushing or trampling from equipment constructing roads or trails,
reconstructing roads, clearing sites, moving earth, or cutting trees.

Tree cutting associated with construction or reconstruction of temporary roads, trails, staging areas, and
work sites would temporarily increase the amount of light environment adjacent to these locations. Due
to project design criteria, this would not directly affect individual federally listed plant individuals but
could affect suitable habitat. Altered light conditions could affect RFSS habitat or individuals. Some at-
risk species could benefit from increased light until shaded conditions return after approximately 15
years. Conversely, species that prefer more shaded conditions, could see a temporary negligible amount
of habitat loss until woody vegetation reestablishes.

The use of off-site fill dirt and limestone rock for road creation or pad building has the potential to
introduce non-native plant species to the sites. The likelihood of non-native plant propagules occurring
in off-site material is high, and new NNIS may become established. However, any potential work site
would have been previously disturbed, some heavily, and most sites likely have a few species of non-
native invasive plants already present, sometimes in dense populations. NNIS introduced through off-
site fill or stone can alter soil chemistry in suitable habitat and out-compete at-risk plants for light,
nutrients, and rooting space. RFSS individuals and habitat within the 100’ buffer of the disturbance area
could be impacted. And although project design criteria requires postponement of project activities
when federally listed species are within a 100’ buffer of the disturbance area, new NNIS that establish
from fill dirt and rock could impact suitable habitat or spread over time to areas where these species
occur. However, as stated above, NNIS are likely already present at these sites and in the surrounding landscape.

There could be temporary or long-term losses of a minor amount of suitable habitat when new temporary roads, trails, drilling pads, and work sites are built. Once the roads, trails, pads, and other disturbance is rehabilitated, habitat may revert to its previous state depending on the amount of use.

Northern monkshood, a federally listed plant, is found in the vicinity of moist cliffs with cold air drainage. Closing mine openings and stream captures may permanently remove a small amount of Northern monkshood habitat if cold-air or water flow is present at these sites. Due to the anthropogenic nature of mines and stream capture areas, these locations are disturbed, likely contain established NNIS infestations, and are probably marginally suitable at best.

Construction of temporary roads and trails through suitable habitat could compact soil in previously unroaded areas or further compact soil if previously used roads are used for access. Soil type and the amount of use would determine the severity of compaction. Soil compaction may be temporary depending on the amount of rehabilitation each access route receives or may be long term if no rehabilitation occurs. Soil compaction can lead to changes in local hydrology causing water to accumulate in areas that previously drained, altering soil structure and hydraulic conditions for at-risk plants.

Beneficial impacts to at-risk plants from the proposed action include access route blocking to prevent unauthorized Off-Highway Vehicle (OHV) traffic. In the absence of OHV’s, soils would not continue to be compacted and damaged from vehicles and establishment and spread of NNIS would not occur from vehicle use. In addition, if orphan wells are leaking or if leaking increases over the next 20 years, any RFSS plants directly in the vicinity of the well could die if they become covered with a coating of oil, gas, or brine. Plugging the wells would prevent this from occurring.

Effects of ongoing and reasonably foreseeable actions in and near the National Forest would not substantially increase the effect to at-risk plants or their habitats when combined with the impacts of this project. Pre-implementation surveys and mitigation measures associated with ongoing and reasonably foreseeable actions helps to ensure that any additive effects would be minimal.

Effects of the Project-Specific Forest Plan Amendment

The proposed amendment to SFW-TES-32: “Protect and improve occupied Regional Forester sensitive species habitat”, is not relevant to the analysis of federally listed species because they are not RFSS species. However, this amendment could result in adverse impacts to RFSS plants, but not to the extent that would lead to a loss of viability of any species. As described above, RFSS flora on the Wayne vary in terms of their abundance and spatial distribution across the Forest, and some species would be at a higher risk for loss of viability or a trend toward Federal listing if a population was adversely impacted. Project design criteria require that if a high-risk RFSS plant species is found during site-specific surveys, the botanist will evaluate the impacts to determine whether the proposal could lead to a loss of viability. The botanist may recommend alternative measures that would not lead to a loss of viability, but if a loss of viability of the species cannot be avoided, additional NEPA analysis would be required before proceeding.

Likewise, project design criteria require that if any lower-risk RFSS plant species is found, project implementation design would be altered to the extent practical to minimize impacts. This could include
flagging and avoiding, transplanting, or other similar measures, but a loss of populations may be unavoidable. Extirpation of currently unknown populations is unlikely due to the small amount of ground disturbance associated with the proposed action, but not impossible. Extirpation of an RFSS population is not desirable, but it is assumed that the genetic diversity in the known populations is diverse enough to support species viability across the forest. Similarly, it is assumed that unknown population locations are not a keystone in gene flow among populations, and therefore that extirpation would not lead to a loss of viability or a trend toward Federal listing of the species. This is partly due to the species being grouped in the ‘low risk’ category. The viability of the species in the Plan area is considered to be maintained based on the existing known populations.

The other three Forest Plan amendments, S-FOF-VEG-1, S-FOFM-VEG-1, and SFW-TES-10 all relate to where and when trees can be cut. Effects to at-risk plants from these amendments are encompassed by the general effects of tree felling that are described above.

Wildlife
The information in this section is, in part, a summary of the rationale and analysis contained in the Biological Evaluation of Wildlife which was prepared for the Orphan Wells and Abandoned Mines Project and is available in the project record upon request.

Scope of Analysis
The primary issues analyzed were project effects on federally listed and RFSS wildlife and their habitats. Federally listed wildlife species are protected by the Endangered Species Act (ESA), while RFSS are administratively designated and not subject to the ESA. Collectively, these two categories will be referred to as ‘at-risk wildlife’. Because the project applies Forest-wide, all threatened, endangered, proposed, and RFSS identified on the Wayne National Forest are considered ‘potentially affected’, with a few exceptions.

The biologist determined that the proposed action may affect and is likely to adversely affect Indiana bats and northern long-eared bats. The project may affect but is not likely to adversely affect round hickorynut mussels. And for all RFSS wildlife, the proposed action may impact individuals but is unlikely to cause a trend toward federal listing or loss of viability. The list of species analyzed, along with detailed analysis supporting the determination can be found in the Biological Evaluation.

Spatial and Temporal Boundaries
The spatial and temporal boundaries for analysis of project effects vary based on the species and are described in the Biological Evaluation. Generally, terrestrial wildlife are directly impacted at the project site, with indirect effects extending beyond. For example, it is assumed that bats may be affected by increased noise during project implementation up to 800 feet beyond the limits of the work site. These effects from noise and disturbance are likely to occur during daylight hours, off and on for a few weeks up to a few months.

Aquatic species, on the other hand, may not be present at the worksite unless it is immediately adjacent to or overlaps with aquatic habitat. However, these species could still be impacted downstream from project activities. For example, any sediment that runs off a work site could cause impacts to aquatic species or habitat downstream. It is difficult to predict the spatial extent of sediment deposition because there are a variety of factors that affect the sedimentation process including the soil composition, land use, in-stream flows, and characteristics of the basin; however, these sedimentation impacts would
likely be short-term, mainly the time needed to allow for vegetation to regrow to a point where it provides the necessary ground cover to prevent erosion and the exposed and disturbed soils from entering waterbodies.

Assumptions and Methodology

Design criteria are built into the project to lessen the effects of the proposed action (including the project-specific plan amendment) on at-risk wildlife species. As site-specific work is proposed, a biologist would evaluate site conditions, availability of suitable habitat, and proximity to known at-risk species occurrences. Biologists would then ensure that all project design criteria and other protection measures are being met or correctly applied during project implementation.

It is assumed that Best Management Practices (BMPs) will be properly implemented, including recommendations outlined in “BMPs for Oil and Gas Well Site Construction” (ODNR 2013), where it applies “BMPs for Erosion Control for Logging Practices in Ohio” (OSU Extension 2004), as well as Forest Plan Standards & Guidelines except as discussed in the Environmental Assessment.

The following measures are recommended to improve project outcomes for wildlife:

- During site rehabilitation, if site conditions allow, consider creating small water features, such as simulated road ruts (5-10 ft long by 1-3 ft wide by 8-12 inches deep) along linear access routes or ephemeral pools (up to 18 inches deep) within cleared areas to benefit bats, amphibians, and other wildlife.
- During site rehabilitation, place the largest log available in cleared areas, especially in non-linear orphan well pads, to enhance grouse drumming habitat.
- To reduce direct mortality and destruction of current and future cerulean warbler nesting habitat, avoid cutting large (≥ 18” dbh) oak trees in project areas to the extent practicable by working around individual trees or adjusting work limits.

Affected Environment

The Wayne occurs in the most heavily forested part of Ohio in the unglaciated Appalachian foothills. Nearly all the land that makes up the Wayne today was either converted for agriculture; mined for salt, clay, brick, and coal; logged for charcoal production; or fragmented by road construction and other development at some point in the past 200 years. Effects of coal mining and other uses have left a legacy on both terrestrial and aquatic ecosystems that also affects long-term resilience and health via altered soil and stream chemistry. Second growth oak-dominated forests now cover much of the area, with other features present, such as reclaimed strip-mine grasslands, un-reclaimed mine features, pine plantations, recreational areas, trails, lakes, ponds, and streams.

Legacy effects from historic mining land use, such as acid mine drainage, can negatively impact semi-aquatic and aquatic populations. Orphan wells can leach toxins into groundwater that ultimately contaminate nearby aquatic systems. Additionally, stream captures tend to occur in ephemeral headwater streams that are dry much of the year and only wet during rain events. While they only support limited aquatic biodiversity, they are important for surface transport of water, soil, nutrients, and organic matter from terrestrial to aquatic ecosystems. Significant alterations of the integrity (i.e., acid mine drainage) of headwater stream systems would be expected to alter quality of the perennial streams they flow into. Therefore, ongoing pollution from abandoned mine lands would continue to allow surface water to be blocked and funneled into the underground mine system through mine
openings and continue to allow the production of untreated AMD in the local area and elsewhere, leading to the degradation of biological communities in the wider watershed. At-risk species, such as federally listed bats could be indirectly affected by AMD production through degradation of healthy, resilient forests, foraging areas, and aquatic prey base.

Watersheds on the Wayne are interspersed between public and private property. Overall, stream quality in the Wayne National Forest is high despite the region’s history of natural resource extraction (USDA FS 2020a). About 75% of high-quality stream sites are in the Marietta Unit, 19% in the Ironton Unit and only about 6% in the Athens Unit, which suffers from a stronger legacy of acid mine drainage from past coal mining operations (USDA FS 2020a). Although the Marietta Unit contains the highest quality and most biologically diverse watersheds, there is also evidence of significant human modification of some stream reaches including nutrient discharge and sedimentation. The Ironton Unit also has noticeably more streams with poor riparian zones than the other two units; however, a large majority of streams with inadequate buffers exist on privately owned property (USDA FS 2020a).

Effects Discussion

Effects of the proposed action vary depending on the species of wildlife in question. The wildlife Biological Evaluation provides a detailed effects analysis for all at-risk species that would be potentially affected by the project. In contrast, this EA will provide a general summary of the effects that could occur, grouping species where effects are similar.

At-risk Bat Species

The proposed action could potentially affect four at-risk bat species – two that are federally listed and two RFSS. The proposed action can affect bats in two distinct ways. First, activities that affect mine openings and belowground microclimates and habitats could impact bats mainly during the spring, fall, or hibernation periods when bats congregate around and use these mine-associated habitats. Secondly, activities that affect tree roosting and foraging habitat could impact bats during the spring, summer, and fall when bats typically rely on forested habitats.

Project activities could disturb bats during hibernation (or in the spring emergence or fall swarming periods) if the work is sufficiently close to or at mine entrances used by bats, if it disturbs hibernating bats, or if it directly impinges on or changes the microclimate in the underground mine void where bats hibernate. Thus, it is important to safeguard these habitats during vulnerable periods of high bat-use. There are two ways to do this: place limitations on 1) the locations and 2) the timing of work. Forest Plan standards and guidelines and project design criteria employ these two methods to help minimize effects during these sensitive periods.

Even with these measures, project activities could affect bats and their mine-associated habitat. Backfilling abandoned mine openings may affect bats through loss of habitat or inadvertent changes to the air flow patterns in the underground mine system, which could be negative, neutral, or beneficial. Likewise, inadvertently drilling into a mine void during well plugging operations could affect habitat suitability. Loss of access to some underground sites is possible, but there are still many openings either left open or gated for bat use, and bats should not have difficulty finding a suitable site within a few miles or less.

Gating mine entrances results in behavioral changes for swarming bats, but that is a necessary trade-off for protecting bats and habitat from human vandalism and disturbance while protecting humans from
unsafe underground conditions. At monitored sites in the Wayne where gates were installed, bat use trended up after the bats had adjusted to the novelty of the gate prior to WNS declines (K. Schultes, 2021, personal communication). It should be noted that GFW-TES-6 requires mistnet surveys and post-gating surveys, which may not be feasible or needed, due to limited capacity of permitted individuals, limited survey seasons, and previously acquired knowledge of how bats respond to the novelty of bat-friendly gates. However, not strictly adhering to the guideline would not result in any effects to bats.

Project activities affecting spring, summer, and fall forested habitat could result in loss of unknown roost trees. Loss of roost trees causes bats to search for new roosting sites, which can lead to increased energy expenditure, torpor, and possible loss of young, if the expenditure is sufficiently severe and prolonged. However, because most bats know of and use a variety of roosting sites throughout the summer and because habitat is not considered a limiting factor in the Wayne, the loss of one or a few roost trees is unlikely to result in detrimental effects.

It is also possible that an undetected roost tree could be cut down while occupied, though given the scale of the project and the distribution of at-risk bats on the landscape, the chance that project actions would intersect with an occupied tree is relatively low. If it did occur, most bats would be forced to flee and seek a new roost tree, but some could be temporarily stunned, injured, or killed. Bat pups that are not yet able to fly would be especially vulnerable. Typically, bats are not exposed to this threat due to forest-wide standard SFW-TES-10, which specifies that trees with suitable Indiana bat maternity roost characteristics must be removed during the hibernation period. This proposed action would authorize summer tree clearing because the project demands operational flexibility and the ability to close bat-suitable mines in the summer to avoid disturbing or entombing bats during the spring emergence, swarming, or hibernating periods. The biologist’s determination that the project may affect and is likely to adversely affect federally listed bats is primarily due to the need for summer tree removal, which would be authorized because of the project-specific amendment of SFW-TES-10. The Forest has communicated with US Fish and Wildlife Service regarding this proposal and will request incidental take to account for potential unintended harm to federally listed bats that could occur as a result of non-hibernation season tree clearing. In addition, the proposed action includes design criteria such as timing restrictions and emergence surveys for potential maternity habitat to avoid effects to juvenile bats during the pup season.

Bats may also be affected through loss of roost habitat that may occur if a substantial portion of a colony’s summer area or a primary maternity roost is cut in the winter (during hibernation) when bats are not present. However, these scenarios are unlikely in this project given the small estimated size of individual work sites (1.6-3.6 acres) compared to the average size of NLE and Indiana bat roost areas (>20 and >200 acres, respectively) and relative to the overall size of the surrounding available forested landscape of the forest. Additionally, there would be little permanent conversion of bat-suitable habitat to unsuitable habitat; trees and vegetation would be allowed to regrow in disturbed areas. Beneficial effects may also occur from the proposed work, including increased solar exposure to potential roost trees along the edges of the project work limits, creation of relatively small forest openings and forest edge provide foraging opportunities for both bat species, and creation or enhancement of bat travel corridors along project access roads.

Bats could also be affected by short-term disturbance from noise and human presence if work occurs outside of the hibernation season. A behavioral response to such human presence may be temporary
abandonment of a roost site. Although bats may flee a specific roost during the activity, the disturbance would be temporary, and bats would not need to permanently abandon a roosting area or search for a new one (USFWS 2005). If bats were displaced, they would likely find alternate habitat in the vicinity, since habitat does not appear limiting in the forest.

Alteration of a traditional foraging area can also impact bats. Some project activities could be beneficial, improving foraging efficiency by altering forest structure or increasing insect prey base through improved water quality. The need to occasionally depart from forest-wide guideline ARR-23 that protects ephemeral wetlands from ground-disturbing work could affect bats that would otherwise drink or feed at the affected wetland in the short-term; however, wetlands would be restored to the extent possible after the project is completed, and it is possible new water sources would be created during site rehabilitation (GFW-TES-14). Thus, from a population-level perspective, few negative consequences to foraging habitat are anticipated, and in fact, beneficial effects to habitat are expected through the proposed action (USFWS 2005).

At-risk Aquatic and Semi-Aquatic Species

The proposed action can also affect aquatic and semi-aquatic at-risk wildlife species, including the round hickorynut mussel, which is proposed for federal listing. Tree clearing and construction activities in riparian areas have the potential to cause erosion and sediment entering nearby streams, which could affect at-risk aquatic species if the work occurs upstream or is adjacent to occupied habitat. The effects of sedimentation on aquatic communities have been extensively studied, and have been shown to alter the survival, behavior, abundance, diversity, and community structure of both aquatic and semi-aquatic species (e.g., Allan 2014; Kemp et al. 2011).

The Wayne has standards and guidelines in place to protect and conserve riparian areas and integrity of aquatic ecosystems. Standards and guidelines include, but are not limited to, stabilization of disturbed areas, use of filterstrips, and restrictions for locating improvements on steep slopes and unstable soil. Some sediment may enter stream systems from proposed project activities; however, due to the implementation of S&G and erosion BMPs, the amount is not expected to alter existing water quality or the composition of stream substrates (USDA FS 2006b) and should represent a short-term impact (1-2 years), if any, where at-risk aquatic species occur.

Re-routing short sections of stream channel would impact riparian and in-stream habitat conditions with short-term (1-2 years) negative in-stream erosion and sedimentation and potential hydrologic impacts on aquatic species; however, this type of work in the Wayne has historically been limited to ephemeral stream systems and would have limited impacts in downstream perennial systems, especially with inclusion of erosion and sedimentation control BMPs. Stream capture re-routes are intended to restore the natural surface flow of streams altered during past mining, improving surface hydrologic function, and, therefore, improve downstream aquatic habitat.

The proposed action could also affect in-stream temperatures and aquatic organism passage. Tree clearing in riparian areas could result in increased in-stream temperatures; however, the affected area would be limited in size and, therefore, impacts would be limited. The Wayne has standards and guidelines (ARR 7-12) in place to protect, conserve and restore aquatic organism passage related to the installation of culverts or similar features to accommodate increased stream flow. Due to the implementation of Forest Plan standards and guidelines, this type of activity would likely improve downstream aquatic organism passage, and therefore, aquatic habitat connectivity.
The departure from plan guideline GFW-ARR-23 and filling in of wetlands could result in death and loss of suitable habitat to at-risk wildlife such as the four-toed salamander; however, design criteria require the restoration, to the extent possible, of impacted wetlands after completion of all treatment activities related to that specific project. Both artificial and natural wetlands occur in the Wayne, with many of the larger wetlands being artificially constructed. Most natural wetlands in the Wayne are small and can generally be avoided. Impacts to all wetlands, but especially natural wetlands, would only occur when no other practicable alternative exists.

**Other Effects to At-risk Wildlife**

The proposed action could also affect RFSS bird species that breed on the Wayne National Forest. At-risk bird species on the Wayne have varied habitat preferences. Some nest in large trees in mature forest, while others nest on the ground in more open, brushy habitats. All these species could potentially be affected by noise and human disturbance during reclamation activities in the spring, which could cause nest abandonment, resulting in nest failure. However, disturbance is likely to be relatively short term (days to weeks), and adults are expected to find unaltered habitat nearby. Furthermore, the scale and time frame over which this project is proposed to occur would ensure that overall effects to these species would be scattered and limited to individuals and not affect population viability.

For tree nesting species, impacts could occur if a tree containing a nest were removed during the nesting season, resulting in nest destruction and failed reproduction. Likewise, ground nesting birds could face nest destruction from vehicle and equipment operation for access, site clearing, and construction in nesting habitat. The project-specific amendment to allow tree clearing in summer may expose nesting birds to more summer project activity work than typical when bat-related timing restrictions are in place.

Tree clearing associated with project implementation would affect at-risk species in different ways. Some at-risk birds or butterflies that use disturbed areas may benefit from these small openings. Other wildlife, like salamanders, might be negatively impacted by openings in the forest canopy that change the microclimate of their habitat. Equipment operation and ground disturbance has the potential to trample and kill unseen wildlife on the ground and could affect unnoticed habitat such as timber rattlesnake hibernation dens. Pre-implementation surveys and project design criteria will be applied to help limit the potential for this to occur.

The proposed amendment to Forest Plan Standard SFW-TES-32, which would allow for project implementation in occupied RFSS habitat has been accounted for in the development of design criteria that maintain protections for RFSS species and their habitat. Many effects can be mitigated through required design criteria (e.g., timing restrictions on mine closures), avoiding prime habitats (e.g., the largest trees or wetlands or other water bodies), employing erosion and sedimentation best management practices (e.g., stabilization of disturbed areas, use of filterstrips, and restrictions for locating improvements on steep slopes and unstable soils), and a few species-specific requirements in known-use areas (e.g., employing monitors to avoid rattlesnake encounters). These protection measures, along with unamended Forest Plan components help to support the biologist’s conclusion that while the project may impact individuals, it is not likely to cause a trend towards federal listing or the loss of viability of RFSS wildlife.
For all wildlife effects, it is important to keep in mind that individual projects are relatively small and short-term. Furthermore, the scale and time frame over which this project is proposed to occur would ensure that overall effects to these species would be scattered and limited to individuals. This project would disturb an estimated 680 acres total, which is less than 0.3% of the entire national forest, over a 15 to 20-year period. This context, along with Forest Plan components and project design criteria, would allow the Orphan Wells and Abandoned Mines Project to accomplish important environmental, health, and safety objectives while limiting adverse effects to at-risk wildlife.

Heritage
Scope of Analysis
The information in this section is, in part, a summary of the rationale and analysis contained in the Heritage Specialist Report, which was prepared for the Orphan Wells and Abandoned Mines Project and is available in the project record upon request. Analysis considered potential project effects on heritage resources, as well as compliance with the National Historic Preservation Act.

Spatial and Temporal Boundary and Rationale
The National Environmental Policy Act (NEPA) and Section 106 of the National Historic Preservation Act (NHPA) requires federal agencies to take into consideration the effects of undertakings on cultural resources and historic properties prior to implementation. Section 106 regulations call for the identification of historic properties within the Area of Potential Affect (APE), defined as “…the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of the undertaking and may be different for different kinds of effects caused by the undertaking.” (36 CFR 800.16(d)). Because of the programmatic and forest-wide nature of the proposed action, APE’s would be identified when each well plugging, safety closure, or stream capture re-route is identified for implementation, and will typically be based on the area of ground disturbance. For the purpose of NEPA effects analysis, the spatial boundary is forest-wide.

Any effects that would occur to cultural or historic resources as a result of the proposed action would occur during project implementation. Therefore, the temporal boundary for this analysis will address effects that could occur at the time of project implementation.

Assumptions and Methodology
Each proposed well plugging, safety closure, or stream capture re-route would be reviewed for heritage concerns prior to implementation. It is assumed that all Forest Plan standards and guidelines will be applied, except as described in Chapter 2. Site-specific surveys and consultation with Tribes and the State Historic Preservation Office (SHPO), will be conducted in full compliance with all laws and regulations.

Affected Environment
Human presence in the Ohio River Basin dates back at least 13,000 years. And during that time period, through the emergence and steady presence of successive resident American Indian cultures, subsequent European settlement, industrial development, and now modern civilization, human populations have left their mark on this landscape. American Indians that lived throughout the area helped shape the landscape of the region, leaving behind countless sites such as quarries, hunting camps, settlements, and earthen mound sites. Other historical resources to be found in the Wayne
National Forest include Underground Railroad sites, evidence of early industrial development, as well as historic homesteads and cemeteries.

Under the existing condition, the potential for effects to National Register of Historic Places listed or eligible heritage resources is very low. There could be situations where a mine collapse or subsidence could destroy or damage an archaeological or historical site or oil spills from leaking wells could damage sites by contaminating datable organic material. However, these hypothetical situations seem highly unlikely.

Effects Discussion

The proposed action has the potential to affect historic resources, but project design criteria would prevent adverse effects to sacred Tribal sites, or sites that are eligible or listed on the National Register of Historic Places (NRHP). Potential effects to heritage resources, if present, could be damage to artifacts or features within known or unknown archeological or historical sites from the ground disturbing actions. Damage could be extensive in some cases or incidental and temporary in others. In some situations, a site’s context or setting may be temporarily disturbed or altered by the construction activities. Effects of more specific nature are discussed below.

The man-made mining adits, shafts and other openings, along with historic oil wells, are historic resources that the Ohio SHPO requires the Wayne National Forest to record and report to their office. The closure or modification of these features is an adverse effect to that historic resource. However, if the property is determined to be not eligible for the National Register of Historic Places then it is not considered a significant property eligible for protection and a No Historic Property Affected determination of effects can be made. Ineligible properties can be released from protection. Those that require further research to determine eligibility will be treated as eligible. Determinations of eligibility will be made by the Forest Archaeologist through consultation with the Ohio SHPO and Tribes. Ineligibility of certain resource types may be agreed upon in advance and codified in the proposed project specific programmatic agreement.

The potential to affect heritage resources with stream-capture reroutes comes from the access roads and ground disturbing activities related to closing off the subsidence collapse and openings and re-routing the streams. The extent of the ground disturbance becomes the Area of Potential Effect (APE). If there are archaeological or historical sites within the APE, they will be identified, recorded and evaluated for eligibility to the NRHP.

Orphan oil and gas wells may be historic features with a historic site. If the feature is historic it should be recorded and reported to the Ohio SHPO. Generally, oil well plugging can use the original platform or disturbed ground for the new drill rig to complete their work. If the new ground disturbing activities exceed the original footprint, there is potential to affect historic resources and full phase I archaeological survey will be necessary to identify any potential heritage resources in these “undisturbed” areas. Generally, the oil well itself will not be eligible for the NRHP, but any resources found within the APE should be identified, recorded, reported to the Ohio SHPO and a determination of eligibility for the NRHP completed.

As required by the project design criteria, the presence of an eligible site or a sacred site would require consultation with Tribes and SHPO to identify an appropriate buffer size to avoid the site. If the site
cannot be avoided, it would be necessary to analyze the undertaking under a separate NEPA project before proceeding.

The project-specific amendments included in the proposed action would not result in any additional effects to heritage resources beyond the overall effects of the proposed action. In general, there will be no eligible historic properties affected by the projects that fall under this NEPA decision.

Ongoing and reasonably foreseeable future actions on the National Forest are expected to have minimal additional impacts to heritage resources because they will employ survey, avoidance, and mitigation measures to reduce or eliminate effects to heritage resources.

Recreation and Scenery
Scope of Analysis
This analysis considers the potential effects of the proposed action on both recreation and scenery resources. Specialists accounted for a variety of issues, including effects to recreation sites and features such as trails and campgrounds, as well as recreation opportunity settings, scenery, and scenic integrity. Effects to the Congressionally designated North Country National Scenic Trail were also considered.

Spatial and Temporal Boundary and Rationale - Recreation
The proposed action could occur forest-wide and could therefore affect recreational values across the Forest. Effects to recreational resources would typically occur only in the immediate vicinity of any work completed under the proposed action. However, if the proposed action requires temporary trail closures or affects access to larger recreation sites, recreation effects could occur at a greater distance from the work. It is estimated that the proposed action could be implemented over a 15-20 year period, however project implementation would consist of a series of small projects of relatively short duration, typically less than one month. Recreation effects in the vicinity are expected to last only as long as the work is being performed.

Spatial and Temporal Boundary and Rationale – Scenery
The forest-wide proposed action could affect scenery resources anywhere on the Forest. Effects would occur within or adjacent to work sites. The rolling and heavily forested landscape of the project area helps to minimize the ‘seen’ area that will be visible from roads, trails, and adjacent private lands, and the spatial extent of each individual well-plugging or mine closure is limited in size. Scenery analysis will be focused on the immediate foreground (0 to 300 feet) and foreground (0 to ½ mile). Any adverse effects to scenic resources would be short-term, lasting approximately one to two years until green-up, with full recovery within 10 to 20 years from the date the work was completed.

Assumptions and Methodology
Each proposed well plugging, safety closure, or stream capture re-route would be reviewed for recreation or scenery concerns prior to implementation. It is assumed that all Forest Plan standards and guidelines will be applied, except as described in Chapter 2.

Affected Environment
Because the proposed action could occur forest-wide, the affected environment encompasses all recreational and scenic resources across the Forest. Popular recreational uses on the Wayne include hiking, horseback riding, mountain biking, and OHV use on designated trails. In addition, common dispersed recreation activities include sightseeing, bird watching, hunting, fishing, camping, and
paddling. Other recreation resources on the Forest include four Developed Recreation Areas containing sites such as Lake Vesuvius, Burr Oak, Leith Run, and Lamping Homestead campgrounds, and the Frontier boat launch. In addition, the Congressionally designated North Country National Scenic Trail passes through both units of the Athens Ranger District.

The Recreation Opportunity Spectrum (ROS) is “a framework for stratifying and defining classes of outdoor recreation environments or settings, activities, and experiences.” (USDA FS 2006a). The ROS includes six different categories of opportunities arranged along a spectrum based on extent of human modification and the interaction between users. Recreation Opportunity Settings (ROS) on the Wayne lie in the middle of the spectrum and include Semi-Primitive Non-Motorized, Roaded Natural, and Rural. Due to the extensive network of roads and motorized trails on the Forest, most management areas on the WNF were assigned the ROS classification of Roaded Natural. The Future Old Forest and Timbre Ridge Lake Management Areas were assigned the ROS class Semi-primitive Non-motorized, while the Developed Recreation Management Area was given the ROS class Rural.

![Figure 15 - This image helps to illustrate the spectrum between the 6 major classes of the Recreation Opportunity Spectrum. The Wayne National Forest includes lands that are classified as Semi-Primitive Non-Motorized (SPNM), Roaded Natural (RN), and Rural (R).](image)

Scenic integrity is defined as “the state of naturalness, or conversely, the state of disturbance created by human activities or alteration.” (USDA FS 2006a). Scenic Integrity Objectives (SIO) define the desired level of scenic integrity across the Forest. SIO’s on the Wayne range from low to high and variation is based on proximity to resources such as trails and recreation areas, communities, and heavily traveled roadways.

As described above, the proposed action is targeted at addressing lingering issues with orphan wells and abandoned mines, so the landscape in which it would occur already bears the marks of past land use. In some areas, recreational users may still come across abandoned equipment and unmaintained access roads that are used for unauthorized OHV riding. These features of the existing condition affect both the recreational and scenic experience of Forest visitors, and unsafe mine openings and leaking orphan wells may pose a threat to their health and safety. The proposed action is intended to help fix these problems and may even help to make some areas suitable for recreational investments such as trails (See GFW-REC-28: “After abandoned mine lands have been reclaimed 10 years or more, consider them for the development of trails and associated recreation facilities.”)
**Effects Discussion**

The proposed action includes several different activities, but the effects can be described generally. The proposed project-specific amendment, which is part of the proposed action, could also affect recreation and scenery. Amending standards SFW-TES-5 and SFW-TES-10 can be grouped with general project effects on recreation and scenery, but S-FOF-VEG-1 and S-FOFM-VEG-1 may have effects on recreation and scenery that should be addressed specifically.

Construction of staging areas and temporary roads or trails, along with site clearing, tree removal and earth moving could lead to dust, noise, heavy equipment traffic, altered scenery, temporary loss of access to favored recreation areas, and temporary closures of nearby trails or sites during project implementation. Because project activities would occur across space and time throughout the duration of the project, and because each well plugging or safety closure is expected to affect only a small area for a short period of time, forest users would be minimally affected. While these disruptions to recreational access could coincide with other ongoing and reasonably foreseeable activities on the Forest, the effects would still be small when considered in the context of a National Forest comprising more than 240,000 acres.

If temporary roads or access routes to the work site are situated near existing trails, one possible effect would be an unintended increase in unauthorized motorized use outside of designated OHV trails. However, project implementation can use gates, slash, or other barriers to deter unauthorized motorized access. In addition, rehabilitating existing access routes to orphan wells or abandoned mines could result in a decrease of unauthorized motorized use.

*Figure 16 - Taken only a few months after a stream capture re-route, this image illustrates a re-seeded access route with large rocks to prevent motorized access. Over time this access route will fill in with dense vegetation.*
The proposed action could also affect the North Country National Scenic Trail if project activities occur near the trail or trailheads. Trail use could be temporarily disrupted, and views from the trail could be affected in the short to medium-term as any cleared vegetation regrows. The Forest Service would follow all Forest Plan guidance on management of the North Country Trail, and would communicate with the US Department of Interior, National Park Service as necessary to protect the resource.

Tree removal and soil disturbance would have immediate impacts on the scenery of the work site. Areas would be cleared of vegetation and soil could be exposed. Natural revegetation coupled with re-seeding would help to ensure that effects to scenery are short-term (1 to 2 years). With reasonable vegetation recovery durations, work areas would not only meet the Forest Plan assigned SIO’s for the area but are also expected to result in a long-term enhancement to scenery as relicts from an industrial past such as pump jacks and old access roads are removed from the landscape.

The proposed amendment of S-FOF-VEG-1 and S-FOFM-VEG-1 could affect recreational and scenic resources in two management areas: Future Old Forest (FOF) and Future Old Forest with Mineral Activity (FOFM). These two management areas are similar in that each has a focus on “mostly old forest that changes only as a result of natural disturbance and succession”, and both seek to provide a more primitive recreation experience relative to other parts of the Forest (USDA FS 2006b).

Appendix I of the Forest Plan describes FOF as “predominantly natural/natural appearing”, with a “high probability of solitude [and] closeness to nature.” (USDA FS 2006c). The desired forest landscape is “extensive stands of old central hardwoods...[with] large, mature trees visually dominating stands of mixed tree sizes.” (USDA FS 2006c). In addition, “few man-made structures and utility corridors are evident.” (USDA FS 2006c)

Unlike FOF, FOFM allows surface occupancy of federal oil and gas leases, and in fact many active wells are already present in the management area. As a result, Forest Plan guidance for FOFM sets a lower expectation of the degree to which the management area will be free from human disturbance. Forest Plan Appendix I describes FOFM as similar to FOF “except there is evidence of mineral...activity and the probability of isolation from sights and sounds of people is low in this area. Facilities, structures, utility corridors, and mineral development are present and noticeable.” (USDA FS 2006c). While FOF is placed in the Semi-Primitive Non-Motorized category of the ROS, FOFM is categorized as Roaded Natural. As a result, while the proposed amendment would have similar effects to recreation and scenery resources in both Management Areas, they would be felt more acutely in FOF.

Amending these two standards means that trees could be cut as needed for project implementation, and not “only when necessary for public safety.” This could result in more opportunities to implement the project in these management area, and potentially more tree-cutting than would occur if the standard were not amended. Because orphan wells and abandoned mines cause threats to public safety, some tree cutting could be permitted consistent with the standard, but the proposed amendment would create greater flexibility to implement safety closures and well plugging without having to determine whether it is necessary for public safety on a case-by-case basis.

Because the proposed amendment could potentially result in an increase in tree-cutting within the management areas, it could cause effects that are counter to the desired condition of a Forest landscape undisturbed except by natural processes, and visually dominated by large trees. However, this effect should be very minimal relative to the overall management area. It is estimated that the proposed
action could result in the disturbance of around 680 acres *forest-wide* over the course of 15-20 years. It can be assumed that only a portion of those acres would occur in the FOF or FOFM management areas, which together constitute almost 27,000 acres (or about 11% of the Forest). And even if all project actions were implemented exclusively in these two management areas, it would only impact roughly 2.5% of the management areas.

In addition, individual projects under the proposed action are estimated to average about 1.6 acres for orphan well plugging and about 3.6 acres for safety closures and stream capture re-routes. Relative to the larger forested tracts of FOF and FOFM, these project sites are unlikely to change the character of the management area. Finally, in some cases it is possible to work around large trees to avoid removing them from the project site, as illustrated in figure 14 above. This would help retain large trees across the management areas.

Similarly, the potential for increased project implementation in these management areas could affect their natural or naturally-appearing character. For example, rehabilitated temporary or reconstructed temporary roads may be evident after project completion, though these visual impacts would subside over time as the vegetation regrows. Again, for the context of potential effects, it is important to keep in mind the scale of project activities compared to the management areas as a whole. And project activities may actually result in long-term improvements to the natural appearance of the area by removing or rehabilitating signs of past industrial use such as abandoned roads, structures, or equipment. Notwithstanding the desired condition of these management areas under the Forest Plan, there are currently areas in both FOF and FOFM that exhibit clear evidence of past resource extraction.

Finally, because the proposed amendment could allow for increased project implementation in these management areas, it could result in disruptions to the feelings of solitude that visitors hope to experience when visiting these management areas, particularly FOF. However, these effects would be short-term and would cease once project work has been completed at an individual site. Individual well plugging and safety closure operations are typically completed in a matter of weeks. The feelings of solitude that visitors experience could be enhanced over time by removing or rehabilitating signs of past industrial use.

When combined with project activities, ongoing and reasonably foreseeable future actions on the Forest could have an additive effect on scenery resources, but these effects are not anticipated to cause major changes to the scenery resources of the area. Overall, it is important to keep in mind that the landscape of Southeast Ohio is not unbroken forest, but a patchwork of ownerships and land uses including residential, agricultural, and forested areas. Small openings in the forest are quite common, and effects from the proposed action should be consistent with the overall visual character of the landscape.

**Acronyms**

AML – Abandoned Mine Lands  
APE – Area of Potential Effects (See 36 CFR 800.16(d))  
BLM – U.S. Department of the Interior Bureau of Land Management  
DBH – Diameter at Breast Height (A common measure of trees)  
EA – Environmental Assessment
Glossary

**Acid Mine Drainage (AMD)** - “Rock layers associated with the coal seam sometimes contain iron sulfide minerals, with pyrite the most common. Sulfur-bearing materials exposed to air and water during mining react with oxygen and water to form dilute solutions of sulfuric acid, which may also contain a number of other dissolved minerals. This contaminated water, referred to as acid mine drainage (AMD), often seeps from underground mines and, sometimes, from surface mined areas.” (ODNR 2011).

**Bat Gate** - A tool for the protection of bat roosts in mines that restricts human access and minimizes disturbance to roosting bats. Horizontal bar gates are commonly used to accommodate bat wingspan (Vories & Throgmorton, 2002).

**Borrow** - “Soil and rock fill that was dug from a nearby pit to furnish fill or soil cover for an earth-moving project.” (OSMRE 2021).

**Brine** - “All saline geological formation water resulting from, obtained from, or produced in connection with exploration, drilling, well stimulation, production of oil or gas, or plugging of a well.” (OAC 1509.01(U)).

**Cuttings** - “A mixture of soil, rock, and other subterranean matter brought to the surface during drilling of the borehole.” (Ohio EPA, 2011).

**Gob** - “A pile of loose waste, coal, and other minerals extracted from a mine that are not marketable. Gob may be left piled in underground workings or at the surface of the mine.” (OSMRE 2021).

**Highwall** - “Highwalls are created during surface mining as sides of hills are removed to expose coal seams. Rock faces resembling cliffs remain at the point where the mining excavation ceased.”
stricter reclamation laws were passed, miners were not required to backfill mine spoil against highwalls. Thus, there are many miles of highwall remaining in Ohio. Typically, they range in height from to 20 to 100 feet. The degree to which a highwall poses a danger to the public is determined by its proximity to human dwellings or activities and to public roads; to its stability, height, and angle.” (ODNR 2011).

**Mine Opening** – “When many older underground mines were abandoned, the entries into them were not adequately sealed. These unstable or open horizontal portals and vertical shafts can be very hazardous but also expose people to dangers lurking within the mines. These dangers include poisonous or explosive gases, oxygen deficiency, flooded sections, unstable roofs, and disorienting mazes of mine workings. These problems are compounded by total darkness within underground mines.” (ODNR 2011).

**Non-Native Invasive Species** – An introduced species that evolved elsewhere, and that has been transported and disseminated purposefully or accidentally. Invasive species can move into an area and become dominant either numerically or in terms of cover, resource use, or other ecological impacts. (USDA FS 2006a).

**Off-Highway Vehicle (OHV)** – “Any motorized vehicle designed for or capable of cross-country travel on or immediately over land, water, snow, ice, marsh, swampland, or other natural terrain. It includes but is not limited to four-wheel drive and other high-clearance vehicles, low-pressure-tired vehicles (ATV), motorcycles and related two-wheeled vehicles (OHM), and any other means of transportation deriving power from any source other than muscle or wind...” (USDA FS 2006a).

**Regional Forester Sensitive Species (RFSS)** – Those plant and animal species identified by a Regional Forester for which population viability is a concern, as evidenced by (1) significant current or predicted downward trends in population numbers or density; or (2) significant current or predicted downward trends in habitat capability that would reduce a species’ existing distribution. Sometimes referred to as a sensitive species.

**Subsidence** – “Surface caving or sinking of a part of the earth’s crust due to underground mining excavations.” (OSMRE 2021).

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