Pine Creek Historic Forest Restoration

EA Appendix One: Response to Comments

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Ecological Restoration

Comment: While the condition may be improving, nothing about the logging and spraying will help the restoration process – not the direct effects to soils, air, and water, not the noise or further fragmentation of the forest (Haynie, pg 1). These proposed actions have only negative impacts on the resource, mainly death, killing, destruction, degradation, pollution and poisoning (Lund pg 2).

Response:

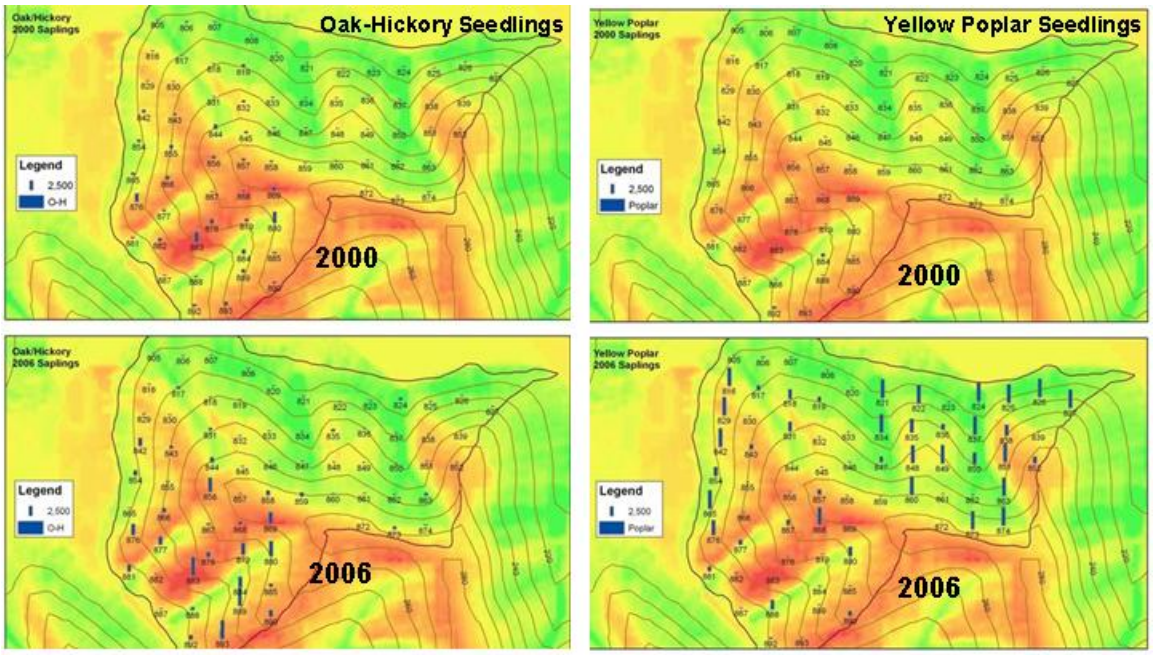
The restoration plan for the Historic Forest area is supported by the best available science (see Appendix 1 of the Botany BE, also pages 8-20 of the EA, Chapter 3). The 2006 Forest Plan also addresses structure, processes and composition of the historic forest (page 109):

> **"Forest conditions have always varied over space and time, due to natural processes and changes in climate as well as natural and man-made disturbances. Forest and fire ecologists believe current conditions of the central hardwood forests lie outside their historic range of variability. The desired future condition of this management area is a mix of vegetation more nearly resembling the historic range that existed prior to 18th/19th century settlement and development. Current fuel loading/fire behavior in much of the central hardwoods is classified as Fire Regime Condition Class 2 or 3, whereas it is believed that the pre-settlement forest would have primarily been in a Fire Regime Condition Class 1.**

This project improves the forest condition by moving the forest toward the historic range of variability over time using uneven-aged management techniques and prescribed fire. The actions proposed in this project vary as forest type varies over the landscape and do not force a change which does not represent a natural ecological progression. An oak-hickory forest dominates the landscape of this management area. Oak and hickory species are typically present on ridges and drier sites, whereas coves and moist northern slopes contain a mixture of oaks together with maples, beech, and yellow poplar. Trees vary in age and size, but large, widely spaced trees dominate the landscape. The forest canopy contains small gaps because the crowns do not completely close, and single or small clumps of trees blow down, die, or are removed. Tree canopy cover averages 60-80 percent (or 20-40% open) over the management area allowing light to reach the forest floor. Away from streamside areas, moist slopes and coves, low to moderate densities of understory vegetation, give the appearance of open woodland. See also the response on Page 5 of this document.

This project offers an opportunity to improve soil condition over time by increasing the buffering capacity of the soil. The buffering capacity of the soil (the resistance a soil has to change in pH when an acid or base is added to the soil) has likely been decreasing over time and needs to be increased. Buffering increases as clay and organic matter of soils increases (Gilmour 2002). While nothing can be done about the clay content, there is an opportunity in this project to incorporate organic matter on site through decomposition of tree tops and through deposition of larger woody debris on site for long term organic matter recruitment. This opportunity would be lost by not implementing this project (Project File 7-18 DePuy). Atmospheric deposition and acid rain will continue and the soil could become more acidic in this area of the Forest if nothing is done.

Fire is used as a restoration tool and its use can also be adapted to ecological conditions. Some individuals of some species will survive and grow better in certain environments of the historic forests. For example, chestnut oak and white oak will do well on the upper and south facing slopes (see regeneration and IMI map/graph below) where fires will burn more intense and more frequent (Appendix 1, Botany BE, page 60). Likewise species such tulip poplar and red maple and sugar maple will fare better on lower and north facing slopes.



Post prescribed burn Oak-Hickory seedlings (50-140 cm) density in 2000 and 2006 overlain on a map of integrated moisture index (IMI). The upper portion of the map is north, thus reddish areas are south-facing slopes and ridges. The IMI uses slope and aspect measures and integrates them into a single measurement. IMI areas are similar to Alliances groupings used for the Pine Creek project. From: Dr. Louis Iverson, USDA Forest Service Northern Research Station

Comment: How can this forest look, much less be like, an 18th/19th century Ohio when there are no chestnut trees, no Indiana bats, no passenger pigeons with a forest full of ORVs running around (Haynie pg 2)?

Response:

The Historic Forest condition is an assemblage of species (i.e. composition) which results from an open structure and re-introduced processes (i.e. fire). It is true that some species may not be present because they have gone extinct (e.g. passenger pigeons). However, the current Historic Forest does have Indiana Bats, the habitat of which will be enhanced by restoring Historic Forest structure (Appendix 1, Botany BE, pages 63 and 64) and will enhance habitat for many rare plant species (Appendix 1, Botany BE, pages 62-66). The presumption that the conditions created by the restoration treatments will help rare plants is based on "Hazards" as listed by the Ohio Department of Natural Resources, Natural Heritage Program (Appendix 1, Botany BE, pages 62-66; for an example see **http://www.dnr.state.oh.us/dnap/Abstracts/c/clitmari/tabid/1171/Default.aspx**).

It is also true that chestnut trees existed in the forests of the 18th/19th century and ORVs did not. Even today small chestnut trees are found in the Forest (24 were found during the botany surveys of Pine Creek), though they do not reach their historic size. In the future, the restoration of chestnut into the Historic Forest management area may be possible by planting disease-resistant

trees. ORV use is allowed on designated trails in a small portion of this area and this use was addressed in Forest Plan.

Comment: Heartwood could support the removal of non-native trees such as white pine if the Forest Service would allow the area to regenerate on its own (Haynie pg 2).

Response:

See Project File 4-07, Silvicultural Prescription, pg 46-49:

> **Two thinning harvests approximately five years apart will reduce the stocking of white pine within the stands and increase hardwood regeneration in the understory. The harvests are planned to open up the canopy so that eventually these stands can grow into diverse hardwood stands. The long-term objective is to restore sites to characteristics of ELTP Forest Types.**
>
> **Although after each thinning stands will be opened up to increase the spacing between residual trees, several harvests will be necessary to create the desired widely-spaced canopy conditions observed during pre-European settlement as documented in the 2006 Wayne Land and Resource Management Plan.**

Comment: The analysis needs to consider the cumulative and site specific effects of this project on biodiversity. The analysis must consider impacts on the following levels of diversity: 1) regional landscape, 2) community-ecosystem, 3) population-species, and 4) genetic. The analysis area must be large enough to consider biodiversity on all these levels (Haynie pg 2).

Response:

Comment is a suggestion for analysis.

The EA and Biological Evaluations disclosed the direct, indirect, and cumulative effects to plants and animals. Rationale was provided to inform the reader why the cumulative effects analysis areas were chosen for the various species (EA, Chapter 3, and Plant and Wildlife Biological Evaluations). There is no requirement for regional landscape analysis according to the National Environmental Policy Act. The EA disclosed the effects of the project's alternatives on plants and animals.

As noted in the EA, while harvesting and prescribed burning are being proposed for this project, no major landscape-level changes in vegetation are expected to occur.

The Wayne Forest Plan, developed in accordance with NFMA and its implementing regulations, provides for diversity of plant and animal communities in a multiple use context. Both NFMA and its regulations are clear that diversity of plant and animal communities is to be provided in a manner that is consistent with the overall multiple use objectives of the area. NFMA does not contemplate the maintenance of a pristine environment where no management may occur, nor does not the Act prescribe any particular methodology or level of diversity that must be provided on a National Forest. Instead, the statute provides considerable discretion to the National Forests to determine how best to maintain plant and animal community diversity across the planning unit (in this case, the Wayne National Forest).

Multiple use management involves compromises which benefit some wildlife at the expense of others for a period of time. The dynamics of ecological systems make it clear that managing resources involves trade-offs. The Forest has carefully considered the existing condition of the project area, the implications of "no action," and silvicultural techniques that can be employed to improve forest health and diversity. The potential effects of the project on diversity are documented, see EA, Chapter Three. Annual monitoring and inventory information concerning plants, animals and other resources were used in project development (see Survey sections in Chapter Three, the Hydrology Report Project File 7-7, the monitoring report in 4-17, and the biological evaluations. There is no evidence that the proposal will "substantially impair" the productivity of the land. Based on the best available scientific information, the proposal was carefully crafted to alleviate the consequences of the 2003 ice storm, aid restoration of forest health and ecological functions in the project area, and over time enhance diversity. See Chapters One and Two for purpose and need and developing the proposal.

The comment does not question the Forest Plan's provision for diversity in a multiple use context, but instead says that the project proposal itself fails to provide for diversity. The comment does not specifically state how the Pine Creek Project - intended to remove damaged and suppressed trees and restore forest health - will instead adversely affect the overall diversity of plant and animal communities on the Forest. There is no suggestion or proof here that the diversity or viability of the Indiana bat will not be maintained as required by NFMA and the Wayne Forest Plan.

Comment: The Wayne waxes eloquently about restoration of oaks and historic forest, but when the forest experiences true restoration by way of an ice storm, all of a sudden the Forest Service cries out about logging and cleaning up. The Indiana bat existed before the advent of people. The Indiana bat existed in a forest beset by blowdown and pests and without management. The picture on p.1 of Chapter One is no cause for alarm – that is what a natural forest looks like: there are downed trees, leaning trees, trees that are not pretty. Indiana bats thrive in ugly trees, as do woodpeckers (Haynie pg 3).

Response:

The ice storm created good structure for many wildlife species and under the current proposal, some of this structure will be maintained (Wildlife BE, pages 8-9, Botany BE, pages 62-66) and some will be utilized for wood products. Indiana bat, other wildlife species and many plants also existed in a historic forest that included fire, wind and ice as natural abiotic disturbances (Appendix 1, Botany BE, page 62). Fire, however, was largely suppressed over the last 100 years by humans, which has led to the current condition (dense, less diverse plant communities). The restoration of Pine Creek aims to increase biodiversity and abundant wildlife through the re-introduction of fire and by thinning overstory trees to a density more typical of a pre-European settlement forest.

Comment: If the Forest Service wants true restoration of the 18th and/or 19th century forest, then why is there no discussion of American Chestnut (Haynie pg 3)?

Response:

The re-introduction of American chestnut is a great idea and is part of the Forest Plan (Goal 7.4). However, it was not considered for the Pine Creek project at this time because

it is uncertain as to what conditions American chestnut will grow best under and there is not yet a reliable supply of low-cost blight resistant trees.

McCarthy (pers. comm.) has had some success in planting chestnut across a variety of light levels in the understory in Vinton County. McCarthy is also working on a project on the Athens District to use chestnut on reclaimed strip-mined lands. In the future, the restoration treatments may help under-plantings of American chestnut thrive in the open understory of the Historic Forest management area.

Comment: This project is futile because in 50 years the national forest will be gone, converted to biomass to produce liquid fuel (Lund pgs 2-5). Commenter challenges the assumption that the proposal will result in acorns and oak timber in 50 years.

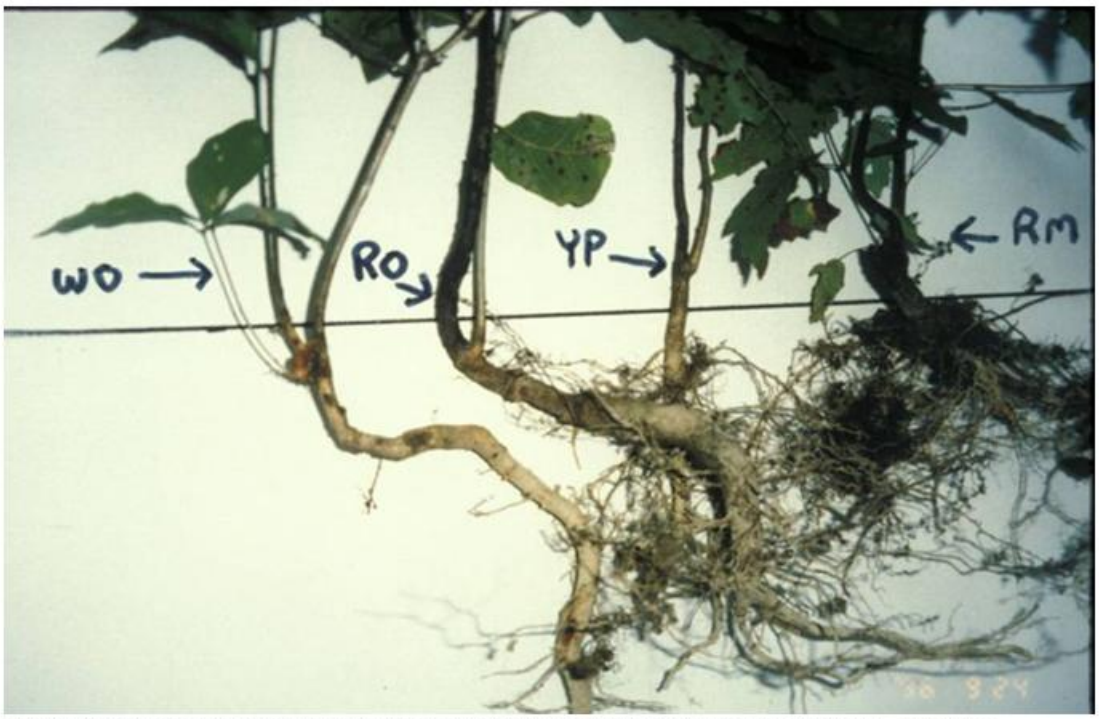
Response:

This project is focused on moving toward the Desired Future Condition of the Historic Forest Management Area (page 3-15), which describes a landscape dominated by large widely spaced trees and a diverse composition of species maintained by frequent fire (page 3-16). In the future, oak regeneration would occur in large pockets of naturally-killed trees or in areas of group selected timber harvests.

Comment: Logging, cutting, burning and poisoning actions impact the resource of trees by killing and damaging them and creating negative ecological consequences to the rest of the forest. A tree is closely associated with other life forms and with life processes both above and below ground. Below-ground life forms get and provide nourishment to roots. (Lund pg 7)

Response:

By removing crowded trees and opening the understory with prescribed fire and herbicide, we intend to enhance habitat for plants and wildlife (Appendix 1, Botany BE, pages 62-66) both above and below ground. Throughout this analysis we have assumed that fire was historically a natural part of the landscape and species both above and below ground are adapted to survive across the landscape in conditions created by fire. A good example of adaptation to fire is seen in oaks (see photo below). The root collar of an oak seedling is positioned below the soil in such a way that is not harmed by fire, allowing it to re-sprout quickly. Other tree species, such as red maple, have their root collar at the soil surface and therefore, are not as well adapted to fire.



Sprouting position of white oak (WO), red oak (RO), yellow poplar (yp) and red maple (RM). Sprouting position indicate how well or how poorly a species might respond to fire. Oaks are well adapted to re-spout after a fire because their root crown is below the soil surface vesus yellow poplar and red maple will often be top-killed by fire because their root crowns are above the soil surface. Photo: Pat Brose, USDA Forest Service, Northern Research Station

See Silvicultural Prescription (Project File 4-7):

> **"The first burn may be detrimental to oak advanced regeneration because small rootstocks may be killed. However, over the long run, oaks will be less adversely affected than competitors and will, therefore, enjoy a competitive advantage that will enable them to favorably respond to subsequent release (VanLear and Watt 1992)."**

Other processes are going on below the soil due to atmospheric deposition and acid rain. This is decreasing the pH of the soil solution (making or keeping it acidic). The buffering capacity of the forest soils has likely been decreasing over time and needs to be increased. Buffering describes the resistance a soil has to change in pH when an acid or base is added to the soil. Highly buffered soils resist this change more than poorly buffered soils. Buffering increases as clay and organic matter of soils increases (Gilmour 2002). Nothing can be done about the clay content. The main buffering opportunity in this project appears to be through the incorporation of organic matter on site through decomposition of tree tops and through deposition of larger woody debris on site for long term organic matter recruitment. There are many opportunities in this project for tops, limbs, foliage to be left on site and to increase soil organic matter and, thus, the buffering capacity (Project File 7-18 DePuy).

Comment: Any attempt to try and manipulate a native forest for any artificially chosen stage of succession or composition will mean fighting against natural forces forever (Lund pg 8)

Response:

The decision to manage for the Historic Forest landscape was analyzed and made in Forest Plan. The description of the Historic Forest condition is not an artificially chosen stage of succession, but one supported by scientific literature cited throughout the analysis documents. Historically, fire maintained a landscape of large, widely spaced trees (Botany BE pages 62-66) and the conditions created by this disturbance likely maintained a diverse landscape.

Comment: Commenter feels the Pine Creek plan looks to be mainly about timbering and timber production. Private forests can provide timber and national forests have things of value that only they can provide, first of which is as preserves for biodiversity which is obligated to older, larger and less fragmented forest ecosystems – also more stable and less disturbed.

Response:

The Pine Creek project is not about timber production, it's about restoring forest, structure, composition and processes to conditions more resembling a pre-European settlement forest (Pine Creek EA Chapter One, page 5). Timber harvesting and prescribed fire are tools to achieve that restoration goal. Numerous studies (Appendix 1, Botany BE, page 62) have suggested that fire played an important role in maintaining diversity on upland sites where we are proposing to focus most of the restoration treatments. Frequent fire created an open forest structure, which we hope to first achieve through timber harvest and then maintain through prescribed burns. Because the densities of trees (both canopy and mid-story) varied with aspect and topography (Appendix 1, Botany BE, pages 59-61) we have based our restoration methods on a scientifically based Ecological Classification System (Appendix 1, Botany BE, pages 55-57).

Wildlife and Endangered Wildlife Species

Comment: A recent study funded by the USFS Rocky Mountain Research Station and authored by Kailen Mooney revealed that "Chickadees, nuthatches and warblers foraging their way through forests spur the growth of pine trees in the West by as much as one-third. 'Forest managers really need to look at the big picture of ecosystems and not just focus on trees when implementing regulations aimed at encouraging the growth of healthy forests.'"(Haynie pg 4)

Response:

This is a suggestion for analysis. See the Ecological Classification and Management Prescriptions (Appendix A to Wildlife Biological Evaluation, Project File 5-6) for the ecological analysis of this project.

Comment: from Chapter one of the EA: The initial harvest will target 1) dead trees and high hazard trees, 2) trees with crown or bole damage and 3) trees not expected to live over the next ten-year timeframe. The Forest Service might as well call this project the "Road to Extinction for the Indiana bat" project. Dead trees, trees with crown or bole damage, and trees not expected to live over the next ten-year time frame is a textbook definition of Indiana bat summer habitat. Activities that may result in a permanent loss of Indiana bat habitat include permanent road and trail construction, recreation facilities and parking lot construction, surface mining, and oil/gas well development. All of these activities occur in and around the Pine Creek project area. **Issue:** This project will exacerbate the loss of Indiana bat habitat.

Response:

As described in the Wildlife Biological Evaluation (pp. 29-37), the proposed project is expected to result in long-term habitat improvement for Indiana bats through

- **increased solar radiation to potentially suitable roost trees,**
- **improved foraging habitat via decreased mid-story clutter,**
- **perpetuation of oaks and hickories into the canopy to improve future roost tree availability,**
- **creation of flyways for travel and foraging, reduced size and intensity of future wildfires,**
- **creation of new roost trees,**
- **creation of additional water sources near summer roosting habitat, and**
- **additional insect production (improved foraging).**

These long-term benefits offset the potential short-term effects, which include noise and disturbance to individuals, potential loss of undetected suitable secondary roost trees, and temporary alteration of foraging habitat. In a letter of concurrence written on October 16, 2007 (see Project File 5-09), the U.S. Fish & Wildlife Service stated,

> **"Based on our analysis of the information provided in your BEs for the Pine Creek Historic Forest Restoration project, we have determined that the effects of the proposed action are consistent with those contemplated and fully described on pages 51 – 53 of the PBO…"**

The commenter asserts that "Dead trees, trees with crown or bole damage, and trees not expected to live over the next ten-year time frame is a textbook definition of Indiana bat summer habitat." The commenter fails to discern between all dead and damaged trees, and

those trees that are actually suitable as Indiana bat roost trees. Dead trees, trees with crown or bole damage, and trees not expected to live over the next ten-year time can be suitable as bat roost trees. However, many dead and dying trees with crown or bole damage do not have the physical characteristics that provide suitable roost sites. These characteristics include cracks, crevices, hollows, or loose, peeling bark. As described in the BE (p.8) and EA (Chapter 2, p. 9), trees with suitable roost tree characteristics will not be harvested. Only dead and dying trees that do not have roost tree characteristics that will be removed.

From the Wildlife BE (p. 30):

> **"The Pine Creek area has a high proportion of dead and dying trees as a result of the ice storm that occurred during 2003. Some of these trees have already died, and some are in the process of dying. Marking guidelines will be written in consultation with a Forest Service biologist, with the objectives to improve the availability and suitability of current and future roost trees in the harvest units, and to ensure that potentially suitable roost trees are not removed. Because harvest may occur during the non-hibernation season, live trees or snags >6" dbh with Indiana bat roost tree characteristics will be retained unless they are a safety hazard (GFW-TES-10). Snags that do not have roost tree characteristics, and which are still marketable as timber, may be removed. Marking guidelines will also incorporate SFW-TES-12, which provides for a supply of future roost trees by specifying that all hardwood harvest units must retain a minimum of 12 live trees per acre (averaged over the cutting unit) of any species that are 6 inches dbh or greater with large areas of loose bark (unless they pose a safety hazard), and 3 live trees per acre that are greater than 20"dbh. If three trees per acre of this size are not present in the stand, a higher number of smaller trees will be retained (see SFW-TES-12 above for details). In addition, potential primary roost trees within the stands will be identified, and trees around them will be removed in order to improve their suitability as potential roost trees. Timber markers will receive training from a Forest Service biologist in order to ensure that they are able to distinguish between trees that are potentially suitable roost trees and those that are not suitable as roost trees."**

Comment: Heartwood will simply not allow the Forest Service to argue with any honesty that logging helps Indiana bats. It is not supported by science. These critters have been found in mines, dead pine trees, dead any kind of tree. To say that logging a maple to grow an oak that will be logged in 40 years is good for the Indiana bat is the height of hypocrisy, not to mention arbitrary capricious and not in accordance with the law.

Response:

We respectfully disagree with the commenter's assertion that the over story oaks in the Pine Creek area will be removed in forty years. The proposed project is designed to move the

existing stands toward the desired future condition as described in the Forest Plan (Forest Plan p. 3-15 – 3-16, Pine Creek EA p. 5). The Forest Plan projects approximately 100 years into the future (Forest Plan FEIS 3-51 and 3-52) and does not include removal of the overstory oaks in 40 years.

The analysis of potential effects to Indiana bats presented in the Wildlife Biological Evaluation and EA is based on the best available science, as cited throughout the BE, and in the BE Literature Cited and References Sections (p. 41-43).

Comment: A recent study in Missouri showed that Indiana bats live in large diameter snags. While this is not "new" information it is the best available science and reinforces decades of observation. Attachment 2 *Effect of Forest Structure and Fragmentation on Site Occupancy of Bat Species in Missouri Ozark Forests*, Yates and Muzika. Indiana bats do not need OHV trails to eat, reproduce, or raise its young. More OHV trails harm the Indiana bat because it fragments forests (Haynie pg 5).

Response:

The Pine Creek project does not include the implementation of new OHV trails. However, the impacts of OHV trails on Indiana bats were addressed in detail in the Kosmos Trail Expansion Project Wildlife BE, as well as the Kosmos project response to comments. The cumulative effects section of the Pine Creek Wildlife BE describes the expected cumulative impact of the Pine Creek project when added to the aggregate effects of past, present and reasonably foreseeable future actions, including the Kosmos OHV trail project (pp. 22-29, 36-37).

Yates and Muzika found that "The most parsimonious model for the Indiana bat indicated a direct relation between the probability of occupancy and BA of large-diameter snags." We agree that in a landscape where snags are uncommon, the abundance of snags may be a limiting factor to Indiana bat populations. However, it is important to note that due to the 2003 ice storm, snags are abundant across the landscape of the Ironton Ranger District, especially in hard-hit areas such as the Pine Creek project area. It is likely, therefore, that snags are not a limiting factor for summer Indiana bat populations, and abundance of bats may therefore not be correlated directly with snag abundance on a local scale.

Yates and Muzika offer a suggestion why they found a direct relationship between the probability of Indiana bat occupancy at a local scale and abundance of large snags, stating "Larger snags can contain larger cavities and areas of loose bark, providing greater-capacity roosts for sheltering numerous bats. This increase in numbers of individuals in a roost provides greater thermoregulatory benefits for pup-rearing females in maternity colonies through concentrating of body heat." In this statement, Yates and Muzika indicate that it is really the abundance of suitable large snags – those with large cracks, cavities and areas of loose bark that can shelter many bats – that is important. Large snags are not useful to Indiana bats simply because they are large snags – they must have suitable roost tree characteristics in order to be beneficial to Indiana bat maternity colonies. The Pine Creek project was designed with this important distinction in mind. While some dead or dying trees will be removed, no currently suitable roost trees will be removed. In addition, abundant currently suitable and future roost trees will remain in the stands after the project is complete. Finally, it is important to point out that of the more than 9000 acres in the project area, selective hardwood harvest is proposed on only 2309 acres. Abundant un-

harvested habitat will remain within the project area and in the landscape surrounding the project area.

Please also see response to comment #2 in this section, which describes the availability of roost trees in the project area, and the elements incorporated into the project design that will protect suitable snags and live roost trees from removal.

Comment: "The WNF is located in the core breeding area for the cerulean warbler, provides summer and winter habitat for the Indiana bat, and contains streams that possess populations of regionally rare fishes and mussels" (Draft Plan, pg. 170). How does logging trees, poisoning trees, and burning trees help the Cerulean warbler (Haynie pg 5).

Response:

As described in the MIS analysis, and the wildlife BE, (see Project File 5-5) pp. 60-61), the proposed project is expected to improve habitat for cerulean warblers by creating semi-open forests with an open understory that are favored by cerulean warblers. In addition, the project will create favorable conditions for the perpetuation of oak-hickory forests that are favored by cerulean warblers, and convert approximately 170 acres of pine stands to hardwood habitat, which is more suitable habitat for cerulean warblers. The potential effects of the project described in the Wildlife BE are consistent with those described in the Forest Plan BE (p. F3-35 – F3-39).

See Forest Plan FEIS pages 3-73 forward for a detailed habitat and area analysis for interior forest species.

From the MIS analysis:
"The pileated woodpecker, cerulean warbler and worm-eating warbler should benefit from the proposed timber harvest and mid-story treatment through the creation of canopy gaps. Additionally, the removal of mid-story trees will open up the mid-story, and make the canopy structure more diverse, improving nesting for the cerulean warbler." And "Prescribed burning in Alternatives 2 and 4 has the potential to negatively affect breeding birds. However, prescribed burns typically occur in the early spring, or late summer/early fall and Forest Plan S&G (see S&Gs as listed in Chapter 2, EA) and design criteria incorporated into the project further limit the potential for burns to occur during the bird nesting period."

Comment: This project will jeopardize the Indiana bat and violates the ESA. This project does not do anything to recover the Indiana bat. The Forest Service states that it has relied on the best available science, but it fails to identify what that is. In response to a member of Heartwood who pointed out the decline in Preble County, the Forest Service responded that one cannot make an assessment on one year of data. What about 40 years of data? What is the population of the Indiana bat compared to 40 years ago?

Response:

The commenter asserts that the proposed project will jeopardize the Indiana bat and violates the Endangered Species Act (ESA). We respectfully disagree.

We have conducted on the ground surveys and inventories in the affected area. We have researched literature and scientific studies. We considered the Programmatic Biological Opinion

issued by the US Fish and Wildlife Service (FWS) on our 2006 Forest Plan. A Biological Evaluation (BE) was prepared documenting this analysis and it was made it available for public inspection . We have consulted with the FWS, the federal agency assigned the authority to ensure the ESA is followed, regarding the findings in our BE.

The proposed project is consistent with the programmatic Biological Opinion (PBO) issued by the USFWS on the 2006 Forest Plan. In her letter of concurrence, dated October 16, 2007, USFWS Supervisor Mary Knapp stated,

> "We believe that the proposed Pine Creek Historic Forest Restoration Project is consistent with the PBO. After reviewing site specific information, including 1) the scope of the project, 2) the environmental baseline, 3) the status of the Indiana bat and its potential occurrence within the project area and surrounding the Wayne NF land, 4) the effects of the action, and 5) any cumulative effects, it is the Service's biological opinion that this project is not likely to jeopardize the continued existence of the Indiana bat. As explained in the Effects of the Action section, we anticipate that there may be individual fitness consequences but do not expect any colony or population level fitness implications. Thus we do not anticipate any appreciable reductions in reproduction, numbers, or distribution for Indiana bats range-wide."

The commenter asserts that the proposed project does not do anything to recover the Indiana bat. To the contrary, the proposed project is expected to improve Indiana bat habitat over the long term, as described in the Wildlife BE (pp. 29-37), and in the response to comment #2 above.

The commenter states, "the Forest Service states that it has relied on the best available science, but it fails to identify what that is." The science used to evaluate the potential effects to Indiana bats and other species is cited throughout the BE, and in the BE Literature Cited and References Sections (p. 41-43).

With regard to the Preble county population comment submitted during the comment period for a different project on this Ranger District, the Forest Service response was to the comment submitted. The commenter to the other project did not submit 40 years of data, nor has the current comment submitted 40 years of data. In fact, the Preble County mine was discovered to be a hibernaculum during the 1990's. Therefore, there are not 40 years of data for this hibernaculum on which to comment. Since its discovery, numbers of Indiana bats in this hibernaculum have been fairly stable, with minor fluctuations between years.

We are very much aware of, and have taken into consideration that range-wide, the population of Indiana bats has declined over the past 40 years. However, recent trends actually show an increase in range-wide population numbers, averaging an increase of approximately 2.9% between 1995 and 2005 (Krusak, personal communication). We suggest that the commenter also consider that the proposed project affects a miniscule amount of the range-wide available habitat for Indiana bats, and is expected to benefit Indiana bat populations by improving habitat over time.

The USFWS stated in their letter dated 10/16/07, that this project is "not expected to result in any colony or population level fitness implications."

Comment: The undersigned continues and will continue to point out the dire circumstances of the Indiana bat. <u>The Wayne exacerbates the decline</u>. The Wayne facilitates and creates the very

summer habitat conditions that doom the Indiana bat. Landscape characteristics that influence bat species distribution include extent of fragmentation, patch size, and presence of edge habitat (Grindal and Brigham 1999, Law et al. 1999, Estrada and Coates-Estrada 2002). The Wayne was fragmented when it fell in the hands of the federal government; over the years the Wayne further fragments the landscape. Shifts in ownership patterns of the Midwest indicate increased fragmentation due to development and greater number of forest-management units (Gobster et al. 2000), and parcelization affects age structure and arrangement of forest landscapes (Ko 2005).

Response:

The commenter asserts that the Wayne exacerbates the decline of the Indiana bat. The Pine Creek project has been designed to address the desired future condition for the area set forth in the Forest Plan (2006 Forest Plan, p. 3-15 and 3-16). The proposed action and the anticipated effects of project activities are consistent with the programmatic Biological Opinion (PBO) issued by the USFWS (Forest Plan Appendix F2). In her letter of concurrence, dated October 16, 2007, USFWS Supervisor Mary Knapp stated, "We believe that the proposed Pine Creek Historic Forest Restoration Project is consistent with the PBO." In that PBO, the USFWS considered the potential effects of all activities proposed in the Forest Plan, and concluded:

> **"As explained in our Effects section, we anticipate that there may be individual fitness consequences but do not expect any colony or population level fitness implications. Instead, we anticipate over the long-term the goals of the proposed action, even with the anticipated negative cumulative effects, will benefit Indiana bats occurring within the action area. Thus, we do not anticipate any appreciable reductions in reproduction, numbers or distribution for this species." (emphasis added)**

The commenter expresses concern that the proposed project will fragment the landscape. The Pine Creek project has been designed to minimize fragmentation by using existing roads and trails, and minimizing creation of new temporary roads. The Wildlife BE also describes the measures that will be used to rehabilitate temporary access roads after use. Because of the design elements, this project is not expected to appreciably increase fragmentation in the project area.

A broad, programmatic-level analysis is done at the Forest Plan level. We have looked extensively at cumulative effects - see Chapter 3. There is also very little cover type conversion in the Lawrence County area. Although there have been many acres harvested, using single tree, shelterwood, thinning and clearcut harvest methods, the acres remain in a forested condition. We track habitat and we look at MIS trend information Forest-wide. This project does not divide the forest up in blocks, so the assumption made by the commenter is inaccurate. Please also see response to Comment #1 in the Fragmentation section below.

Comment: The Wayne makes a point to cut dead and dying trees, the habitat of the Indiana bat, when the greatest indicator of Indiana bat is old growth forest. The most parsimonious model for the Indiana bat indicated a direct relation between the probability of occupancy and BA of large-diameter snags. Previous studies have indicated the use of large-diameter trees and snags by Indiana bats as roosting sites for maternity colonies (Callahan et al. 1997, Foster and Kurta 1999, Britzke et al. 2003, Carter and Feldhamer 2005). Larger snags can contain larger cavities and

areas of loose bark, providing greater-capacity roosts for sheltering numerous bats. This increase in numbers of individuals in a roost provides greater thermoregulatory benefits for pup-rearing females in maternity colonies through concentrating of body heat. Other benefits may include possible information transfer among individuals within the same roost about quality foraging areas (Wilkinson 1992). *See* Yates and Muzika Forest Structure, Fragmentation, and Bat Occupancy.

Issue: Cutting dead and dying trees in this project reduces critical habitat of the Indiana bat.

Response:

The observation in this comment was taken into consideration in the interdisciplinary team's review of the project. This observation simply reinforces what is known. In Barclay, Robert M. R. and Brigham, R. Mark. 1998. Hide and Seek: In Search of Forest Bats, the scientists there identified what habitat was best for the North American bat:

The common feature of the roosts chosen by these species of bats in B.C. (and other bats in forests all over North America), seems to be that they are located in large-diameter, tall trees that rise above the forest canopy in the open or on the edge of forest clearings; also, the trees are relatively early in the decay process. Such trees are probably most likely to have spaces to hold many individual spaces that receive warmth from the sun and are safe from terrestrial predators, yet are easily located and accessible for clumsy juveniles when they start to fly. Trees of this type, however, are not always abundant. In a study of little brown bats in the boreal forest in northern Alberta, graduate student Lisa Crampton found that suitable roost trees were only available in old-growth forest stands. Five hundred miles southeast, in the mixed coniferous-deciduous forest of the Cypress Hills, Marina Kalcounis, another graduate student, found that big brown bats selected the same attributes. In fact, every suitable tree Kalcounis checked had evidence of use by bats.

From a conservation perspective. the fact that each individual bat uses several suitable roost trees in its home range--rather than just one that houses a large, stable colony--means that we must view both the forest and bat populations from a larger, landscape scale when making recommendations on how to protect critical bat habitat. We cannot simply save particular trees; significant areas of forest with appropriate types of trees must be preserved.

Harvesting old-growth stands may also have negative impacts on foraging by bats. There is mounting evidence, exemplified by Lisa Crampton's work, that bats spend more time foraging in gaps in old growth forests than they do in younger forests, perhaps because insects are more abundant in these locations. Paul Bradshaw's University of Regina study in three different old-growth forest stands on Vancouver Island added a further element to the complexity of how bats use forest habitats. Bradshaw regularly detected bats foraging near the tops of old growth trees-some of which tower more than 320 feet above the forest floor.

The frequency of movement between roosts and the apparent lack of cohesiveness in "colonies" has probably been the biggest surprise we have encountered in our work to date. Roost-switching represents behavior opposite to the high degree of site fidelity exhibited by bats roosting in buildings or caves: Without any human

disturbance, individuals move between tree roosts on a regular basis sometimes to a site only yards away, but in other cases to trees nearly a mile away. Females will move even while nursing their dependent young presumably carrying the pup from one tree to the next during the night. Why they do this is a fascinating question that current research is attempting to answer. Perhaps bats move to confuse potential predators such as weasels and squirrels. Perhaps moving reduces the load of parasites such as ticks. fleas, and mites that can build up in roosts. Or perhaps different trees offer appropriate microclimates, depending on whether it is sunny and hot or cool and wet (Haynie pg 7).

Since 1962, researchers and the government have known that Indiana bats could travel up to 230 miles between winter and summer habitat. See Hall, 1962, p. 65. Kurta et al, also found that, regarding Indiana bats in Michigan:

It seems that it may do little good to preserve single roost trees. Roost trees lose their entire bark covering in a few years through natural processes, and the evidence suggests that Indiana bats generally do not return each season to the same tree anyway. On the other hand, the evidence also suggests that they do return to the same general area for summer roosting. To preserve Indiana bats, we need to preserve pieces of unmanaged forested habitat where roost trees (i.e., dead trees of appropriate species near appropriate foraging grounds) are produced on a continual and reliable basis.

According to the Ohio Department of Transportation, the local summer population of Indiana bats in Ohio and maternity colonies in particular, is thought to be most stressed by the lack of or loss of available suitable habitat. Research has demonstrated that densities of tree-roosting bats are generally greater in old growth forests of temperate regions, where structural diversity provides more roosting options (Crampton and Barclay 1996, Brigham et al. 1997, Racey and Entwistle 2003). Within the range of the Indiana bat, particularly within the core maternity range in the Midwest (including Ohio) old growth forest has been virtually eliminated. While the forest cover in Ohio has increased since the Indiana bat became Federally-listed in 1967, the composition of these forests is primarily second growth forest.

Clearly, an increase in forest quantity is not a reliable indicator of forest quality and its suitability as Indiana bat habitat. Over time, second growth forest will mature and likely develop into higher quality Indiana bat habitat. Currently, high quality suitable Indiana bat habitat, especially for maternity colonies which typically utilize larger mature dead and dying trees, appears to be a significant limiting factor for this species based upon the current conditions of many forested areas throughout the state (Haynie pg 8).

It is important to point out that though the commenter suggests that the proposed project affects old growth forest, and the literature references old growth forest, the project area does not contain old growth forest, and no old growth forest will be affected by this project. The majority of forest in the project areas is 80 – 120 year old second growth forest. However, the purpose of the proposed project is to move the forest toward a condition similar what would have been found in the same area prior to European settlement. In the desired future condition, forest stands in the Pine Creek project area would have characteristics similar to those described as important and desirable for old growth forest, including large overstory trees with large snags, canopy gaps, and a diverse canopy.

Both the Barclay et al., and Kurta et al., articles referenced above describe the importance of retaining multiple large, suitable snags across the landscape. We fully agree. It is important to note that the landscape surrounding the Pine Creek project area is very different from that of Michigan and Alberta, where large suitable snags are presumably rare. The Ironton Ranger District was affected by an ice storm in 2003 that damaged many trees, creating an abundance of large snags across the landscape, many of which are suitable roost trees. Therefore, unlike in Michigan and Alberta, there is an abundance of suitable roost trees in the Ironton District. Stand exam data from 2004-2005 indicates that there are, on average, approximately 18 snags per acres in the Pine Creek stands. Observations since that time confirm that more damaged trees continue to die each year, pushing that number upwards. As described in detail in Comment #4 above, all snags that are suitable as Indiana bat roost trees will be retained in the Pine Creek project area, and includes design elements and Forest Plan Standards and Guidelines have been incorporated to provide abundant future roost trees across the landscape.

The Barclay et al. article excerpted above describes the importance of old-growth stands in Alberta Canada, emphasizing the importance of canopy gaps for solar radiation on maternity roost trees and foraging areas. It is important to note that the landscape surrounding the Pine Creek project area is very different from that of Alberta. The Ironton Ranger District was affected by an ice storm in 2003 that damaged many trees, creating an abundance of large snags across the landscape, many of which are suitable roost trees. Therefore, unlike in Alberta, there is an abundance of suitable roost trees in the Ironton District. The authors of that study also mention several important functions of canopy gaps for bats. Canopy gaps can improve solar heating to suitable roost trees, improving their suitability as maternity roosts, and are often used by bats as foraging areas. The proposed project will create some canopy gaps, giving the stands beneficial physical characteristics similar to those of the old growth stands described in the cited paper.

Comment: Degraded water quality in Ohio is also thought to play a large role in the apparent decline of the species. More than 1,300 miles of streams throughout the State are currently impacted by acid mine drainage, due to the large amount of past and present coal mining (and associated acid mine drainage) happening throughout the State, especially in the southern and eastern portions of Ohio (ODNR 2006). *(also a water issue)* Elsewhere in the State, the legacy of industrial pollutants in the surface water is known to contribute to water of low quality, though the quality of many streams has markedly improved since point source pollution has been reduced through enforcement of various environmental laws (Sanders and Zimmerman 2000). Riparian areas that have low water quality may have a lower insect abundance available for Indiana bats foraging needs (Haynie pg 8).

Response:

The Ohio 2008 Integrated Report was consulted for information on water quality and watershed condition. The project area is located within the Pine Creek watershed (Digit Number 05090103020). This watershed was listed as having waters impaired for some beneficial uses. The causes for the identification of impairment for aquatic life was on metals, pH, siltation, and salinity/TDS/chlorides with surface mining, tailings and acid mine drainage as the sources. Fish tissue assessment was also identified as impaired due to PCB's. Recreation use was classified as unknown and drinking water was classified as none due to no public drinking water supply outtakes. (Ohio EPA 2008)

Impairment of aquatic life use in the Pine Creek watershed was based on a limited amount of data collected in 1996 and 1997 in response to an investigation of a severe acid mine drainage seep. The suspected seepage came from Kimble Creek, for which a limestone filter was installed by 2003. The Ohio EPA 2006 assessment of available fish tissue data from Pine Creek documented body burdens of one or more pollutants at levels exceeding the threshold level for human health upon which Ohio Water Quality Standards are based, which resulted in listing as impaired for fish consumption. While the data (24.4 miles monitored) used to assess fish consumption status are now considered historical, the assessment unit will remain Category V (impaired) until TMDL's (Total Maximum, Daily Load) are developed for all pollutants impairing all beneficial uses. The next monitoring is scheduled for 2009 with a projected TMDL date of 2011. (Ohio EPA 2008)

Natural resource management and associated activities were not identified as causes or sources of any impairment of beneficial uses. The Ohio EPA will be giving the watershed close attention during the next few years to ensure that the watershed will not be identified for impairment for any beneficial uses.

The observations set forth in this comment are general and broad, applicable to the entire State of Ohio. The comment does not provide any site specific information that the Forest overlooked or ignored regarding water quality, or the mitigation measures incorporated into this proposal to protect water quality. The Forest has taken a hard look at water quality issues at both the programmatic and site specific level. See, e.g. Forest Plan FEIS, pages 3-5 to 3-20. Existing water quality in the project area was investigated during project development. (EA chapter 3, pages 10-12). Protection of water quality on the project area was identified early as a key issue and was considered in project development (EA, chapter 2, pages 24-25).

As described in the Wildlife BE (p. 75), Forest-wide standards and guidelines are incorporated in the proposed project to reduce the potential effects to water quality. From the wildlife BE (Project File 5-5 pages 75-76):

> **"Forest-wide standards and guidelines are incorporated in both alternatives to reduce the potential effects of earth-disturbing activities (i.e., filterstrips, stream crossings). The WNF, in all new construction and re-construction, meets or exceeds best management practices and professional engineering practices to reduce any effect the road system may have on soil transport (USFS, 2006a). In addition, past monitoring of vegetation management projects on the Wayne-Hoosier National Forest indicated that projects in compliance with Forest Plan standards and guidelines were not exhibiting significant soil and water resource problems (USFS 1988). Also see monitoring from recent activity on the Ironton Ranger District in Project File 4-17 and Project File 4-26. Based on this, it is possible that some minimal sediment will enter Pine Creek from the proposed timber harvest and earth-disturbing actions under either alternative; however the amount is not expected to alter existing water quality or the composition of stream substrates."**

The effectiveness of watershed-related standards and guidelines, including BMPs, is discussed at length in the FEIS (pages 3-17 to 3-21) prepared for the revised Forest Plan. The programmatic FEIS cites and references a report by McClenahen et al., Evaluation of Logging Best

Management Practices on Private Forest Lands in Ohio (1999), which documents the effectiveness of BMPs implemented for timber harvest activities in situations similar to this proposal. Field observation and monitoring on the Forest of past projects confirms the efficacy of the water quality mitigation measures. (EA, chapter 3, page 12 and Project File 5-13). The monitoring and effectiveness of the water quality protection measures is well-documented in the project record.

The interdisciplinary team was concerned about existing and potential water quality effects from the proposal and took a hard look at this issue. The use of BMPs for mitigation of potential effects based upon site specific information was reviewed. In addition, the Forest incorporated additional recommendations from Stephen Hamilton, Soil Scientist with the Ohio Division of Soil and Water Conservation (now retired), based on site specific field visits (EA, chapter 3 page 40,Project File 7-2 and 7-10). The mitigation measures adopted for the project have been proven effective in protecting water quality under similar circumstances (see Project File 5-13 and 4-17).

Over time, continuation of the ongoing vegetation restoration work to address the legacy of private resource extraction in this area will improve water quality. The Pine Creek project is has taken past mining restoration work into consideration and continues the restoration of ecological processes which will then improve Indiana bat foraging opportunities.

Comment: Based on the Ohio Department of Transportation, not all of the biological requirements of the Indiana bat and its habitat are being met in many of the forests, uplands, riparian areas, and stream corridors occupied by this species in Ohio. Improvements in the environmental conditions of this habitat, as well as protection from further fragmentation may be necessary to meet the biological requirements for survival and recovery of this species. Further degradation of these conditions could appreciably reduce the likelihood of survival and recovery of the Indiana bat.

The 2003 Ice Storm was a Godsend for the Indiana bat. The Wayne National Forest is taking that Godsend and destroying the positive effect: Indiana bat summer habitat (Haynie pg 8).

Response:

The observations included in this comment are general and broad, referencing Indiana bat habitat across the entire State of Ohio. The comment does not provide any site specific information regarding the project area, and its contribution to the survival and recovery of the Indiana bat. In the project record the declining quality of the existing habitat in the project area is well documented (EA Chapter 3, pages 22-23, Wildlife BE page 23). The proposal incorporates specific measures to protect roost trees and does not "destroy" summer habitat (EA, Chapter 3, pages 70-73, Wildlife BE pages 14-16 and 30 "Because all currently suitable potential roost trees and hickories will be retained, it is unlikely that a roost tree would be removed during timber harvesting.") The resource protection design criteria were specifically formulated to ensure survival and recovery of Indiana bat.

The potential effect upon summer habitat for Indiana bat, including fragmentation concerns, was a key consideration in project development from the outset (*see* EA, chapter 1, page 25). As noted previously (*see* Wildlife and Endangered Species section above), mitigation measures specific to the protection of Indiana bat roost trees have been incorporated into this project (EA, chapter 1, page 25). The U.S. Fish and Wildlife Service reviewed this project and provided a letter of concurrence. Contrary to the assertions in the comment, the proposal here is to change course to restore historic forest in an area

already greatly altered by human activity and natural events (*e.g*. 2003 ice storm). Both agencies agree that the proposal will not jeopardize the survival nor hinder the recovery of the Indiana bat.

Equally important, the EA evaluated two alternatives that did not involve any timber harvest, Alternatives 1 (no action) and 4 (no harvest). (EA chapter 2, pages 4, 20). These alternatives are consistent with the intent of this comment, *i.e*. no removal of any trees. The trade-offs of these alternatives are clearly set forth in the EA (chapter 3, pages 22-23, 104, 108). Taking no action at this time will allow the gradual decline in Indiana bat habitat to continue. Alternative 4, which involves primarily prescribed burning, may or may not attain the desired condition. The EA (chapter 3, page 108) clearly describes the benefits to Indiana bats foregone by choosing this alternative. *See also* Wildlife BE, pages 23, 39.

As described in the Wildlife BE (pp. 29-37) and the programmatic BE prepared for the Forest Plan (Forest Plan Appendix F, pages F1-44 to F1-45), single tree selection hardwood harvest as prescribed in the project is expected to improve Indiana bat habitat over the long term. Anticipated benefits include oak regeneration, increased solar exposure, and reduced understory clutter. Indiana bats may respond to these impacts by having increased roosting success (via increase in the diversity of thermal roosting opportunities), improved foraging success, less torpor, and ultimately increased pup and adult fitness. Oak regeneration will improve roosting habitat in the long term for the Indiana bat by providing ample suitable roosts, while reduced understory clutter will improve travel corridors and foraging opportunities. Maternity roost trees may receive additional solar exposure as the result of harvest activities, reducing the amount of time pups need to develop, and reducing the amount of heat energy needed to keep a colony warm. This thermoregulatory benefit can increase survival of adults and pups due to lower energy demands.

Please also see response to comments #2, #7 and #8 above.

Comment: There is no indication that the USFS consulted current or accurate field studies to arrive at any of the numbers for the Indiana bat, and there is no identification of the methodology used in determining what constitutes suitable habitat. Furthermore, the Forest Service and the Fish and Wildlife Service both parrot the language that ecological relationships between Indiana bat [insert species – could be Cerulean warbler, etc.] and summer habitat are largely unknown and/or the use of habitat per seasonality and topography is currently unknown in [fill in the blank]. Additionally Forest Service and Fish and Wildlife Service biologists admit that the Forest Service has insufficient data and knowledge regarding (1) the population of the Indiana bat, and (2) the quantity and quality of habitat preferred by the Indiana bat to justify using habitat as a proxy for population (Haynie pg 16).

Response:

The commenter states that "there is no indication that the USFS consulted current or accurate field studies to arrive at any of the numbers for the Indiana bat, and there is no identification of the methodology used in determining what constitutes suitable habitat." This assertion is incorrect, as the project Wildlife BE (Project File 5-06, pages 7, 22, 45-49) contains information concerning the population of the Indiana bat and documents the surveys conducted for the species. As previously noted, information contained in the programmatic biological opinion was used as well for this tiered consultation. *See also* Heartwood v. Kempthorne, 1:05-cv-313 (S.D. Ohio June 19, 2007) (discussing baseline

information requirements in programmatic biological opinions). The project is supported by considerable scientific information in the record with regard to identification of suitable habitat. The comment raises no information regarding suitability that the interdisciplinary team did not consider. See also discussion of suitable habitat above in the "Wildlife and Endangered Wildlife Species" section.

The comment also states that "the Forest Service has insufficient data and knowledge regarding (1) the population of the Indiana bat, and (2) the quantity and quality of habitat preferred by the Indiana bat to justify using habitat as a proxy for population (Haynie pg 16)." The purpose of this project is to restore forest health by moving the project area towards Historic Forest conditions. The improvement in the quality of Indiana bat habitat is well documented in the record (EA, chapter 3 pages 70-73) and described in detail above (*see* "Wildlife and Endangered Wildlife Species" section). Likewise, the gradual deterioration of the quality of Indiana bat habitat if no action is taken is documented. (EA, chapter 3, pages 22-23). The project analysis is based upon the best available scientific information (including that used to develop the programmatic biological opinion for the revised plan) with regard to the population of the Indiana Bat and the habitat used by the bat.

The comment is unclear as to what is intended by using habitat as a proxy for population. The Forest has not attempted to estimate population based on habitat. Rather, the Forest used the best available population data and science concerning habitat suitability to develop mitigations to protect the bat, as well as improve its habitat quality over time.
The commenter also states that "the Forest Service has insufficient data and knowledge regarding (1) the population of the Indiana bat, and (2) the quantity and quality of habitat preferred by the Indiana bat to justify using habitat as a proxy for population (Haynie pg 16)." This comment is outside of the scope of this project and appears to be directed at a different project than what is described in the Pine Creek EA. Nowhere in this project has the Wayne National Forest attempted to estimate the population of Indiana bats based on habitat availability. Rather, this project is designed to improve existing habitat for Indiana bats without attempting to estimate their current population.

Comment: The action of prescribed fire impacts the resource box turtles by killing them directly with flames and indirectly by habitat destruction. Box turtles cannot outrun fire. There are no published papers (by the fire surrogate study) on box turtle survival. Box Turtles are dependent up on the natural ground cover on the forest floor. A turtle cannot long survive without the cover and would have to move or perish. See the attached article about box turtles, relating how essential ground cover is to turtle survival (Lund pg 11). Turtles rest in shallow layer of leaf litter and soil, which help to prevent desiccation particularly during hot, dry periods. Hatchlings over-winter in nests 7.5-10 cm deep (Lund pg 12).

Response:

Published papers addressing prescribed fire impacts to box turtles are rare and conflicting. In a review of recent research on the affects of fire to amphibians and reptiles in eastern oak forests, Renken (2005) found that current data suggest that fire results in little direct mortality of amphibians and reptiles, and that "current research also suggests that fire has no effect on reptile abundance, diversity, or number of species except in several studies in which lizard abundance was or tended to be greater in burned plots."

Gibson (2007) studied eastern box turtles in burned and unburned areas of the Fort Custer Training Center in Michigan. She did find scarring on the carapaces of several individuals, but was unable to conclude where the fire scarring came from. She also found that the turtles used burned areas. In one of the study areas (Area 7), 69% of all turtle locations were made in identifiably burnt habitat. She also documented box turtles hibernating in recently burned areas and nesting in burned areas within weeks of the burn completion. Gibson none-the-less recommends limiting prescribed burns to the inactive season to reduce potential for impacts to turtles.

We recognize that prescribed burning may result in adverse effect or mortality to individual box turtles, and short-term habitat alteration. However, the following project design factors reduce the potential risks to box turtles.

Factor #1: The majority of prescribed fires will likely be conducted while eastern box turtles are inactive, minimizing the potential for harm to individuals.

From the Wildlife BE (pp. 32-33): "The primary prescribed fire season generally occurs during the late-winter and early spring, often times ending by mid-April when the forest vegetation begins to leaf out. Depending on environmental conditions, a small amount of prescribed fire could occur as late as the end of April. However, the "spring green-up" that occurs by mid-April limits the use of fire. The secondary prescribed fire season runs from fall and through the winter if weather conditions are appropriate. However, secondary season prescribed fires could be conducted as early as late-summer if weather permits.

Forest-wide standard SFW-TES-11 states that summer prescribed burning will be conducted after August 15th to provide time for juveniles to strengthen their flying skills and to account for possible late birth events resulting from colder spring weather (TES-11). Prescribed burning of this project area will be conducted prior to leaf-on in the spring (generally before mid-April) and after August 15th."

From "Terrapene Carolina" (Lund attachment): "The annual cycle in most of the United states begins in early April and ends in October… In the northernmost parts of the range, Terrapene Carolina may be forced into hibernation as early as late September, and emergence may be delayed until late April or early May during a cold spring. A warm autumn may allow individuals to remain active into December, and warm spells in November and December may arouse some from hibernation."(p. 255-256)

Factor #2: Habitat alteration is short term and incomplete. Prescribed burns are mosaic in nature and not all litter or duff is consumed. In addition, studies have shown that litter seems to accumulate to unburned plot levels within three years after a fire (Renken 2005).

Forest Plan FEIS 3-187: "According to Boerner (2000), transfer of heat to the unburned humus and upper soil layers may induce mortality of soil organisms, especially where concentrations of woody debris continue to smolder. Data suggest that soil animals (e.g. springtails, mites) are more likely to be affected if they are within the litter rather than the mineral soil, but these animals appear to be able to repopulate an area after periodic prescribed fire. Fires conducted annually on the same site may reduce the abundance of these organisms. While few data exist, the same pattern appears to be true for the microbial community (e.g. fungi, bacteria); re-colonization of burned areas occurs, but microbial abundance is lower where lengthy smoldering occurred." These comments support the above conclusion that habitat alteration is incomplete and does not reach to any

depth. Some turtles may be lost, but 250 acres of burning does not represent 250 acres or turtle, or turtle habitat, lost.

Literature Cited:

Renken, R.D. 2005. Does fire affect amphibians and reptiles in Eastern U.S. oak forests? In Fire in Eastern Oak Forests: Delivering Science to Land Managers. Proceedings of a Conference. USDA-Forest Service General Technical Report NRS-P-1.

Gibson, J. 2007. Ecological study of the Eastern Box Turtle (Terrapene c. carolina) as a representative herpetological species at Fort Custer Training Center, Michigan: Final Report and Management Recommendations. Department of Defense Legacy Resource Management Program. Accessed at https://www.denix.osd.mil/denix/Public/Library/NCR/Animals_birds/05-271-Final-Report.pdf on October 24, 2007.

MIS

Comment: What is lacking in the Wayne National Forest Management Indicator Species list is a list of species that (1) have populations that are sensitive to changes in habitat on the Wayne National Forest and not elsewhere, and (2) have populations whose trends reflect the specific trends of the species they are alleged to indicate. No MIS are chosen that represent small, site-sensitive creatures with limited motility such as salamanders or flightless invertebrates. Because of their life histories, physiologies, and size, terrestrial salamanders are particularly sensitive to the fragmentation, alteration, and destruction of the mature forest interiors with which many of them are associated.

Issue: WNF Forest Plan MIS list is incomplete.

Response:

This comment does not address any site specific concern regarding the Pine Creek Project, but is instead an opinion about the 2006 Forest Plan. This comment raises issues concerning development of the programmatic biological opinion, and as such relates to matters beyond the scope of this site specific project. We note that similar issues regarding MIS selection were raised in administrative appeals to the revised Wayne Forest Plan. The Chief of the Forest Service reviewed the extensive planning record and upheld the MIS selection, recognizing that the Forest has considerable discretion in identifying MIS under NFMA.

Citing Attachment 1 of the Appeal Response to the WNF Forest Plan appeal: "The NFMA regulations require that the reasons for selection of a species as a MIS be stated (36 CFR 219.19(a)(1)), and that population trends of MIS be monitored and relationships to habitat changes determined (36 CFR 219.19(a)(6)). There is no requirement to provide reasons for non-selection, or to select any particular species or guild of species as management indicators. The Wayne NF selected two habitats, seven terrestrial bird species, and one habiata/terrestrial species combination as MIS (LRMP, p. 2-16; LRMP App C, pp C-3 to C-4). The Forest followed a well-documented process for selection of MIS and stated the reasons for selection of each (LRMP, p. 2-16; LRMP App C, pp. C-1 to C-4; FEIS, pp.3-38 to 3-153; FEIS Appendix E, pp E-21 to E-25)." This document can be found in the Project File 9-8.

Selection of MIS at the programmatic Forest Plan level of decision making is an issue beyond the scope of this site specific environmental analysis. The Chief of the Forest Service reviewed the same issue in the administrative appeals for the revised Plan decision, and upheld the Forest based on the planning record. See Chief's decision on administrative appeals of the revised Plan. NFMA does not specify particular species or habitat types be monitored, but allows considerable discretion for Forest level managers to make the selection of MIS based on experience, knowledge of field conditions, and other local factors. The planning record contains detailed information concerning MIS and their selection at the programmatic level. As noted in the FEIS for the 2006 Forest Plan (pages E-20 to E-21) and in the Response to Comments 194 and 195 (Response to Comments, pages RTC-98 through RTC-101) for the programmatic document, MIS were developed in accordance with 36 CFR 219.19(a)(1) (1982) which requires that certain vertebrate or invertebrate species present in the area shall be identified and selected as MIS and the reasons for their selection be stated. Please refer to Table E-6 and E-7 in the FEIS for the 2006 Forest Plan (pages E-23 through E-25) for the species selected and the rationale for their selection or non-selection. The Record of Decision states that MIS are just one part of the overall monitoring effort and that species not designated as MIS may still be monitored (see ROD-32).

Four management indicators that are indicative of diverse interior forest habitat (cerulean warbler, worm-eating warbler, Louisiana waterthrush and pileated woodpecker) were selected as MIS. As noted in the planning record, several amphibian and invertebrate species were also evaluated for potential designation as MIS species during the Forest Plan revision. However, these species were not chosen for reasons described in the planning record.

The comment does not present any evidence that would have altered the disclosure of effects or comparison of the alternatives. It is not clear how additional monitoring of additional species, beyond those already being monitored, would have resulted in a different decision.

Comment: Nothing in this EA shows that sensitive species will be protected, that this project will not result in the harm and/or listing of sensitive species.

Issue: This project does not protect sensitive species and may result in harm and/or listing of sensitive species.

Response:

Both the Wildlife and Botanical Biological Evaluations evaluate the potential impacts of the proposed project to Federally-listed as well as Regional Forester Sensitive Species (Wildlife BE pp. 49-80, Botanical BE pp. 27-54). These documents discuss the potential effects, and describe mitigations and project design elements that have been included to either enhance habitat for the species, or reduce or eliminate potential adverse effects.

Comment: The Forest Service's use of habitat as a proxy for population violates the NFMA. Species viability may be met by estimating and preserving habitat "only where both the Forest Service's knowledge of what quality and quantity of habitat is necessary to support the species and the Forest Service's method for measuring the existing amount of that habitat are reasonably

reliable and accurate." *Earth Island Inst. v. United States Forest Serv*., 442 F.3d 1147, 1175-76 (9th Cir.2006). (Haynie pg 16)

Response:

This comment is outside the scope of this decision.

Ron– does the following paragraph work here? There must be a good canned response to this point….

There are two regulations that are applicable to this discussion. 36 CFR Sec. 219.19 (a)(1) states that "…certain vertebrate and/or invertebrate species present in the area shall be identified and selected as management indicator species and the reasons for their selection will be stated." A recent revision of the Forest Service Manual (FSM 2620.5, WO amendment 2600- 91-5) states that management indicators are defined as "plant and animal species, communities, or special habitats selected for their emphasis in planning, and which are monitored during forest plan implementation in order to assess the effects of management activities on their populations and the populations of other species with similar habitat needs which they may represent". This rule expands the use of MIS to use of "management indicators" that can include habitats.

Fragmentation

Comment: The Wayne National Forest is a small forest – only around 240,000 acres under Forest Service ownership. The small forest is fragmented by private inholdings and roads. This sale will further fragment the forest (Haynie pg 2).

Issue: This "sale" will further fragment the forest.

Response:

The Pine Creek project has been designed to minimize fragmentation by using existing roads and trails, and minimizing creation of new temporary roads. Of the approximately 27 miles of road that will be used to implement this project, 26 miles are existing county roads, township roads, FS system roads, ORV trails, or unclassified roads. Less than one mile of new temporary road will be constructed as part of this project, and no new permanent roads will be constructed. Temporary roads will be rehabilitated and closed off after use.

The Wildlife BE also describes the measures that will be used to rehabilitate temporary access roads after use. From the Wildlife BE (p. 32):

> **"In order to implement the proposed hardwood treatments, approximately 5.4 miles of existing ORV trail/FS System roads will be hardened. Approximately 0.4 miles of ORV trails will be widened from a clearing width of approximately 7-8 feet to a width of approximately 16 feet, and hardened to accommodate wider vehicles for hauling timber. Approximately 0.8 miles of unclassified roads will be cleared and reconstructed, and 1.0 mile of new temporary road, 48 miles of skid roads, and 46 landings will be constructed. The total area committed to temporary access and log landings will be approximately 125 acres. However, approximately 10.5 of these acres are existing ORV trail/FS system roads**

and FS System roads that will require only brushing and hardening. "

After the project is complete, these landings and roads will be closed off with water bars and left to revert back to forest habitat. ORV trails that were altered for temporary use as hauls roads would be reshaped, and the widened corridor would be narrowed through use of brush piles and other barriers to encourage ORV riders to ride only on the re-established ORV trail. The temporary, short term loss of approximately 109 acres of habitat is small in the context of the heavily forested landscape, and is offset by the potential benefits of travel corridor creation, long-term improvement of foraging and roosting habitat, and creation of new upland water sources."

From the BE, Project File 5-6, pg 60: Construction of approximately 88 acres of skid roads, temporary roads and log landings is proposed under Alternative 2. Rich et al. (1994) inferred that most of interior forest bird species do not perceive narrow forest dividing corridors (e.g., roads and trails) as sources of forest fragmentation, but predators could gain better access to interior forest areas. However, edge effects on nesting success appear to be influenced by the degree of habitat fragmentation at the landscape scale rather than the local scale (Chalfoun et al., 2002), as evidenced in studies conducted in the Midwest (Robinson et al.,1995), Pennsylvania (Rodewald, 2002), and within the WNF (Dettmers, 1997). The WNF lies within a heavily forested landscape where 80% of all the lands within the proclamation boundary are covered by forest (Landsat TM, 1994). The Pine Creek area contains some of the largest contiguous blocks of forest within the WNF. This suggests that the temporary loss of forest habitat and due to construction of temporary roads, skid roads and log landings is not likely to meaningfully impact cerulean warbler survival or nesting success.

This project is not expected to appreciably increase fragmentation in the project area.

Comment: Ohio was originally 95% forested, of which 75-80% was old-growth, but this was reduced to only 12% forested by 1912. Today, Ohio is 33% forested, but all of that or 99.99% of that is early succession forest. Ohio does not need more early successional habitat; Ohio needs old-growth. Ohio only has 1,400 acres of old-growth forest in total, of which the largest patch of 200 acres occurs on the Ironton Unit.

95% of Ohio's wood and paper products come from private land. In light of the national and local paucity of intact forests, the Wayne, particularly in the Ironton Unit, could become a forest nearly or completely managed for primitive recreation and mature, interior forests such as those that were here 200 years ago. But to do this, issues like fragmentation must be addressed in a proactive way. By proposing to build more roads, allow further oil and gas development, and generally increase intrusions into the forest, the Service is consciously moving against that goal (Haynie pg 3).

Issue: This project, along with oil and gas development, further fragment the forest.

Response:

This comment is outside of the scope of this decision, and the commenter has not cited a source for the data presented above. See response to Fragmentation comment #1. This project is not expected to appreciably increase forest fragmentation.

See Forest Plan FEIS page 3-59 for a discussion of the WNF and early succession habitat.

Timber sale feasibility

Comment: We have had four (4) growing seasons since the ice storm. The wood has rotted (Haynie pg 2).

Issue: Uncertain.

Response:

Trees that were killed outright during the ice storm have decayed past merchantability. An unpublished study by Turcotte, NA S&PF, Forest Health Management, is following the rate of decline and decay in storm-damaged trees. Our prescriptions and subsequent marking guidelines reflect increasing decay in damaged trees. The prescription written for Pine Creek reflects this condition, shows the variation in damage/decay across ecological land types, and contains guidelines (see Project File 4-7 and Chapter Two) that aim at improving the overall health of the forest.

Comment: The pictures in the EA are of pictures of flat land. The area that will be logged has slopes up to 70% (Haynie pg 2).

Response:

Photos were chosen to display the desired future condition following a selection harvest and repeated burning, without regard to slope. Maps of slope are available in the Project File.

NEPA

Comment: This project violates NEPA from the outset due to the fact that it is improperly segmented from the Kosmos Trail Creation project. Perhaps the interdisciplinary team is cross-referencing materials, but how is the public supposed to do that or review this cross-referencing (Haynie pg 2). I oppose the arbitrary separation the Forest Service is using for the Kosmos ORV Trails and the Pine Creek logging projects when both projects overlap in the Ironton district and both were scoped at the same time.

This violates NEPA and is misleading to the public (form letter).

Issue: This project violates NEPA from the outset due to the fact that it is improperly segmented from the Kosmos Trail Creation project.

Response:

A thorough analysis of project effects for each project has been made available to the public during the 30-day comment period for both projects, within a relatively short time frame (August and November 2007) such that each project may be fresh in the reader's mind. In addition, the cumulative effects analysis for each project includes the effects of the other project in addition to those of other past, present, and reasonably foreseeable future actions. As the decision maker advised the team during the analysis process, it became clear that two decisions would be necessary to provide a clear comparison of the alternatives to meet each purpose and need. To combine the decisions would have created a baffling array of alternatives.

The rationale for the separation was provided in the Kosmos response to comments and with the Decision Notice (Kosmos Decision Notice Appendix 2) and in Pine Creek EA Chapter One.

Comment: There is a lack of alternatives. There is no alternative that simply removes trees about to fall on a person's head. There is no alternative that limits prescribed burning to fire-adapted areas with no herbicide treatment. There is no alternative that focuses on creating a sustainable, resilient forest (Haynie pg 2). If the Forest Service is truly interested in restoring the Ironton Unit, then the Forest Service needs to put forth a proposal that has no commercial logging, no burning, and no spraying of herbicides (form letter).

Response:

The alternative that has no commercial logging, no burning, and no spraying of herbicides is called the No Action Alternative. This alternative would not benefit the Forest because atmospheric deposition and acid rain are most likely decreasing the pH of the soil solution (making or keeping it acidic). Buffering describes the resistance a soil has to change in pH when an acid or base is added to the soil. Highly buffered soils resist this change more than poorly buffered soils. The buffering capacity of the forest soils has likely been decreasing over time and needs to be increased. Buffering increases as clay and organic matter of soils increases (Gilmour 2002). Nothing can be done about the clay content. The main buffering opportunity in this project appears to be incorporation of organic matter on site for decomposition and deposition of larger woody debris on site for long term organic matter recruitment. There are many opportunities in this project for tops, limbs, foliage to be left on site and become recruitment to increase soil organic matter and, thus, the buffering capacity. This opportunity would be lost by doing nothing (Project File 7-18 DePuy).

Alternatives analyzed in this project are consistent with Forest Plan direction and with the purpose and need as stated in Chapter One. See discussions on Alternatives Not Considered in Detail in Ch Two.

In accordance with the National Environmental Policy Act, the decision maker feels that the four alternatives developed for the Pine Creek Restoration Project provide a reasonable range of alternatives that respond to the issues, concerns, and opportunities raised during the initial scoping period. NEPA does not require analysis of every conceivable alternative, but only that a reasonable range of alternatives be considered. NEPA does not require analysis of alternatives that are infeasible, ineffective or inconsistent with the purpose and need of the proposal. Indeed, the analysis of alternatives must be bounded by some notion of feasibility, as the budget and personnel resources available to analyze a myriad of alternatives are limited. As one Judge has said, "When the purpose of a proposed action is one thing, it makes no sense to consider alternative ways by which another thing might be achieved.

The array of alternatives was chosen to respond to commenters concerns about the use of fire, the use of harvesting, and the use of herbicides. In the existing array of alternatives analyzed, there is one alternative that considers eliminating each of these actions. The decision maker and the team limited the number of alternatives to those which would be useful in comparing the effects of the actions and useful in making a decision. The No Action alternative was also thoroughly analyzed, and considered "no commercial logging, no burning, and no spraying".

The decision to include management areas which allow timber harvest was made in the Forest Plan (see FEIS pg 2-4 for consideration of the No Commercial Timber Harvest Alternatives). "No evidence was found to suggest that the degree of vegetation management necessary to provide for viability of all species could be accomplished without commercial timber harvest. "Timber sales are designed and implemented to improve desired wildlife and plant habitat…if the same habitat is created through a service contract in which trees are felled or killed but not removed and sold, then the entire cost of the operation must be borne by the taxpayers. There are management areas, including the Future Old Forest, which do not include management activities."

Comment: The direct, indirect, and cumulative effects (from past logging and mining and illegally created trails) are "significant" and require an Environmental Impact Statement (Haynie pg 2).

Issue: Significant effects require an EIS.

Response:

The Council on Environmental Quality (CEQ) regulations require an agency to consider "the degree to which the possible effects on the human environmental are likely to be highly controversial." 40 CFR 1508.27(b)(5). However, "controversy" as set forth in the regulation does not equate with public opposition or controversy. Town of Orangetown v. Gorsuch, 718 F.2d 29 (2nd Circuit 1983); Foundation for Global Sustainability v. McConnell, 829 F. Supp. 147, 153 (W.D.N.C. 1993). If that were the case, opponents to any federal action could manufacture controversy and require an EIS for any project. "Controversy" instead refers to a substantial dispute about the "size, nature, or effect of the major federal action, rather than opposition to a use," Foundation for North American Wild Sheep v. USDA, 681 F.2d 1172, 1182 (9th Cir. 1982).

The comment equates an "adverse effect" on an ESA-listed species with NEPA "significance." This is an incorrect view of the NEPA regulations, which state that federal agencies must consider the degree to which an action may adversely affect and ESA-listed species, 40 CFR 1508.27(b)(9). The view suggested by the comment would require an EIS to be prepared any time a proposed action has an adverse affect upon a listed species, regardless of the magnitude of that effect. The NEPA regulations, however, plainly require agencies to evaluate the severity of the effect on the species as part of its process of determining whether the impact of the proposal rises to the level of NEPA significance and requires an EIS.

The analysis here (EA Chapter Three page 80 forward and BE determination on page 38) indicates that the proposal will have no effects on the Indiana Bat beyond those included in the 2005 programmatic biological opinion. The effects upon Indiana Bats may likely adversely affect (Chapter Three pages 80 forward) but are not likely to jeopardize the population of the Indiana bat. The comprehensive consideration of the Indiana Bat demonstrates a detailed, thorough consideration of the effect on the bat in the context of NEPA significance. Although the Forest and U.S. Fish & Wildlife Service entered into consultation based on their conclusion of a likely adverse effect, this does not automatically mean that the effects of the Project rise to the level of NEPA significance requiring the preparation of an EIS. In fact, in the project biological opinion the U.S. Fish and Wildlife Service concurred with the Forest's conclusion that although direct and

indirect impacts may not be avoided and the proposed project may adversely affect the Indiana bat, that implementing the Terms and Conditions (Standards and Guidelines) from the BO would minimize adverse effects, specifically by maintaining a sufficient quantity and quality of Indiana bat roosting and foraging habitat (see Project File 5-12 Concurrence letter pages 2 and 3). The FWS acknowledges the 2003 ice storm that created a tremendous amount of new Indiana bat roosting habitat through the creation of crevices and splits and through increased exfoliating bark through tree death (page 3). FWS also acknowledges that therefore, use of the area by Indiana bats is expected to remain stable or increase into the future (page 3).

Comment: Failure to provide the Biological Evaluation to the public violates NEPA and ESA. The Forest Service's failure to provide this to the public indicates the Forest Service's blatant disregard for the public's right to know (Haynie pg 17).

Issue: Process did not give access to public to BE.

Response:

Federal agencies are required by law to make project materials available to the public. Contact information is available on each piece of correspondence sent to the public and on invitation to comment letters posted on the website and in the legal notice in the Ironton Tribune. The deciding officer can decide at what point in time to send an analysis to the public for review and when this document was released, the biological evaluations were still in draft form.

Comment: (in conclusion Haynie pg 18) The more rotten projects that are proposed in the Wayne, the more the idea of transferring ownership of the Wayne to the National Park Service appears to be a good idea. At a very minimum, this project requires an Environmental Impact Statement because of the significant (negative) effects this logging will have on the resources of the public land: soils, wildlife, water quality, air quality, recreation, and vegetation.

Issue: Project has significant effects on soils, wildlife, water quality, air quality, recreation, and vegetation and should be an EIS.

Response:

The Finding of No Significant Impact makes the final determination on the level of analysis needed for a project. See the Decision Notice and FONSI for this project. See answer to previous question on level of impacts in this document.

Comment: Commenter asked to receive mailings for Kosmos and Pine Creek, but did not receive the Notice and Comment for the pre-decisional EA for Pine Creek (Lund pg 1).

Response:

Commenter made an individual request to receive the Pine Creek mailings and the team leader failed to create a mailing list separate from the list of initial commenters. Commenter called and the comment package was mailed on September 22, 2007.

Comment: Commenter was told comments were "thought to be due 45 days after publication of the notice". (Lund pg 1)

Response:

Commenter asked and was sent a copy of the legal notice from the Ironton Tribune. Legal notice states when comments are due based on publication date. Commenter's letter was dated one day past the due date but was admitted to the project record and responses appear in this document.

Comment: Commenter points out different wording between the legal notice and the comment invitation letter with regard to "supporting reasons that should be considered in reaching a decision". Commenter is bothered by wording difference. She might have written comments which did not comply with the instructions and risked having my comments discarded without consideration. Commenter feels this confusing information looks like either a deliberate ploy to avoid having to consider some comments or a careless error. (Lund pg 1-2).

Response:

Wording is abbreviated in the legal notice but is substantially the same as in the invitation to comment. Most commenters see the full letter and not the legal notice.

Comment: Commenter states that public comments will be considered, answered and disregarded and the public objections will be countered and rejected (Lund pg 6).

Issue: Not an issue, only an opinion.

Response:

The Wayne National Forest has responded fully to comments received on projects, as evidenced by the 2006 Athens Prescribed Burning Decision (RTC 23 pages), Buckhorn Restoration Project (RTC 34 pages), Kosmos ATV Trail Extension EA (RTC 62 pages).

NFMA

Comment: Heartwood is worried about the effects of this logging and road building on water, soil, wildlife, water, air and recreation (Haynie pg 16) *discussion continues on glyphosate?*.

Response:

The resources mentioned are fully analyzed in specialist reports in the Project File. Much of this information is also included in Chapter Three of the EA.

Cumulative Effects

Comment: The Forest Service mentions the effects of mining on this area, but fails to analyze how the soils, water, wildlife, and vegetation are still affected by the cumulative effects of mining and other extraction industries. Merely listing other projects by the Forest Service that have taken place in the general vicinity does not satisfy NEPA or cumulative impacts (Haynie pg 2).

Response:

Each specialist has included a review of effects of past actions on their resource (see specialist reports in the project file and in Chapter Three). There are also tables in both the Botany BE and Wildlife BE listing effects of these actions.

Private Land

Comment: What about the 190,000 acres of private ownership? How is that managed?

Response:

The management of private acreage is most important when the land cover type is changing, especially from forest land to some other use. There is very little cover type change occurring in the vicinity of the Ironton Ranger District. There is timber harvest occurring on private lands and on nearby state lands, but again, the cover type is not changing. Similarly, the Pine Creek project does not change forest age classes (except in the few acres of pine management) and only proposes selective harvest, so has little impact on habitat in relation to age class. See Chapter Three page 23 for discussion of harvest activity on private land.

The discussion in the Forest Plan FEIS on habitat indicators included trends on other large ownership in the vicinity of the WNF. See FEIS pages 3-52 forward.

Water Quality

Comment: According to the Draft EIS for the Wayne Plan: "Fully one half of this [280] stream mileage does not meet water quality standards because of acid drainage from abandoned underground mines and sediment from strip-mining. The Wayne is uniquely positioned to implement state-of-the-art restoration of abandoned mine lands, contributing to ecological and economic recovery in southeast Ohio" (DEIS, pg.12). To state that mines no longer affect water quality does not seem supported by facts (Haynie pg 4).

Response:

We do not say that mines no longer affect water quality (see Project File 7-7 pg 12). There was very little historic underground mining on the Ironton unit. The only segment of Pine Creek that was listed as threatened by the OEPA was due to a mine blow-out at Kimble Creek. This blow-out caused a fish kill in Kimble Creek and the main stem of Pine Creek and has since been abated by the installation of the pyrolusite bed at the blow-out site in Kimble Creek. OEPA and the FS sampled the stream for fish right after the blow-out and documented a fish kill for some distance in Pine Creek. In 2006 follow-up electrofishing conducted by OEPA and the WNF fisheries biologist showed the recovery of fish once the pyrolusite bed was installed at the Kimble Creek mine. Other reclamation projects on strip-mined lands within the Pine Creek drainage have helped to reduce sediment loss. This is listed under the monitoring section in the Soils and Hydrology Report. It is also on the WNF web site under monitoring...FY06 report.

Comment: Degraded water quality in Ohio is also thought to play a large role in the apparent decline of the species. More than 1,300 miles of streams throughout the State are currently impacted by acid mine drainage, due to the large amount of past and present coal mining (and associated acid mine drainage) happening throughout the State, especially in the southern and eastern portions of Ohio (ODNR 2006). Elsewhere in the State, the legacy of industrial pollutants in the surface water is known to contribute to water of low quality, though the quality of many streams has markedly improved since point source pollution has been reduced through enforcement of various environmental laws (Sanders and Zimmerman 2000) (Haynie pg 8).

Issue: This project further degrades water quality and leads to the decline of the Indiana bat.

Response:

See analysis of current water quality conditions in Hydrology Report (Project File 7-7) and analysis above that states that standards and guidelines and project design criteria will prevent deterioration of water quality in the project area.

Comment: This project will violate the Clean Water Act. The Clean Water Act requires the Forest Service to comply with the water quality standards set by the State of Ohio. 33 U.S.C. § 1323. Proper implementation of state-approved "best management practices" will constitute compliance with the Clean Water Act unless water quality monitoring reveals that the "best management practices" have permitted violation of these water quality standards.

The Clean Water Act prohibits the Forest Service from engaging in activities that would cause impacts in excess of Federal or State water quality standards. The State water quality standards impose a minimum level of protection by which the Forest Service must abide. Best Management Practices do not ensure that the minimum level of protection will be met. The Forest Service is not allowed the discretion to weigh the benefits of the project as opposed to the harm to the impaired waters. Has section 401 certification been sought? (Haynie pg 16)

The Clean Water Act requires the Forest Service to comply with the water quality standards set by the State of Ohio. 33 U.S.C. § 1323. Proper implementation of state-approved "best management practices" will constitute compliance with the Clean Water Act unless water quality monitoring reveals that the "best management practices" have permitted violation of these water quality standards. Although, compliance with this turbidity standard can be met when land management activities employ Best Management Practices (BMPs), BMPs must be in full compliance with all specifications governing the proper design, installation, operation and maintenance of such BMPs. Best management practices throughout the Ironton ORV trail system are improperly designed: trails are routed in close proximity to streams and sediment traps and culverts are undersized. In addition, best management practices are not maintained: sediment traps are overflowing, culverts are compromised, trails are worn down to bedrock, and water bars and other erosion control structures are eroded away. This project will create 5 new stream crossings and result in more illegal stream crossings, therefore contributing to the degradation.

Each of the ditches, failed berms, or any discrete conveyances of sediment to waters of the United States is a point source subject to regulation under the Clean Water Act. The regulatory definition of discharge of a pollutant from a point source expressly includes “additions of pollutants into waters of the United States from . . . surface runoff which is collected or channeled by man.” 40 CFR 122.2. (Haynie pg 17)

Response:

We agree that ditches, failed berms, or any discrete conveyances of sediment to waters of the US are a point source subject to regulation under the Clean Water Act. However, the heavy maintenance ORV program being implemented on the Ironton Ranger District greatly reduces and/or eliminates point source sediment transport into streams from designated ORV trails. In addition to the heavy maintenance program on the trail system, best management practices along with Forest-wide standard and guidelines are followed for any new trail construction and/or stream crossings, as well as for any roads constructed or re-constructed during harvest activities. These BMPs and S&Gs are cited in the Soil and Water Analysis Report for both the Pine Creek Historic Forest Project and the Kosmos Trail Expansion Project. Effectiveness monitoring of our BMPs are also cited in the EA. Photos of pre and post maintenance on ORV trails are provided in the Kosmos EA (see

Kosmos Decision Notice Appendix 2) and clearly show that the maintenance being done results in a net positive outcome for the soil and water resources.

New trail locations in Kosmos were purposely located out of the riparian zone and away from streams to eliminate any adverse impacts to water quality. Roads used in the Pine Creek project are also on or adjacent to ridge tops and will not cross streams or riparian zones. See Map of Alternative 2 (Pine Creek Alternative 2 Proposed Action). The Kosmos Trail Expansion project only requires 5 new stream crossings where three will have appropriately designed bridges that will not impede flows or add fill material to the stream. The other 2 crossings are small and only require hardening with rock.

The Pine Creek Watershed Ecosystem Analysis clearly identifies the primary source of sediment to streams in the Pine Creek Watershed is a result of user-developed trails. The Kosmos project intends to close many of these illegal trails, thus reducing large amount of sediments entering the streams. The Forest can only have control over what we designate and maintain. The miles of user-developed trails are increasing and are predicted to continue to grow well into the future if we do not intervene now and stop them, either by including them into our system and/or closing them permanently.

The Pine Creek Historic Forest project is mainly on ridge tops where only the tops of ephemeral streams will need to be crossed. The EA addresses all the filter-strip guidelines, Forest-wide standards and guidelines, and additional mitigation measures through the use of Best Management practices to minimize and/or avoid any adverse impacts to water quality/streams.

Based on the proposed actions for both the Kosmos and Pine Creek projects, there will be no dredging or filling of material into a stream or water body, thus a permit from the corps of Engineers under sections 301 and 404 is not required, nor is a certification under section 401 from the OEPA. Please see the following attachment from the Permitting Division of the Army Corp of Engineers, Huntington District, specifically the section that is highlighted in red and yellow that concurs with my findings.

See Attachment in Project File 7-08 from the Army Corps of Engineers.

Roads

Comment: Where is the travel management plan? How is the public or the agency supposed to analyze the effects of this project when, in Table 3-2, the Forest Service refers to previous road building projects as "many miles of road development"? Many national forest owned roads are unclassified and may or may not be visible on an aerial photo, but are visible on the ground. ATV riders will often use these unclassified roads when exploring to create a user-developed system. An unclassified road may not be mapped or inventoried and is not part of the Forest Service road system. But they are in existence in reality. Whether the Forest Service wants them to be a part of the system or not (Haynie pg 4).

Response:

The primary intent of the travel management rule (rule) is to take a broad-scale comprehensive look at a Forest road and trail system to produce a set of proposals for changes in travel management direction. Those proposals may suggest additions or new trail routes, which are then analyzed through the National Environmental Policy Act

(NEPA) and the public is given an opportunity to comment. It is also intended to bring Forests that have open off-road motor vehicle use into alignment with Forests that have designated ORV areas and trails. Because the Wayne NF designated an ORV management area in its 1988 Forest Plan and designated trail beginning in 1990, and reinforced that designation in the 2006 Forest Plan, there is no requirement for additional travel planning other than producing a Motor Vehicle Use Map (MVUM) for the Wayne NF.

There is no requirement for additional travel planning or public input for forests with designated trail systems. The Motor Vehicle Use map was completed for the entire Forest in summer of 2008 and published by District. A roads analysis, per FSM 7712.13c, is completed and in the project file for any project which changes the travel system (see Pine Creek Project File 8-2 for the Roads Analysis). If a unit already prohibits motor vehicle use off designated routes and outside designated areas, and no change to those designations is needed, the unit may proceed to public notice and publication of the MVUM. The MVUM will simply confirm travel management decisions that have already been made.

The rule is specific in that a full inventory of user-created routes is not necessary. The focus will be on identifying routes that should be considered.

National Historic Preservation Act

Comment: Without a programmatic agreement for the Eastern Region, any 106 consultations are in violation of the NHPA. Were the Tribes consulted or the SHPO or the ACHP?

Response:

Without a regional programmatic agreement, legal compliance for Section 106 of the National Historic Preservation Act is achieved through consultation between the Wayne National Forest and the State Historic Preservation Office (SHPO), indigenous federally recognized Native American Tribes, and the Advisory Council on Historic Preservation (ACHP). As per Section 106, the ACHP seldom participates in consultation and has delegated most of their authority to the SHPO's (NHPA as amended in 1992).

"Advisory Council on Historic Preservation (ACHP) regulations do not require Programmatic Agreements. Under the regulations, programmatic agreements may be established in lieu of, or to supplement, project-specific consultation (36 CFR 800.14.b, "The Council and the agency official may negotiate a programmatic agreement to govern the implementation of a particular program...." Also see 36 CFR 800.14.b.1 (i) and (iv). For this project, the Wayne opted for project-specific consultation. The SHPO was consulted, but since no adverse effects were found, the ACHP was not consulted (36 CFR 800.5). A letter describing the project was sent to seven tribes on November 1, 2007 (see Project File 3-38). A single response was received relevant to this project in which the tribes defer to the Forest Service to protect their interests and to notify them if new sites are located. Earlier correspondence on a similar project had been received in 2003 and is included in the Project File 6-3.

Global Warming and Changes in Forest Composition

Comment: How will southern Ohio change as a result of a warmer climate? It is generally accepted that the 1700s and 1800s were the end of a mini ice age. If the atmosphere is warming, how can the Forest Service replicate the trees that grew at that time?

Issue: How can the FS replicate a historic forest when global climate is different than it was 200 years ago?

Response:

The intent is not to replicate historic forest composition in full detail. The intent of the proposal is to establish a vegetation composition that more closely approximates the historic composition in terms of mast production and fire regime. Mast production, with its value to wildlife, is dependent on the continued dominance by oak and hickory and a more open understory. Species composition and abundance may differ from historic details.

Modeling of how tree species dominance is affected by future climate is described in "Atlas of Current and Potential Future Distributions of Common Trees of the Eastern United States"(Iverson, et al. GTR NE-265). In this report, northern red oak is expected to increase in importance across Ohio (see pg 140) and fire is an important component of its natural history (see pg 206). Hickory is also expected to be an increasing component of the central hardwood forest (see pg 39). Updated reports by the same authors cite differences in the continuity of hickory across its current range. Our management practices are consistent with those for oak and hickory species (see pg 181). We see nothing inconsistent between our treatment scenario and predicted changes in dominance by the major species occurring in our area (see Project File 7-13 on Climate Change).

The influence of time scale was considered in developing the proposal. The time scale for establishment of the desired conditions is shorter than the time scale over which species distribution will change in response to climate (5-10 years vs the 90-year endpoint of the tree distribution models). Recent experience with the Ironton Heavy Fuelwood project in which basal areas were reduced and oak regeneration has responded dramatically, and in the Buckhorn Project Area, where natural canopy openings following the ice storm have allowed regeneration to grow, indicate that existing oak regeneration responds well to canopy opening. This experience indicates that research results (see Hilt 1979 as cited in Project File 4-26) citing stand response to thinning is accurate for southern Ohio. Increment cores from thinned stands on the District were compared to non-thinned stands and significant increases in growth were noted the first three years following thinning. See Project File 4-26 on Stand Health and Vigor.

The above results verifying research indicate that we can release existing regeneration and in some cases establish more regeneration in desired species, after which they will be relatively resilient to longer-term trends, especially if stands are thinned and a natural fire regime is established as contemplated in this project. Our results also verify that residual stems in mature stands can respond to canopy release through thinning, but that thinning needs to reduce basal area enough that the response lasts longer than three years. The prescription for Pine Creek reduces the canopy to 55-65 square feet, as opposed to approximately 70 square feet where the sample trees were measured.

Disturbances such as fire and insect and disease outbreaks are among the most important causes of changes in species composition (see Project File 10-17; Shugart and others 2003:ii, v, 9-16, 22-23). In a review of the literature available on forest management, climate change and carbon sequestration (see Project File 4-21, Summary), it is noted that the goals and proposed actions of the Pine Creek Restoration Project act to increase forest vigor.

Air Quality, Acid Deposition

Comment: Recent research reveals what the Clean Air Act left out: that the major threats to forests are from nitrogen oxides (Nox), which come mostly from cars, factories, and farm runoff, and from VOCs which react with sunlight and nitrogen oxide to form ozone, a component of smog. Nitrogen oxides are blown by prevailing winds out of the major urban centers of the Midwest and Southeast US, and increase in concentration from south to north along the Appalachian region (Loucks, 1991). Along the Ohio River corridor, Ohio has more than double the amount of nitrogen compared to Arkansas (Loucks, 1991) (Haynie pg 9).

Whenever an automobile is driven, or whenever a factory is in operation, the emissions from the combustion of fossil fuels create various compounds of nitrogen, mostly the chemical compound nitrous oxide (NO). Nitrogen is a fertilizer, so at first forests may actually show increased growth in response to increasing levels of these nitrogen compounds (Agren, 1985). But like most things in life, too much of a good thing can have serious consequences, and nitrogen is no exception. Nitrogen acids cause ions of aluminum to become mobile in the soil (Loucks, 1995). Aluminum is naturally present in forest soils, but it is locked up in chemical compounds that make it harmless to living things. In the presence of low pH (acidic) soils, this aluminum becomes cationically charged and is taken up into the tree's roots (Loucks, 1995). In this form it is toxic heavy metal.

The acidification of soils also leaches out essential minerals and nutrients important to the tree's survival, such as calcium and magnesium (Loucks, 1995). Trees affected by acid rain in this way may show reduced root growth, which reduces the ability of the tree to take up water and tolerate drought. The loss of vital nutrients means slower growth and greater susceptibility to disease. The tree has an immune system similar to that of a human, and if the tree is not properly nourished then it may not be strong enough to deal with other stresses like disease, drought, or insect defoliation.

Logging and road building also have impacts on a forest, and a tree weakened by acid rain may not be able to withstand these impacts either. Excess nitrogen is also absorbed directly from the air through the leaves. The Appalachian forests are often shrouded in fog or low clouds, and these clouds have a low pH due to nitrogen emissions from cars and factories in urban areas. This acid fog creates a nitrogen bath for the tree, which absorbs the nitrogen directly through the leaves. If ozone is present in sufficient concentrations, as it often is during hot summer days, exposure to this oxidant can damage the leaves, damaging respiration processes of the organism. There is evidence that damage done to the plant when both pollutants are simultaneously present is greater than the effects of each pollutant singly (Aber, Knute, Nadelhoffer, Steudler and Melillo, 1989, Vong and Guttorp, 1991). (Haynie pg 9)

Issue: Trees affected by acid rain/acid deposition may show reduced root growth. A tree weakened by acid rain may not be able to withstand the impacts of logging and road building.

Response:

We have reviewed the data that shows acid deposition across the midwest and northeastern US (located at the following site: http://nadp.sws.uiuc.edu/isopleths/maps2006/ndep.pdf). We have also seen publications that refer to acid deposition across the world (see ref_deHaynes). We have reviewed work by Ralph Boerner in which prescribed fire is hypothesized to reduce N in forest soils. Ohio soils are typically low in organic matter, the chief carrier for soil N. Selection thinning as proposed in this project does not reduce

organic matter. Litter material may be incorporated into the soil where logging equipment has soil contact, but the only organic matter removed from the site is the bole of the tree.

The commenter correctly states the effect of acid rain on acidification of soils. Buffering describes the resistance a soil has to change in pH when an acid or base is added to the soil. Highly buffered soils resist this change more than poorly buffered soils. The buffering capacity of the forest soils has likely been decreasing over time and needs to be increased. Buffering increases as clay and organic matter of soils increases (Gilmour 2002). Nothing can be done about the clay content. The main buffering opportunity in this project appears to be incorporation of organic matter on site for decomposition and deposition of larger woody debris on site for long term organic matter recruitment. There are many opportunities in this project for tops, limbs, foliage to be left on site and become recruitment to increase soil organic matter and, thus, the buffering capacity (Project File 7-18 DePuy).

There is no research showing that acid rain has reduced root growth in southern Ohio. The Pine Creek proposed actions are designed to increase forest vigor by reducing basal area, removing trees that are dying and attracting insects and disease, and by restoring the historic fire regime.

The Forest Plan considered the fact that

> **Timber harvest and motorized recreation affect air quality due to dust and the impacts of increased emissions. These impacts are expected to be negligible compared to background levels of air pollution from power plants and automobiles. There is currently no evidence to suggest that air quality in Ohio and near the Wayne NF should constrain Forest management options or actions. In general, management actions improve forest health, which should allow the forest to better withstand the stress caused by air pollution (2005 Wayne LRMP Final Environmental Impact Statement, pg 3-29).**

The National Atmospheric Deposition Program monitors nearly a dozen chemicals in precipitation across the country, noting high levels of many pollutants in the Midwest and northeastern states (see Project File Ref section for references on NADP). Researchers have noted the effects of acid deposition on trees in North Carolina, Pennsylvania, New York and New England, but there is no research supporting this effect in southern Ohio. Although industries in the Ohio River valley are known contributors to acid rain, prevailing winds generally carry pollutants away from the purchase units of the Wayne National Forest.

We have reviewed research noting the presence of high soil N (Boerner, R et al. Can. J. For. Res. 34: 609–618 (2004)), which also points out the accompanying decline in oak and rise in maple dominance. Boerner shares some of Loucks' hypothesis that the lack of fire and acid deposition have combined to alter species composition. Boerner's research conducted through the Delaware lab of the Northern Research Station is focused on the use of fire to both restore normal levels of soil N and species composition. There is no research showing that acid rain has reduced root growth in southern Ohio. The Pine Creek proposed actions are designed to increase forest vigor by reducing basal area, removing trees that are dying and attracting insects and disease, and by restoring the historic fire regime.

The decline of oak in Forest Inventory and Analysis plots has also been attributed to harvesting practices (high grading on private land), to lack of management for oak

regeneration, to a change in cultural practices which disfavor oak, and to the general decline of oak species based on senescence and insects and disease.

The silvicultural practices proposed in this project follow the recommendations of researchers to 1) restore the historic fire regime and 2) utilize harvesting practices to increase light levels more favorable to oak regeneration and growth. In addition, the removal of dead and dying trees will allow residual trees to increase in vigor. See References and Forest Health in the Silvicultural Prescription, Project File 4-7.

From Project File 4-9, pg 2: Periodic occurrences of decline and death of oaks over widespread areas have been recorded since 1900. The condition is often caused by a complex interaction of stresses and pests. Generally trees are weakened by environmental stresses such as droughts, frosts, by pests such as defoliating or sucking insects. Weakened trees are then invaded by other insects or diseases and the trees subsequently die. Healthy trees can withstand secondary pests, but in a weakened condition, they lack sufficient energy reserve to survive. Usually, the progression of decline is slow, occurring over several years. Control of oak decline is generally considered to involve keeping the trees healthy, and thus able to withstand pests and diseases. Certain causal factors such as drought and frost cannot be controlled, but management actions such as thinning can reduce competition for moisture and nutrients and thus promote a better physiological condition of the remaining trees. (Wargo, Houston, LaMadeleine, 1983)

Comment: Nitrogen is one of the most abundant nutrients in a forest, and is one of the most 10 complicated of the plant nutrient cycles (Horn, Schultze and Hantschel, 1989). Unlike sulfur oxides, which re cycled through the ecosystem through chemical reactions, nitrogen is cycled through the ecosystem via biological activity such as microbial activity or plant photosynthesis. Relationships between nitrogen deposition and the rates of deposition of other acids, especially sulfate, between nitrogen and ozone, and on the ability of the soil to buffer acids all affect how nitrogen will affect a given forest (Aber, Knute, Nadelhoffer, Steudler and Melillo, 1989).

E.D. Schultze of Germany determined critical loads for nitrogen deposition on forest ecosystems, taking into account the relationship of nitrogen saturation with sulfate deposition. Their findings lead researchers to believe that the forests of Ohio and Indiana are already more than three times above the critical load for nitrogen (Loucks, 1991). Observed effects in forests and in laboratory experiments include reduced biomass of fine root hairs of plants and reduced mycorrhizal growth in the soil (Aber, Knute, Nadelhoffer, Steudler and Melillo, 1989). This reduction in root mass has implications on the ability of the plant to obtain water or essential nutrients, leaving the plant susceptible to drought conditions it otherwise would have survived.

The chemical balance within the leaves is affected by excess nitrogen, and this imbalance caused by air pollution may be contributing to the severity of insect outbreaks. The increase of nitrogen in foliage, and the resulting elevated amino acid content (Margolis and Waring, 1986) and lowered phosphorus and lignin content (Waring, MacDonald, Larsson, Ericsson, Wiren, Arwidsson, Ericsson and Tohammar, 1985) make these leaves more attractive to insect defoliators such as the gypsy moth (Lymantria dispar). Ohio and Indiana have been identified as among the most likely locales for such outbreaks (Loucks, 1991), but other biological forces may already be acting to control this exotic insect.

Foliar damage is also associated with acid deposition, especially of high-elevation conifers (Aber, Knute, Nadelhoffer, Steudler and Melillo, 1989, Weetman and Fournier, 1984). Some conifer species, such as those found in the New England region, are more susceptible to

increased frost damage and needle loss due to continued exposure to high levels of nitrogen (Soikkeli and Karenlampi, 1984). Eventually the pollution-caused tree damage will exceed the increased tree growth stimulated by lower concentrations of nitrogen (Weetman and Fournier, 1984), and the process of forest decline will begin. Once the critical load, or saturation point, of nitrogen has been exceeded, the ecosystem will no longer function as a nitrogen sink. Instead nitrogen is converted into groundwater nitrate, which reduces water quality, and to nitrous oxide, which contributes to the greenhouse effect (Aber, Knute, Nadelhoffer, Steudler and Melillo, 1989). The soils of Ohio are estimated to be as much as three times the critical load of nitrogen (Loucks, 1991). There is also a correlation between acidity of the soils and the basal area of certain tree species, most notably oaks. Basal area is the measure of square feet of forest floor occupied by trees; a reduction in basal area means fewer trees (Haynie pg 10-11).

Issue: The soils of Ohio may have three times the critical load of nitrogen, which may be correlated to the reduction in basal area of oak species.

Response:

See response to acid rain question above.

Acid deposition is occurring on broad scales (see Project File Ref_nadp_history) . The decline in oak species has been attributed to a complex of factors, one of which is changing soil chemistry. In spite of what may be undocumented changing soil chemistry in our region, we have documented a positive response in the past 10-15 years from similar silvicultural actions across the District (see Project File 4-26, Stand Health). The actions proposed in this project should increase the vigor of the mature stand and the opportunity for abundant oak regeneration to grow in the understory in the project area.

Comment: The Union of Concerned Scientists has addressed forests in the United States and global warming:

There is a widespread and misguided belief that logging or clearing mature forests and replacing them with fast-growing younger trees will benefit the climate by sequestering atmospheric CO2. While younger trees grow and sequester carbon quickly, the fate of stored carbon when mature forests are logged must also be considered. When a forest is logged, some of its carbon may be stored for years or decades in wood products. But large quantities of CO2 are also released to the atmosphere - immediately through the disturbance of forest soils, and over time through the decomposition of leaves, branches, and other detritus of timber production. One study found that even when storage of carbon in timber products is considered, the conversion of 5 million hectares of mature forest to plantations in the Pacific Northwest over the last 100 years resulted in a net increase of over 1.5 billion tons of carbon to the atmosphere. Using forest products as a source of biomass energy can present a conflict between climate mitigation and other environmental objectives. This is because a trade-off exists between leaving carbon in standing forest and producing a sustainable flow of renewable woody biomass that can be used to produce energy (instead of fossil fuels) or building materials (instead of energy-intensive steel or aluminum). While increased forest carbon storage yields climate benefits, greater mitigation may be possible over time by managing forests for the long-term production and use of biofuels. Managing for biomass should only be an option if deleterious effects on biodiversity can be avoided (i.e., is fully compatible with the Forest Stewardship Council's guidelines for biomass management).

Logging mature forests releases more CO2 to the atmosphere than leaving old trees on the stump. Preserve the integrity of mature forests when managing for timber or biomass (Haynie). Commenter feels cutting and burning releases carbon by burning non-living carbonaceous material on the forest floor and in the soil. Greenhouse gases producing global warming are driving the climate changes. (Lund pg 6-7)

Mature forests and other forest areas with recognized high conservation value should be fully protected. Even careful commercial forestry operations in high conservation value forests impose substantial costs to other forest ecosystem services such as biodiversity conservation, watershed maintenance, recreation and other forest amenities. These forests should not be managed for timber or biomass. **Note: Comment is a policy preference, not a data or science issue.**

The Wayne National Forest needs to be allowed to grow in a natural state as a way to (1) clean up the air – the trees being a filter; (2) clean up the water – the trees being a filter; (3) give refuge to wildlife that will be affected by the warming climate (Haynie pg 11).

Issue: Logging mature forests releases more CO2 to the atmosphere than leaving old trees on the stump.

Response:

These comments, especially the first about logging and fast-growing young trees, provide a brief overview of the carbon effects of harvest. However, the first and most detailed comment uses an inappropriate comparison based on the example of clearcutting a forest. Clearcutting has been shown to release over 30% of stored carbon within a 5-year period after harvest. In this project we are considering approximately 2,500 acres of single tree and group selection harvest, and 2,800 acres of prescribed burning over 5 to 10 years. There is no clearcutting proposed.

The key finding here is that for a site harvested with clearcutting, roughly two-thirds of the forest carbon is not stored in forest products following a harvest, and individuals seeking to maximize carbon benefits of a forest should recognize this (NEASF 2002).

Harvest method is likely important in describing these after-harvest carbon budgets. A Wisconsin study (Strong, 1997) suggests that in northern hardwoods where the harvests have seen light to moderate thinnings (partial cuttings), total carbon stored in tree stems will increase over time. This would suggest that landowners should be able to manage their forests, including periodic harvests, while increasing sequestered carbon (NEASF 2002).

The global warming impacts of the proposed action and alternatives are negligible at our geographic and temporal scale, particularly given that biomass densities in local forests are less than those in the Pacific Northwest. Further, the current project is not a biomass energy or bio-fuel project.

Review of the literature available on forest management, climate change and carbon sequestration (see Project File 4-21, Summary), concluded that the goals and proposed actions of the Pine Creek Restoration Project act to increase forest vigor, harvest dying trees so they can become forest products which hold C for indefinite periods, and decrease the quantity of biomass releasing carbon on the forest floor.

According to Birdsey (1992),

> **"because of the relation between forests and atmospheric carbon dioxide, there are opportunities to manage forests in ways that would result in storage of additional carbon and thus reduce atmospheric carbon dioxide. Major forestry opportunities include increasing forest area, increasing the productivity of existing forest lands, reducing forest burning and deforestation, increasing biomass production and utilization, planting trees in urban environments, and increasing use of wood in durable products."**

This project harvests approximately four thousand board feet per acre, of which only 18% (see Project File 4-25) is harvested as pulpwood. Therefore, most of the wood removed from the site is utilized for long-term products such as building materials and over half the standing volume, the more vigorous trees, remains as growing stock.

The global warming impacts of the proposed action and alternatives are negligible at our geographic and temporal scale, particularly given that biomass densities in local forests are less than those in the Pacific Northwest. Sustainable forestry approaches carbon neutrality. What the project releases is re-absorbed as the vegetation regenerates. According to Birdsey (1992),

> **"The quantity of carbon varies considerably between regions, with Pacific Coast States containing 205 thousand pounds per acre (23.0 kg/m2) and South Central States containing 117 thousand pounds per acre (13.1 kg/m2) in the average forest (fig. 3). Of the total 57.8 billion tons (52.5 billion metric tons) of carbon in U.S. forests, 22.6 billion tons (20.5 billion metric tons), or 39 percent, is found in Pacific Coast forests, far more than in any other region (fig. 4). The Rocky Mountains and the Northeast each contain about 15 percent of U.S. forest carbon. The Southeast, South Central, and North Central regions each contain about 10 percent of U.S. forest carbon."**

A mature forest may suffer effects from long-term changes to the climate, but relative to climate change, silvicultural activities have relatively short-term effects. Over the longer term, the main risk to the vegetation community is likely to be from insects, disease and wild fire. One of the purposes for the Pine Creek project is to reduce the number of trees damaged in 2003 and slow the spread of insects and disease.

Prescribed fire releases far less carbon into the atmosphere than catastrophic wildfire because much less fuel is consumed during prescribed burning due to tightly controlled atmospheric and fuel moisture conditions (see Project File 10-19, Kern Prairie Burn Plan and Fire Weather Forecast as an example).

While over the near term harvest may release more CO2 to the atmosphere than leaving the vegetation on the stump, at relevant scales (Forest to national), forest management has favored carbon sequestration. Information from the Union of Concerned Scientists shows that following a harvest (method undefined but assumed to be clearcutting based on Strong, 1997 – see below), forest carbon -- all carbon in trees, shrubs, coarse woody debris and soil -- is either lost to emissions, stored in wood products, or stored on-site. Following a harvest, an estimated 32.5% of forest carbon is released to the atmosphere within five years. Another 32.5% is stored in long-lived forest products, with an average annual loss of 2% to decay or disposal and an estimated 35% of forest carbon remains stored on-site, either in

unharvested material, forest soil, or coarse woody debris. The key finding here is that for a site harvested with clearcutting, roughly two-thirds of the forest carbon is not stored in forest products following a harvest, and individuals seeking to maximize carbon benefits of a forest should recognize this (NEASF 2002 see Project File 4-21).

Harvest method is likely important in describing these after harvest carbon budgets. A Wisconsin study (Strong, 1997) suggests that in northern hardwoods where the harvests have been light to moderate thinnings (partial cuttings), total carbon stored in tree stems will increase over time. This would suggest that landowners should be able to manage their forests, including periodic harvests, while increasing sequestered carbon.

Note: This last paragraph differentiates the claim made by the commenter that harvesting trees removes over 30% of the carbon stored in a forest and releases it to the atmosphere in the five years frollowing clearcutting. "the clearing and degradation of forests actually accounts for approximately 20 percent of annual CO2 emissions worldwide. This is more than the annual CO2 emissions generated in the United States by burning fossil fuels". (Union of Concerned Scientists 2004).

Clearly the two harvest practices are vastly different and would release different amount of carbon.

Commenters also claim that mis-management of forests results in a decline in sequestration: "Carbon sequestration by forests and other lands decreased by approximately 20 percent from 1990 to 2001, a decline stemming primarily from unsustainable timber management (especially on privately owned forests) and the clearing of forests for development" (Union of Concerned Scientists 2004).

According to Birdsey 1992: "The accumulation of carbon in live and dead trees totals 508 million tons (461 million metric tons) per year, while the total removal of tree carbon from U.S. forests resulting from timber harvest, landclearing, and fuelwood use amounts to 391 million tons (355 million metric tons, fig. 8). A comparison of accumulation and removal suggests that U.S. forest trees are storing additional carbon at a rate of 117 million tons (106 million metric tons) per year. This is equivalent to about 9 percent of the annual U.S. emission of carbon to the atmosphere (1.2 billion metric tons) per year (Boden and others 1 990)."

Improved forest management practices, afforestation of previously cleared forest areas (in which eastern national forests have been active), as well as timber harvesting and use have resulted in net uptake (i.e. net sequestration) of carbon each year from 1990 through 2005. In 2005 land use, land-use change, and forestry activities resulted in a net carbon sequestration of 828.5 Tg CO2 equivalents. This represents an offset of approximately 14% of total U.S. CO2 emissions. Total land use, land-use change, and forestry net carbon sequestration increased by approximately 16 percent between 19990 and 2005, primarily due to an increase in the rate of net carbon accumulation in forest stocks (United States Environmental Protection Agency 2007:7-1 to 7-2). These estimates include consideration of above- and below-ground biomass, dead wood, litter and soil organic carbon, and includes the effects of forest fires (United States Environmental Protection Agency 2007:7-2 to 7-4). This pattern of net sequestration is expected to continue for the foreseeable future, although at a reduce rate because of forest maturation (USDA FS 2007:84). On the Wayne National Forest, overall carbon stocks increased between 1987 and 1997, the last years for

which data are available (http://www.fs.fed.us/ne/global/pubs/books/epa/states/OH.htm, Table 5).

Globally, approximately 75% of global carbon dioxide emissions are from fossil-fuel consumption, the remainder is from land-use changes. Much of the land use change contribution results from deforestation in the tropics (USDA FS 2007:83). Forests in the US have been carbon sinks – significant changes in atmospheric carbon dioxide must come from control of fossil fuel emissions.

The implementation of the Pine Creek activities will do little to mitigate global warming. The project scale is so small in relation to the scale of climate change that the effect is inconsequential. While it could be argued that aggregate effects from multiple projects make a difference, in practice the aggregated effects of forest management in the U.S. have been positive. Forests are net carbon sinks. Sustainable forestry approaches carbon neutrality – what the project activities release is re-absorbed as the vegetation regenerates or grows to fill canopy gaps. Whether it is truly neutral or not depends on factors that are too speculative to analyze here, such as the level of fossil fuel emissions from equipment operation; the timing of re-growth and the next harvest; or the rate of substitution of more carbon-intensive materials such as steel for wood products.

There is no requirement of law or policy that regulates the carbon effects. As forest managers, we strive to maintain a sustainable, vigorous forest that responds to direction in the Forest Plan. Regarding ecosystem services (clean air, water, and wildlife habitat), please see the responses to those issues elsewhere in this document.

Additional Response:
Carbon is continually sequestered in the soil and in living biomass just as carbon is released into the atmosphere. Any carbon released into the atmosphere through prescribed burning has to be balanced with additional carbon sequestered in the forest through increased tree and plant growth generally observed after a prescribed fire.

An increase of green house gases has been observed during the past few decades and many (including many scientists) recognize this. There is some debate on the role of trees in relation to this increase. Gerould Wilhem of the Conservation Research Institute out of Elmhurst, IL, in his article "The Realities of Carbon Dioxide: Seeing Through the Smog of Rhetoric and Politics" and found on-line at:
http://www.cdfinc.com/images/download/Realities_of_CO2_revised.pdf.), states in his summary: "Planting trees or setting forests aside cannot offset the oxidation of fossil fuels because fossil carbon represents stored carbon from another era. Such organic carbon is converted to CO2 in surplus amounts. Trees and vegetation of this era already are cycling carbon into the atmosphere at a rate and concentration to which contemporary life forms are adapted" (Project File 7-18 DePuy).

Comment: The actions of prescribed fire will impact the air resource by polluting it. (Lund pg 15). The FS is avoiding the environmental costs of the air pollution it creates by letting someone else pay. The FS should keep its pollution to itself, not dump it on someone else. Air pollution produced by prescribed fire on WNF will statistically have harmful effects on someone or something somewhere. Everyone lives downwind (Lund pg 16 cites pg 17 of Ch 2). No figures

are given for this plan as to the composition and amount of smoke which would be produced from prescribed fires on 2,875 acres burning both plants and animals. Commenter refers to pg 27 of the Athens 2006 Prescribed Burning Decision. In the Athens Decision, the tons of PM 2.5 particulates produced by burning 2,052 acres is six to eleven percent of the annual PM 2.5 pollution for two counties (Athens and Hocking). The FS should not add one more ounce of smoke pollution to Scioto County's air (Scioto Co is often in or near non-compliance for PM 2.5). Any additional pollution for Lawrence Co is bad. (Lund pg 17-18)

Issue: Prescribed fires create smoke and air pollution

Response:

Land managers must balance the ecological purpose for prescribed burning and the production of pollutants. Because prescribed burning occurs infrequently, there are no national air quality standards applied to regulate it. Ohio, Florida, California and other states, as indicated in Martha Monroe's article (full article in Project File 10-14) and in California (see Project File 10-15), are regulating "silvicultural smoke" by requiring a burning permit, a burn plan, qualified burn bosses, and sophisticated weather reports for potential and actual burning days. The WNF has created its own smoke management plan and mitigations consistent with what other states are doing and with concurrence from Ohio EPA. In addition, the WNF maps structures within the zone of impact around the prescribed burning area and has a notification plan for residents who may be sensitive to smoke. See Project File 10-2 for an analysis of smoke and mitigations for it. The WNF meets all requirements of OEPA, regulator for the Clean Air Act, as documented in 10-2.

From the 2006 Forest Plan FEIS, pg 3-31: "Timber harvest and motorized recreation affect air quality due to dust and the impacts of increased emissions. These impacts are expected to be negligible compared to background levels of air pollution from power plants and automobiles. Prescribed burning is accomplished in a controlled manner, and acreages are similar across all alternatives. Prescribed burn plans indicate the best conditions to conduct the burns, and include mitigations for air quality concerns."

There is currently no evidence to suggest that air quality in Ohio and near the Wayne National Forest should constrain Forest management options or actions. In general, management actions improve forest health, which should allow the Forest to better withstand the stress caused by air pollution. Potential emissions from wildfire are expected to be constant across all alternatives which include prescribed burning, and could be slightly higher if the No Action Alternative is selected.

Ohio EPA's current management of silvicultural smoke is encompassed in the following quote from Bill Spires (Ohio EPA):

> **"With respect to the 24-hour standard (original or revised), the procedures in the Smoke Management Plan (and currently followed in most burn plans) are designed to minimize ambient impacts (and maximize safety) by indicating the appropriate meteorological conditions for each size burn. These procedures, along with the proper notification of potentially impacted citizens and the avoidance of sensitive receptors, provide for a proper approach to minimize short term human impacts"(see Project File 10-16).**

Ohio's experience with managing silvicultural smoke is similar to that in Florida, a state in which prescribed burning is common and seen as essential to both managing forest production and protecting nearby communities.

(from "Where there's fire there's smoke: Air Quality and Prescribed Burning in Florida" by Martha C. Monroe, Florida IFA Extension (Project File 10-14)

> **"Under a new approach to air quality management, however, if smoke from prescribed burning violates the air quality standards, the state's approved Smoke Management Plan (SMP) will be reviewed instead of requiring an Implementation Plan. This new solution to air quality and wildland fire conflicts comes from the 1998 Interim Air Quality Policy on Wildland and Prescribed Fires, which was jointly crafted by the federal land management agencies (including the Forest Service, Park Service, and others) and the USEPA. It suggests that an SMP include a set of guidelines to mitigate concerns about smoke from wildland fires. Such a plan can establish parameters for prescribed fires, such as size, wind speed and direction, and distance to monitors or populations sensitive to smoke."**

6. The Clean Air Act regulations are not only inadequate, they are basically disregarded and often violated. (Lund pg 15)

Response:

Comment exceeds scope of decision. The WNF and the Pine Creek Smoke Management Analysis and Plan meet all Ohio EPA requirements in compliance with the Clean Air Act. See responses from Florida and California in Project File 10-2, 10-14 and 10-15.

Economics

Comment: What is lacking in any of the analysis of economics of the forest is two-fold: (1) global warming and (2) sustainable communities. The Forest Service is in a unique position in southern Ohio in that it has the resources of the federal government to analyze the true worth of a standing forest in a warming climate, and it can use those resources to set up a sustainable, non-cyclical economic engine for the region. Instead of cutting down the forests for pulpwood, the forest could, with the support of Heartwood, be in a position to log forests in a sustainable way that could help the local community – i.e. furniture makers, musical instruments, and environmental tourism. The International Ecotourism Society defines ecotourism as "responsible travel to natural areas that conserves the environment and improves the well-being of local people." We would further add that this must conserve the biological diversity of an area first and foremost. Considerable literature exists on the problems of "green-washing" within tourism and industry, and this includes ecotourism.

We would expand by saying that there is a rich cultural heritage which Appalachian Ohio offers to outsiders, and while our forests are a special one, there are not the only ones. The Service noted the history of the Underground Railroad. There is also a rich indigenous cultural heritage in Ohio that pre-dates white settlers and the US government. These and many others areas offer opportunities for tourism in Ohio. Heartwood believes and supports strongly the rights of people to nurture their heritage. For example, Heartwood has leant support to folks who were expelled by the federal government to create the Land Between the Lakes. These folks should have a right not just to preserve the past, but create a vibrant future. Here in south Louisiana, the native French population has a right to speak their language, live off the land and waters, and nurture the Cajun and Creole heritage. Heartwood supports people who live in a sustainable manner off the land.

As the Service moves towards ecotourism and recreation-based management and away from all extraction-based marketing approaches they will find much more support and help from the public and private sector for the Wayne (Haynie pg 12).

Issue: The WNF's extraction-based marketing approach denies them the support and help from the public and private sector for the Wayne. The Wayne should move more toward ecotourism and recreation-based management.

Response:

Citing studies that have been done to identify the niche best filled by the WNF and the support for recreation offered by the Forest, the following is an excerpt from Kosmos EA Chapter One:
"During public scoping for the Wayne National Forest Land and Resource Management Plan Revision (Plan) in 2005, and during scoping for proposed recreational permit fee increases for the national fee demonstration project in 2006, the public identified the addition of new off-highway vehicle trails as highly desirable (USDA FS 2005). Further, the Lawrence County/Wayne National Forest Potential Enhancement Study (Edwards and Kelcey 2005) identified outdoor recreation as an economic activity that could be developed effectively in rural Lawrence County, while meeting the needs and interests of local rural residents and stakeholders.

The Lawrence County Enhancement Study was prepared by an independent contractor that met with a committee of local business interests and also held public meetings in the county's rural communities in 2004. The results were documented and a strategy developed

to build long-term economic vitality in rural Lawrence County based on the area's strongest assets and opportunities (see Project File 8-3). The potential for economic development from outdoor recreation and tourism in Lawrence County is partially based on the concentration of tourism-oriented resources on the Wayne National Forest located with in the County. A map delineating outdoor recreation opportunities, including the off-road vehicle expansion between Pine Creek and Hanging Rock is in the enhancements study and in Map Appendix 4 to this project.

The Study recognized the national trend toward growth in the demand for outdoor recreation over the past 10 years, and concluded that building on the outdoor recreation and tourism opportunities should be a primary goal of the county, state, and national partners in Lawrence County. Specifically, it recommended that the committee "support expansion and maintenance of horse trails and ORV trails to the greatest extent possible" and "support [for] the Wayne NF's acquisition of property necessary to extend the existing ORV trail system north from the Hanging Rock area (Project File 4-5).

A 2003 Wayne National Forest feasibility report states that "outdoor recreational activities have always been important in America, but within the past decade their importance and frequency of uses have increased rapidly (USDA FS 2003). Outdoor recreation sites may serve as destination points to draw visitors from many different states and urban centers throughout the mid-west. This in turn can and will increase local and state tax revenues, create jobs and bring economic and entrepreneurial opportunities in the communities adjacent to these recreation destinations (Project File 4-5).

The 2003 Feasibility Study reaches the conclusion that, due to the increasing numbers of citizens enjoying outdoor recreation activities, the demand for facilities will exceed the current recreation opportunities available on the Forest. "Stakeholders and town meeting participants have indicated that ORV trails in the area are already crowded…and that the number of existing camping facilities is insufficient."

The 2002/2003 National Visitor Use Monitoring (NVUM) study estimated that half the recreation use on the Forest was for ATV trail riding. This study was conducted during a 2-year period when Lake Vesuvius, the Ironton Ranger District's very popular lake-based recreation area, was closed for dam re-construction. NVUM data on visitor expenditures is cited in Chapter Three." (end of quote from Kosmos EA)

The adjacent Kosmos ATV Trail Addition project implements the 2006 Forest Plan and addresses a need identified by forest users and by the local community to provide additional trails on the WNF. At the same time, the Forest Plan identifies ecological needs in the Historic Forest Management Area to move the forest to a condition more resembling the historic forest. We are multiple use managers and must balance many uses on the national forest ownership.

As for marketing the wood harvested from national forest lands, any private entity could purchase a timber sale contract and market it whatever way they want to, provided they harvest it according to the contract. Let's leave it to them to develop the markets, recruit folks to market it for them, etc. This aspect of the operation is not the Forest Service side of the business.

Comment: A study conducted in 1995, entitled The Economic Impacts of Fish and Wildlife-Associated Recreation on Public Lands in Ohio found that:
"Hunting, fishing and non-consumptive activities provide Ohio with an important source of jobs, income and other benefits...It is clear that hunting, fishing and

non-consumptive activities generated significant economic impacts that must be considered in policymaking."

The report found that hunting, fishing and non-consumptive activities generated "approximately $38.4 million in federal income tax revenues and $33.3 million in state income and sales tax revenues." Overall, it found the following impacts from recreation related activities on public lands in Ohio:

Response:

No issue is found in the above statement. The ability of hunters and fishermen to use the project area is only limited during actual harvest, burning or herbicide application. Based on analysis in the Forest Plan, habitats supporting these species should improve following project activities. A new Executive Order requires federal agencies to maintain or enhance habitat and hunting opportunities (see Project File 5-11). This project enhances habitat for many species and the connected action of improving eight visitor parking areas along forest roads facilitates hunter access (see Table of Actions in Chapter Two and Decision Notice).

Comment: Animal deaths need to be taken into account in any cost benefit analysis. The ecological cost is too high for the dubious benefits [of burning] hoped for but not assured. (Lund pg 14)

Hunting
$54.1 million in retail hunting sales
$34.4 million in salaries and wages
1,700 jobs annually
$2.8 million in state sales tax revenues
$1 million in state income tax revenues

Pond and Lake Fishing
$305.9 million in retail sales
$203.9 million in salaries and wages
10,400 jobs annually
$14.9 million in state sales tax revenues
$6 million in state income tax revenues
Stream and River Fishing
$71.1 million in retail sales
$47.2 million in salaries and wages
2,400 jobs annually
$3.5 million in state sales tax revenues
$1.4 million in state income tax revenues
Non-Consumptive Recreation
$59.2 million in retail sales
$35.5 millions in salaries and wages
2,000 jobs annually
$2.7 million in state sales tax revenues
$1 million in state income tax revenues

These numbers clearly show the high value that recreation plays on public lands in Ohio. If we were to add these values together, we could estimate that these activities alone generated nearly $845 million dollars for the Ohio economy, as well as creating 16,500 jobs annually. This is

perhaps the best illustration of the value of a recreation based economy over an extraction-based economy.

Another study conducted in 1996 and entitled The Economic Impacts of Outdoor Recreation at the Wayne National Forest, Ohio found similar conclusions. The report states that:

> "Economic impacts indicate that the recreation services provided in the forest are a vital component of the economy of Southeastern Ohio. Without these services there would be a marked decreased in the attractiveness of the region to tourists, recreationists and other visitors (Haynie pg 13-14).

Issue: The death of animals caused by proposed actions impacts the value of the WNF to the recreation economy.

Response:

Most animals survive burning by moving away from the heat and flames. Hunted animals such as deer, turkey, squirrels and grouse are very mobile. We agree with the statistics and claims that recreation is very important to local economics and have taken steps in other projects (See Kosmos Decision Notice, Arabia Canoe Launch, Vesuvius Archery Trail, Frontier Boat Landing, New Straitsville ATV Trail Connector, etc) to enhance visitor opportunities on the Wayne National Forest.

In a review of recent research on the affects of fire to amphibians and reptiles in eastern oak forests, Renken (2005) found that current data suggest that fire results in little direct mortality of amphibians and reptiles, and that "current research also suggests that fire has no effect on reptile abundance, diversity, or number of species except in several studies in which lizard abundance was or tended to be greater in burned plots."

Prescribed fire effects on the Indiana bat are thoroughly analyzed in Wildlife BE, Project File 5-5 (pg 30): "Timber harvesting is a tool used to achieve desired future terrestrial and riparian habitat conditions, and to maintain a component of oak-hickory in the landscape. It can improve short-term and long-term foraging habitat for the Indiana bat, but at the same time, it can alter the condition of forest stands to where optimal foraging conditions are reduced for a period of time. Uneven-aged methods, such as the selective harvest proposed in the Pine Creek project, can open the canopy to a desired level to improve foraging. An established Forest-wide standard (SFW-TES-8), which has been incorporated into this project, directs the Forest Service to maintain at least 60% canopy cover in all hardwood cutting units treated with uneven-aged methods to promote quality foraging habitat. Under Alternative 2, the proposed treatments will leave an average of 60 – 75% canopy in Dry Upland and Dry Mesic alliance areas and 90 – 95% canopy in Mesic and Rich Mesic alliance areas. Harvesting some trees in stands that are even-aged, as most of the stands in the Pine Creek area are, reduces the density of trees on the site, and encourages healthier and larger individual trees. "

The BE repeatedly refers to the effects of both harvesting and prescribed fire as temporary in nature. From the BE pg 33: "These activities (road re-construction and construction) have the potential to remove suitable roost trees, and could temporarily alter suitable foraging habitat. The potential impacts of suitable roost tree removal and alteration of foraging habitat are discussed in the Hardwood Treatment section above. However, these activities, particularly temporary haul and skid road creation could also create conditions

beneficial for foraging individuals. The temporary roads and skid roads are narrow and linear, and the forest canopy is usually retained over the road, which could make them suitable travel corridors, especially if a water source, such as the waterholes that are proposed as part of this project, is located nearby. A log landing is small in size, but may create a gap in the canopy that would be suitable for foraging or increase solar radiation to a potential roost tree. These activities would open the canopy and understory, thereby moving localized conditions closer to optimal foraging habitat conditions."

The BE, pg 38 summarizes the cumulative effect to the Indiana bat: "Although direct effects to Indiana bats are not likely to occur, there is a small chance that an occupied roost tree could be removed or destroyed during prescribed burning operations. Firelines are generally constructed prior to the prescribed fire season (mid winter and mid-late fall), but could occur to a lesser degree during the spring and summer months. Hazard trees are usually removed during construction of the firelines (during the Indiana bat hibernation season). However, a small number of hazard trees may be felled during a prescribed fire, which may occur as late as late as the end of April, to ensure firefighter safety. While most hazard trees are removed during the hibernation season, there is potential for removal to occur between April 15 and September 15. Therefore, there is a small chance that short-term adverse effects may occur during prescribed burn operations. We expect that hazard trees that would be removed during prescribed burn operations would be secondary or lesser roost trees. The removal of these trees may result in individual fitness consequences, but would not be expected to result in colony or population level consequences.

Although there is a small chance of short-term adverse consequences as a result of the proposed project, these potential impacts are minimized by the incorporation of S&G and Design Criteria, and are strongly offset by the expected long-term habitat benefits. The proposed hardwood harvest activities, along with mid-story treatment and TSI will increase the proportion and future abundance of species that are favored roost trees, such as oaks and hickories. Trees less suitable as roost trees will become less abundant, in favor of those that are suitable as roost trees. The combination of prescribed burning and timber harvest is expected to improve forest structure by reducing mid-story clutter and canopy density and increasing solar radiation to roost trees, and lead to more successful oak regeneration in the treatment stands, providing for future roost trees over the long term. Creation of temporary access roads, skid roads and log landings may create small amounts of optimal foraging habitat and flyways for Indiana bats. Non-native invasive species treatments will improve native insect diversity and abundance, and creation of waterholes will improve foraging and water availability."

The Forest Plan FEIS states regulations that NFMA requires national forests to provide habitat that can maintain viable populations of existing native and desired non-native plants and animals (see FEIS pg 1-14). The Pine Creek project activities are consistent with the various methods prescribed, which include 1) various methods of timber harvest, and 2) prescribed fire, mowing and herbicide application.

Prescribed Burning

Comment: The micro- and macro-organisms found in the forest floor and soil horizons play very important roles in the functioning of forest ecosystem. Burning affects the micro- and macro-organisms. In effect, acid rain and global warming affects soil quality. The Forest Service fails to analyze the health of the soil. The Forest Service held a conference in November of 2005 entitled: Fire in Eastern Oak Forests: Delivering Science to Land Managers Proceedings of a Conference November 15-17, 2005 Fawcett Center The Ohio State University, Columbus, Ohio. General Technical Report NRS-P-1. On p. 32 of a paper entitled, Fire scars reveal variability and dynamics of eastern fire regimes, there is a chart that shows how often southern Ohio burned between 1650 and 1850. That chart shows that fires erupted about once every 28 years. For the Forest Service to want to return to that time period and burn on a yearly, bi-annual, or tri-annual basis simply is not based on facts. That map on p. 32 shows that southern Ohio burned less than almost any other area of the eastern United States except for parts of Minnesota, West Virginia, and northern Maine.

Issue: Historic fire did not burn at the intervals proposed in this project. Burning at these intervals affects the micro- and macro-organisms.

Response:

The analysis presented in the reference paper is a coarse-scale landscape analysis. It is useful in comparing fire history of one region to another. It is not useful in describing a very localized fire regime (e.g. SE Ohio). This is evident in the author's comments at the end of the article:

> **"Fire history modeling and mapping from fire scars can provide estimates of fire intervals for restoration and reference conditions (Maclean and Cleland 003; McKenzie et al. 000; Morgan et al.). However, the quality of any model or map is dependent on the quality of the data from which it is desired. In this study, we mapped large regions of the Southern and Eastern United States for which pre-European settlement fire scar histories were unavailable. Therefore, estimates for these regions are un-calibrated and approximate but might be imposed by future studies and data collection."**

A better gauge of local fire history is gleaned from fire scar data. The best current study suggests a fire return interval of 11 years (McEwan et al 2007) in southern Ohio. Often land managers wanting to restore an area will burn more frequently (2-5 year return intervals) at the onset of a restoration project to achieve open understory conditions because larger species of red maple and other more mesic species will re-sprout vigorously after a fire and then are more susceptible to future fires while they are small (Dave Minney, TNC, personal communication).

Soil biological properties involve a wide range of organisms which the soil as well as the properties they regulate. These components are made up of both living and dead biomass and both can be affected by the project activities including harvest and prescribed fire. Living organisms are classified in several ways. Soil flora includes algae, some bacteria, mycorrhizae and plant roots. Soil fauna includes protozoa, earthworms, and insects. This is further divided into micro, meso, and macro fauna. These participate in processes such as nitrogen cycling processes (nitrogen fixation and denitrification), decomposition, and

mineralization. Management activities, including prescribed burning, will influence these processes. (Neary et al. 2005) (De Bano et al. 1998)

Fire affects living organisms in direct and indirect ways. Because organic matter and organisms are located at or near the surface, they can be exposed to flaming fuels and smoldering forest floor fuels. In the period after fire, a stable recovery of microbial populations to pre-fire levels can be expected. The moisture content of the litter, organic matter, and soil influences the effect on organisms. Water absorbs a lot of heat and this will reduce the temperatures and amount of substrate consumed. Because most soil micro-organisms are heterotrophic and require pre-formed organic material in the litter and soil for their source of energy. (Neary et al. 2005) (De Bano et al. 1998)

Low severity prescribed fire has a minimal effect on soil organisms. Temperatures can be non-lethal except in the upper litter layer and the consumption of forest floor substrate is limited. A single entry burn could be considered to have a minimal effect but repeated entries over time may reduce microbial population size and activity. (Neary et al. 2005) (De Bano et al. 1998)

In the past, soil organisms were not seriously considered in natural resource management as many were invisible to the naked eye, there was no economical field test available, and research studies did not always give matching results of the response of organisms to management activities. Some generalizations can be made from past experience and studies.

1. **Micro-organisms do re-colonize disturbed forests due to a great physiological and genetic diversity.**
2. **Fire effects are greatest in the forest floor and decrease with depth in the mineral soil. Recovery of microbial populations increases with the increasing moisture content of the litter layer and soil profile.**
3. **Repeated prescribed fire can reduce organic matter content and increase the loss of soil organisms through erosion.**
4. **Avoiding drastic changes in soil temperature, moisture, and substrate availability will have a higher probability of ensuring maintenance of soil biological populations.**
5. **Knowledge gaps exist such as the effect of repeated prescribed burns on organisms. (Neary et al. 2005) (De Bano et al. 1998)**

The effects of prescribed burning on soil erosion and nutrient loss are related to the severity of the burn. These effects are complex and depend on a host of factors but certain generalizations seem relatively consistent. Burning has its most pronounced effect on the forest floor where carbon (C), nitrogen (N), and sulfur (S) are volatilized and calcium (Ca), magnesium (Mg), potassium (K), and phosphorus (P), and other elements are left as ash. The ash is leached by rains into the mineral soil which increases its base saturation and pH. (Alban 1977) Increased nutrient availability at higher pHs may result in positive plant responses following fire. (Van Lear and Kapeluck (1989) The positive response of plants leads to less soil erosion because plants hold the soil and slow the impact of rainfall. These coincide with results from a variety of other reviews and studies. (DeBano 1998) (Liechty, Luckow, & Guldin 2004) (Neary, Ryan, & DeBano 2005) Timing of prescribed fire can influence the degree of plant responses. Prescribed fire in late fall to early winter may result in nutrients from ash to leach out of the soil due to the higher precipitation events for

that season. Plants may be able to take advantage of ash in the soil after early spring burns after their winter dormancy (Project File 7-18 DePuy).

Comment: Dr. Wayne Clatterback, associate professor at the Institute of Agriculture at the University of Tennessee, states the following:

"I have seen it over the last eight to 10 years, and the research I've seen shows there is really no difference," Clatterback said. "The burning we believe that may have enhanced oaks was in a totally different environment than it is today. In the 20's, 30's and 40's there was just a different culture. I don't think it is something we can simulate today, or could even try to simulate. They have even tried the methods used by Native Americans, but conditions are so different now, I don't think we can replicate what they did years ago.

Issue: This project cannot simulate the effect of historic fire on oaks.

Response:

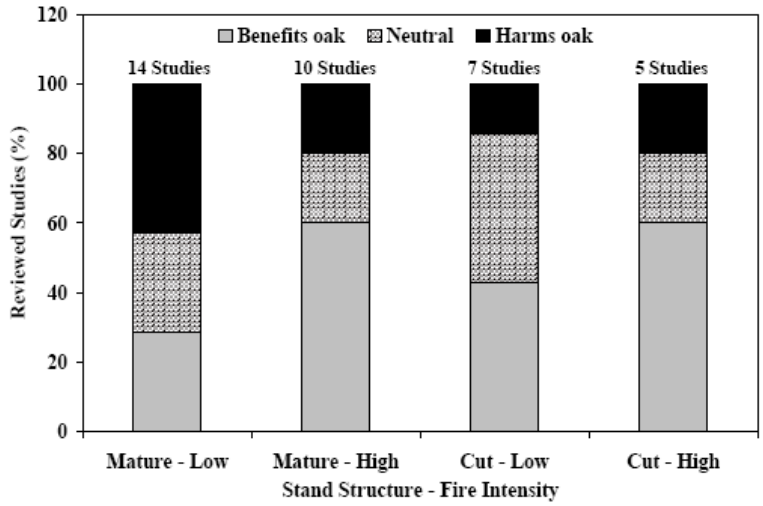


Figure 1.—Distribution of reviewed studies of the response of hardwood regeneration to single fires. The studies were divided into 12 groups based on stand structure, i.e., had the overstory been harvested to some degree, reported fire intensity (flame length or

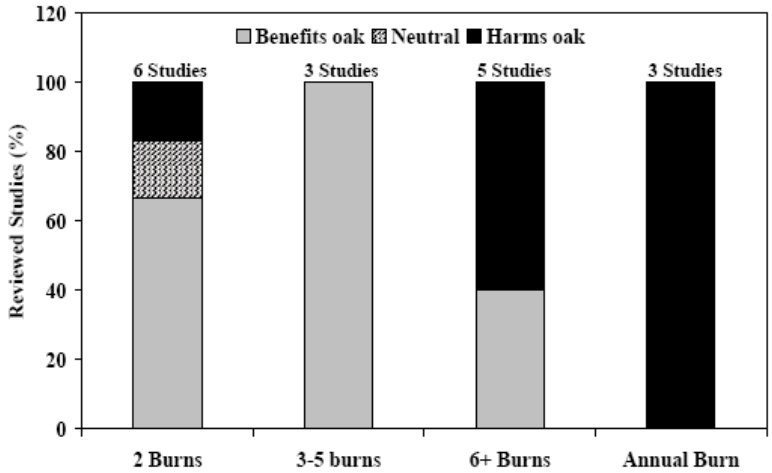


Figure 2.—Distribution of reviewed studies of the response of hardwood regeneration to multiple fires. The studies were divided into 12 groups based on the number of periodic burns and whether the fire benefited, harmed, or did not affect the competitive position of oak in the regeneration pool.

A 2005 summary of the literature by Brose et al more accurately reflects what the scientific literature reports on how oak is affected by fire. The effects vary according to the structure of the forest and the intensity of the fire. In some conditions oak could be harmed by fire, but for most conditions oak either benefits or is not affected by fire (see Figure 1 below). Figure 2 depicts the effects of multiple burns on oaks. In the Pine Creek project we are not only managing for several species of oaks but many other trees, shrubs, forbs, grasses and associated wildlife that benefit from the effects of fire.

Figures From: Fire in Eastern Oak Forests: Delivering Science to Land Managers

Proceedings of a Conference November 15-17, 2005 Fawcett Center The Ohio State University, Columbus, Ohio. General Technical Report NRS-P-1, page 124.

Comment: From April 17, 2007 newspaper article in the *Portsmouth Daily Times*.
The effects of smoke on humans are well known and have been documented in studies such as "Human Health Impacts of Forest Fires in the Southern United States: A Literature (Haynie pg 15) Review," by Cynthia T. Fowler Journal of Ecological Anthropology (Vol. 7, 2003; www.treesearch.fs.fed.us/pubs/6467). Fine particulate matter— smoke particles less than 2.5 micrometers in diameter (PM2.5)—can cause minor irritations such as burning eyes and runny nose, cause illnesses such as bronchitis, and aggravate chronic heart and lung diseases and bring about premature death in people with these conditions.

The economic effects of these health problems are the subject of the paper "Economic Analysis of Health Effects from Forest Fires," which was published in the Canadian Journal of Forest Resources (Vol. 36, 2006). The Forest Service states unequivocally that fire is good for oaks – fire is good for Ohio, but there is no scientific certainty.

Issue: Prescribed burning produces smoke which has known health effects on people and additional economic consequences.

Response:

See response above to issues on air quality and prescribed burning. The WNF has set the standard in Ohio for mitigating smoke concerns (see Project File 10-2).

We have reviewed the article published in the Canadian Journal of Forestry and it deals with an almost 300,000-acre wildfire that burned for a week in May of 2001. There are substantial differences in the amount and control of smoke produced by a large wildfire and a 200-400-acre prescribed burn. A wildfire will continue producing smoke 24 hours a day, regardless of the atmospheric conditions that would be carefully estimated for a prescribed burn. There is a calculated ending point to ignition in a prescribed burn to coincide with diurnal wind and surface temperature changes. This is not possible with a wildfire. Predicted wind direction and lift are closely monitored during a prescribed burn, which is not possible for a wildfire. All effect the direction and settling of smoke on populated areas.

While we cannot dispute the health effects of wood smoke, we do not feel the conditions are similar enough to apply the costs as quoted in this article. We take steps to mitigate the effects of smoke on local residents, as described in Project File 10-2 and 10-16. According to Ohio EPA, "With respect to the 24-hour standard (original or revised), the procedures in the Smoke Management Plan (and currently followed in most burn plans) are designed to minimize ambient impacts (and maximize safety) by indicating the appropriate meteorological conditions for each size burn. These procedures, along with the proper notification of potentially impacted citizens and the avoidance of sensitive receptors, provide for a proper approach to minimize short term human impacts."(see Project File 10-16)

Comment: Recent work at the Harvard Forest emphasized the variety of opinions on the importance of interactions between fire and oaks in the Northeast. Parshall and Foster (2002) generally discounted the importance of fire relative to climate and soil factors as influencing

regional variation in the vegetation of the oak region of southern New England. But Foster et al. (2002) postulated that fire is important, albeit at lower levels than along the coast, in maintaining oak and chestnut forests in central Massachusetts. From THE PALEOECOLOGY OF FIRE AND OAKS IN EASTERN FORESTS, William A. Patterson III. Fire in Eastern Oak Forests: Delivering Science to Land Managers. Proceedings of a Conference. GTR-NRS-P-1.

Issue: Fire does not have a conclusive benefit to oaks.

Response:

Two studies that indicate opposing views of the issue does not mean there is a great scientific debate. A more comprehensive review of the literature and comparison of the effects of fire on oaks is the study cited and summarized above by Brose et al from the same conference proceedings that the commenter cites. Brose et al and the studies cited in the Botany and Wildlife BE's indicate that there are many studies that find beneficial effects to oaks and that fire benefits many other plant and animal species as well.
In the Pine Creek project we are not only managing for several species of oaks but many other trees, shrubs, forbs, grasses and associated wildlife that benefit from the effects of fire. The literature cited in Appendix 1 of the Botany BE, pages 62-66 also support the use of fire to maintain diverse plant and animal communities. The Botany and Wildlife BE's also discuss and analyze how several rare species of plants and animal are also expected to benefit from the reintroduction of fire.

Comment: The prescribed burning will take place between December and April. What science supports that this is the most effective time for burning? Is this historical? Would historical, natural fires occur in winter (Haynie pg 15)?

Response:

The table in Project File 10-10) shows 28 fires, 26 were from 1870-1933. We determined that these were fires from basal cross-sections of trees that had fire scars. As you can see, nearly all fires occurred in the dormant season (between annual growth rings), which is from October to mid-April. This is from a paper that is "in press". Hutchinson, T.F., Long, R.P., Ford, R.D., and Sutherland, E.K. Fire history and the establishment of oaks and maples in second growth forests. Canadian Journal of Forest Research.

From this, we do know that these fires occurred in stands (usually young) that subsequently developed into oak forests. Is the dormant season the "best" time to do prescribed burning? That is still much less sure. Research has shown that perhaps the most effective time to burn for silviculture (more oak less maple) is when the maples have leafed out in the spring but the oaks have not - about late April in southern Ohio.

There is also some information going farther back (pre-settlement) for a couple of areas (Ozarks, Maryland) showing that dormant season fires predominated then as well (1600s up to early 1800s. Response provided by Todd Hutchinson, NEFES.

Table occurs in Project File 10-10.

Comment: Prescribed fire and logging actions impact the resource acorns by reducing them. Acorns are a resource for reproducing oak trees and providing food for various animals from worms to deer. Empty acorn shells provide housing for some ant species. Prescribed fire directly

kills acorns on the ground. Logging kills acorn-producing trees. Clear cut logging destroys habitat for acorn sprouting, reproduction and regeneration (Lund pg 8).

Response:

Please see Table of Proposed actions in the EA, Chapter Two:
a) we are not clear-cut logging;
b) logging in general increases light availability which oaks will respond to if there is not much competition from maple and other species (but that's where fire comes in);
c) acorn production could be enhanced by thinning and burning. See citations from Brose and Van Lear 1998, Van Lear and Watt 1992, Abrams, M.D. 1992, Abrams and Nowacki. 1992, Fischer, B. C. 1979, etc in Project File 4-11.

Comment: Commenter feels it is crazy to do fire in areas where there are now one and two year old seedlings which would be totally killed by fire, not having had enough time to develop a big enough root system and root crown buds which could resprout. In 2007 seedlings are likely stressed and vulnerable to further stress. (Lund pg 9)

Response:

See response to question 8 under ecological conditions on page 5 above.

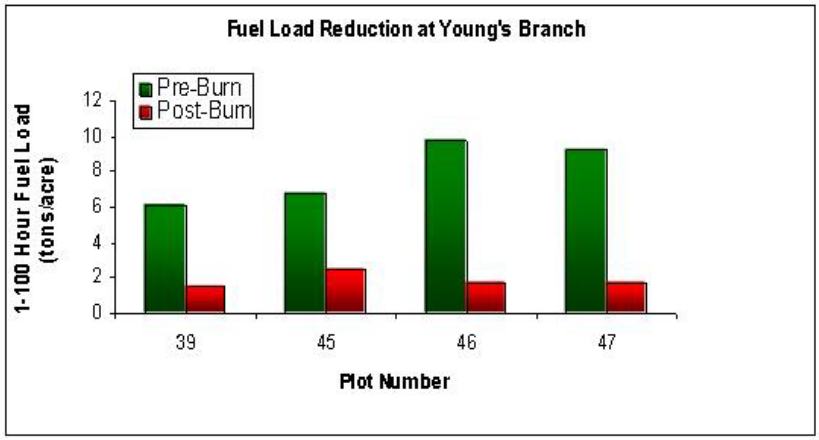
Comment: Getting money is a bad reason to burn or log a native forest. Pushing to conduct prescribed fires in the face of ecological data which shows that fire would have negative consequences for oak reproduction helps confirm the belief of many of us that salary and program money are driving these management programs (Lund pg 9). Getting money is not the purpose for the Forest Service proposing to carry out a prescribed burning project.

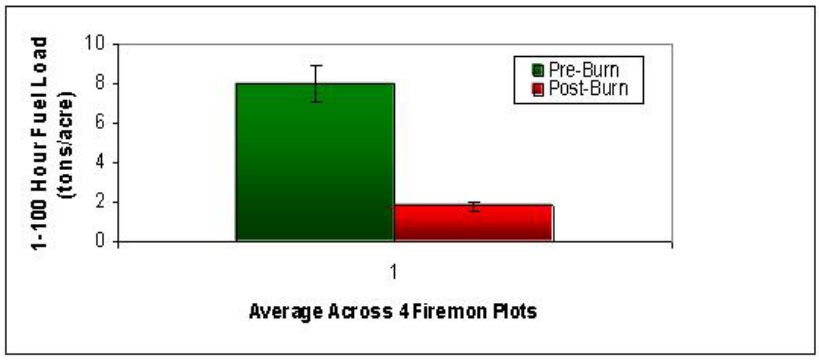
Response:

Prescribed burning is done for ecological restoration and fuels reduction purposes, as we have demonstrated in the analysis documents (see EA Chapter One). The Pine Creek analysis area differs greatly from the desired future condition described in the Forest Plan (Forest Plan, page 109). Prescribed fire is one tool that can be used to move toward the Desired Future Condition.

Also, due to the ice storm of 2003 there are heavy loads of fuel in the Pine Creek area. Based on permanently established monitoring plots in the Pine Creek project area fuel loads averaged 26 tons/acre and ranged from 12-48 tons per acre. Wildfires, such as the Binion Fire of 2005, can burn extremely hot in these high fuel loading areas and can cause erosion and invasive species problems. A wildfire burning through heavy fuel loads will also threaten people and homes in the wildland-urban interface. Prescribed burning can help reduce these risks by consuming fuels under controlled and safe conditions so that a wildfire moving through area that has been burned has less fuel to consume.

Data from Young's Branch fuels monitoring plots show that prescribed fire is effective at reducing amount of fuel loading (see figure below). A Young's Branch prescribed fire in the spring 2007 reduced 1, 10 and 100 hour fuels by 77%. 1000 hours fuels, large coarse woody debris, which are used by many wildlife species, were not statistically significantly lowered by the burning activity. Thus prescribed fires can not only restore ecosystem health and diversity, but can also reduce the risk of catastrophic fires by lowering fuel loads.





Comment: Prescribed fire has a killing impact on the resource composed of the living forest blanket called "litter", which is an absolutely essential component of the forest ecology. It is a main part of the nutritional cycle. The material shades, insulates and protects soil, soil life and plant roots. Leaves take about two years to decompose into substances available for plant nutrition. Leaves are nearly 100% consumed by even the least of fires. One fire starves that area of the forest of food for two years. Interfering with and reducing the nutritional basis of the forest isn't good for any of the forest life, including the trees. Burning this critical part of the forest makes no ecological sense (Lund pg 9-10).

Response:

The commenter does not depict an accurate assessment of how most prescribed fires and most wildfire treat the litter layer. Most prescribed fire used in restoration or fuel treatment areas follows a mosaic pattern. See Project File 10-11 for the infrared landscape images as presented by Renken 2005, in Fire in Eastern Oak Forests: Delivering Science to Land Managers. *Proceedings of a Conference*. This image shows a mosaic pattern and that some areas in a prescribed burn are left un-burned. Also, nutrients that are in leaves are actually released during the burn. Leaves from the fall following the burn then "re-colonize" the litter layer. Because of the nutrient release after burning and because leaves fall again on the forest floor, a fire does not starve an area of nutrients.

According to Boerner 2000, fires in the central hardwoods are typically low in intensity and consume primarily the unconsolidated leaf litter. As long as the fire can move across the

open forest floor, soil temperatures generally do not increase enough to cause significant heating-induced mortality among soil-dwelling organisms. Soils under smoldering piles of woody fuels may be subject to sterilization. Low fire temperatures also prevent nitrogen volatilization from being a major source of nutrient loss. The microclimate at the forest floor surface is probably affected significantly and this may produce phenological changes in root growth and microbial activity.

Base cations released from dissolving ash may or may not increase soil pH and cation availability, depending on the nutrient status of the soil and the amount of ash deposited. Nitrogen availabilty typically increases after one or a small number of fires but may decrease over the long term.

Abundances of soil animals in the forest floor are reduced by fire whereas those in the mineral soil are affected little. Based on limited research, the below-ground impact of low intensity, dormant season fires in the central hardwoods is likely to be less than the impact aboveground, though considerably more research is needed.

Boerner, Ralph E.J. 2000. Effects of Fire on the Ecology of the Forest Floor and Soil of Central Hardwood Forests. In Proceedings: Workshop on Fire, People, and the Central Hardwoods Landscape. GTR-NE-274

Figure 1.—Results of a prescribed burn where not all the litter and woody debris was eliminated.

Comment: Commenter points out a disconnect between the burning permit to Ohio EPA for the Young's Branch prescribed burn in which the purpose is given as hazard fuel reduction, whereas in Pine Creek (Chapter One pg 5) 'The long-range goal of the proposed management activity is to create an open forest dominated by large, widely-spaced mast producing trees, in which a broad ecological diversity of vegetation and wildlife occupy the landscape. Burns are one way to achieve this historic park-like forest. Commenter states the public has a right to be properly confused. Calling the forest's food layer hazard fuel is a deceitful way to justify burning (Lund pg 11).

Response:

Objectives for prescribed burning can include multiple goals. Fuels reduction and restoration goals can be met simultaneously. Also, the Young's Branch Special Area (see

Project File 5-11), though with-in the Historic Forest management area, is a separate management unit and therefore can have different management objectives.

Comment: Many species of reptiles, amphibians, rodents, spiders, moths, beetles, other insects and various invertebrates dependent on the leaf and other material on the forest floor will be burned. (Lund pg 14) Fire research has not studied effects on and survival of the above animal groups.

Response:

Fire research has indeed studied the effects on and survival of animal groups. Renken (2005) and Rieske-Kinney (2005) in Fire in Eastern Oak Forests: Delivering Science to Land Managers. Proceedings of a Conference summarize current literature on this subject. Rieske Kinney concluded that:

> **"Although soil- and litter-dwelling arthropod abundance is affected by prescribed burning, arthropod diversity and richness are not. Litter arthropod evenness increases in response to burning, most likely due to reductions in mites and collembolans, the two dominant taxa."**
>
> **The author points out later on in the article that large mobile arthropods are not affected by fire but that less mobile arthropods (e.g. Coleopteran larvae) functioning on the forest floor can suffer population declines, though this has been studied only 1 year after burning.**

Based on the scientific literature Renken found that:

> **"Current data suggest that fire results in little direct mortality of amphibians and reptiles. Fire has no effect on overall amphibian abundance, diversity, and number of species in comparisons of burned and unburned plots, though salamander numbers tend to be greater in unburned plots. Current research also suggests that fire has no effect on reptile abundance, diversity, or number of species except in several studies in which lizard abundance was or tended to be greater in burned plots. The season of burn seems to make no difference in amphibian and reptile response."**

Even though the literature indicated that fire has minimal effects, burning in mosaic patterns in Pine Creek and not forcing fire into mesic slopes will lessen any long-term affects to insect and herptile populations.

See Silvicultural Prescription (Project File 4-7) :

> **Fire helps to control insect predators of acorns and new seedlings. Insect pests act as primary invaders, secondary ivaders, parasites, or scavengers on or in acorns. Many of these insects spend all of part of their lives on the forest floor. Infestations, which can vary from year to year and even from tree to tree in some areas, are a major contributor to the oak regneration problem. Annually, about 50% of the acorn crop in Ohio is destroyed by the larvae of Curculio weevils, acorn moths, and gall wasps. However, recent studies**

indicate that prescribed burning may reduce populations of oak insect pests when conducted under proper conditions. A reduction in insect predation would allow more acorns to be scattered and buried by jays and squirrels. This enhances the probability of successful germination and helps subsequent seedlings become established. Burning may also reduce rodent habitat, eliminating another source of acorn predation (Van Lear, Watt 1992).

Comment: EPA and the FS should determine what kind of smoke pollution is caused by burning tons of animals (in the forest floor) (Lund pg 14). Burning dead animals is against the law anytime, anywhere in Ohio. This law is overlooked by both OEPA and the FS.

Response:

See answer to # 8 above. See also Boerner 2000 in Project File 10-12. See also Wildlife responses.

Comment: Research is inconclusive for the stated purpose of the prescribed fires. FS is jumping from 50-acre study plot burns to 2,875 acres of contiguous burning. That's bad use of science, or the lack of science (Lund pg 15).

Response:

It is unlikely that all 2,875 acres will be burned at one time, in one season or in one calendar year. Current burning practice at Ironton is to burn one, two, or three 100 to 250-acre burn units in one burning window. There is often only one burning window during a spring or fall season. See the Map titled "Fire Analysis Burn Units" to see the eight individual burn units in the analysis area. Burning occurs in a mosaic pattern strongly influenced by moisture availability, so any size burn unit will include many acres unburned or very lightly burned.

Herbicides (glyphosate)

Comment: Heartwood is worried about the effects of this logging and road building on water, soil, wildlife, water, air and recreation. For example, soils: A fraction of the glyphosate that reaches the roots of a sprayed plant actually leaks out, in active form. This secreted glyphosate can even be taken up by roots of adjacent plants, causing damage. So contrary to common claims, not all glyphosate is rapidly adsorbed to soil particles at the surface and broken down quickly by microorganisms. Some of it maintains activity near the roots of plants.

Response:

The application of Glyophosate and other herbicides will follow the procedures and protocols listed in Appendix 4 of the Botany BE. Using these procedures Wayne National Forest biologists determined that the non-target effects of herbicide application will be minimal (NNIS EA 2007). Spot applications of glyphosate as proposed in the Pine Creek project to control NNIS and undesirable woody native species in upland sites will not have the far reaching effects hypothesized by the commenter.

See also Herbicide Impacts, Project File 4-16.

Comment: Microorganisms living around roots—in the rhizosphere—are crucial for converting minerals into forms plants can use, protecting plants from pathogens, and so on. When glyphosate leaks into the rhizosphere from roots of sprayed plants, it affects the numbers and types of microorganisms present, because again, contrary to popular belief, green plants are not the only organisms sensitive to glyphosate (Haynie pg 16).

Response:

The Forest Service Risk Assessment (SERA 2003) examined the available literature on the effects of glyphosate to different organisms. On page 4-7 the author summarizes the literature:

> **"As noted in Section 3.1.15.1, glyphosate is readily metabolized by soil bacteria with AMPA as a major metabolite. In addition, many species of soil microorganisms can use glyphosate as sole carbon source (Dick and Quinn 1995a; Dick and Quinn 1995b; Dotson et al. 1996; Wardle and Parkinson 1992a). Microorganisms, like higher plants, do have the shikimate pathway for the production of aromatic amino acids. Since glyphosate inhibits this pathway, toxicity to microorganisms may be expected (Cox 2002; Issa 1999). As noted in Section 3.1.2, glyphosate has been considered as an antimicrobial agent for human pathogens. Nonetheless, there is very little information suggesting that glyphosate will be harmful to soil microorganisms under field conditions and a substantial body of information indicating that glyphosate is likely to enhance or have no effect on soil microorganisms (Busse et al. 2001; Wardle and Parkinson 1990a,b; Wardle and Parkinson 1991)."**

While harmful effects to soil microbes are possible most studies suggest soil microbial activity may be temporality enhanced or not affected by glyphosate. Since spot applications, rather than broadcast applications will be used in Pine Creek, these effects will be further minimized.

SERA. 2003a. Glyphosate - Human Health and Ecological Risk Assessment - Final Report. Prepared for USDA Forest Service, Forest Health Protection, March 1, 2003. Available online at: http://www.fs.fed.us/foresthealth/pesticide/risk.shtmll