Economic Analysis of the 2006 Wayne National Forest Plan

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By GreenFire Consulting Group, LLC

Commissioned by Heartwood

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DEDICATION

This report is dedicated to Claude Ferguson. As the former Supervisor of the Wayne/Hoosier National Forest, Claude had been punitively transferred and harassed for blowing the whistle on Forest Service misdeeds in the design of proposed motorcycle trails in the Hoosier National Forest. As a disciple of Aldo Leopold, and as someone who had a deep and abiding love for the hardwood forest and a commitment to its attentive and respectful care, Claude had a thorough understanding of the complexity of the forest and the requirements of forest-dependent species, because truth be told, he was one himself.

ACKNOWLEDGEMENTS

This study would not have been possible without the assistance of a number of Heartwood members who have devoted much of their lives to the protection of our region's hardwood forests. Special thanks go to the following people who kindly shared information and insights: Mark Donham, David Maywhoor, Andy Mahler, David Nickell, Steve Chaplain, Ernie Reed, Jim Scheff, Jim Bensman, Gwen Marshall, Tom Buchele, and Sarah Mincey.

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Abbreviations

ASQ	Allowable Sales Quantity
ATV	All Terrain Vehicle
BLM	Bureau of Land Management
DFC	Diverse Continuous Forest (Management Area)
DFCO	Diverse Continuous Forest with OHV (Management Area)
DR	Developed Recreation (Management Area)
E_{mod}	Alternative E modified (Preferred Alternative in 2006 WNF Plan)
EIS	Environmental Impact Statement
FEIS	Final Environmental Impact Statement
FOF	Future Old Forest (Management Area)
FOFM	Future Old Forest with Mineral Activity (Management Area)
FOIA	Freedom of Information Act
FY	Fiscal Year
HF	Historic Forest (Management Area)
HFO	Historic Forest with OHV (Management Area)
LRMP	Land and Resource Management Plan
MMS	Minerals Management Service
MUSYA	Multiple Use Sustained Yield Act
NEPA	National Environmental Policy Act
NFMA	National Forest Management Act
NNIS	Non-Native Invasive Species
OHV	Off Highway Vehicle
ORV	Off Road Vehicle
RC	River Corridor (Management Area)
ROD	Record of Decision
RPA	Renewable Resources Planning Act
TSPRIS	Timber Sale Program Information Reporting System
USDA	United States Department of Agriculture
WNF	Wayne National Forest

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I. Introduction and Summary of Findings

A. Introduction

This White Paper, developed by GreenFire Consulting Group, LLC and commissioned by Heartwood, contains a comprehensive economic analysis of public benefits and costs from the Forest Service's 2006 Plan for managing the Wayne National Forest (WNF) over the next 10 years.

The WNF has the potential to become the jewel of southeastern Ohio. Covering 238,000 acres of unglaciated Ohio hill country, it is the only national forest in the entire state. About 12 million people live within 100 miles of the Wayne. Ohio ranks seventh among the states in population but only 47th in public lands (Federal and State) per capita.

Yet under the management of the USDA Forest Service, the WNF has continued to be a sacrifice zone for extractive industries, including logging, strip mining, oil and gas drilling. Its hills are scarred with clearcuts, crisscrossed with power lines, torn up by ORVs, and the water flowing through its creeks and rivers is tinted orange with mining waste.

The WNF, managed for its highest values — water filtration and flow regulation, air purification, tourism, biodiversity and carbon sequestration — could become a great natural asset to the State of Ohio and to the nation. Yet, by implementing the 2006 WNF Plan, the Forest Service continues to degrade and diminish this natural asset. The 2006 WNF Plan has declared 161,752 acres—almost 70 percent of the WNF area—as suitable for timber production and proposes to log 18,441 acres over the next decade—not including salvage logging. In addition, the Forest Service plans to burn 46,215 acres for an unproven "Oak regeneration" program and 21,904 acres to reduce questionable "hazardous fuels" risks. Almost 11,000 acres of forest land may be sprayed with herbicides, 1,250 acres opened to surface coal mining, and 121 acres to oil and gas well development. We may see about 180 miles of new temporary and permanent roads.

The sum of extractive and destructive activities proposed in the 2006 Forest Plan will lessen the attractiveness of the forest and will negatively impact tourism. They will also diminish the capacity of the WNF to deliver "ecosystem services" such as water purification performed by the natural filtration systems of the earth and carbon sequestration provided by the trees and other forest plants. These ecosystem services have a much higher value to society than the timber that is taken out.

In addition, cutting timber, digging for minerals, drilling for natural gas, and building ORV trails costs more in purely financial terms than what the Forest Service receives in revenues from those activities. Consequently, they create a financial loss to the taxpayer. The Forest Service justifies this double–negative with supposed benefits of "ecosystem management," "oil independence," and "tourism niche marketing," as well as benefits to the local economy.

However, as our analysis shows, it is questionable whether the 2006 WNF's Land and Resources Management Plan (LRMP) provides any net benefits to the public.

The failure of the Forest Service to manage the WNF according to what would maximize net public benefits is rooted in a system of financial incentives established by Congress. This system of incentives is operative in other national forests as well. Since the failure of the WNF Plan to maximize net public benefits derives directly from Congress, only Congress, through the urging and support of the citizens of the United States, can fix it.

We hope to move this process along by providing the U.S. Congress and concerned citizens with a proposal for reforming the WNF system (please see our Recommendations Section at the end of the document) in a way that gives agency managers an incentive to reduce public costs and increase the value of the resources under their management, thus providing numerous benefits to the public that only standing forests can provide.

In our view, this analysis is not an endpoint, but rather a beginning. We offer this analysis as a framework based on simple, but powerful, principles of economic reasoning, and we illustrate how this framework can be put to use in evaluating the management of this nation's forests. It is our hope that others use this framework and expand on any aspects that we could not fully develop. We hope that this report will alter the debate over the management of national forests by putting a strong focus on identifying the highest values and benefits that forests can provide to society and by exposing what is sacrificed when forests are not managed for these highest values.

B. Summary

1. The main question we tried to answer in this White Paper is whether the programs and activities envisioned in the 2006 WNF Plan are likely to maximize net benefits to the public from the WNF, which covers 238,000 acres in southeast Ohio. This involves looking at both monetary and non-monetary costs and benefits associated with implementing the plan over ten years.

2. We started our analysis of public benefits generated by implementation of the 2006 WNF Plan by identifying four threats to national forests that are pointed out in the two latest USDA Forest Service Strategic Plans. The Strategic Plans set national priorities and give guidance for planning on individual national forests. We assumed that major public benefits (or reduction of public costs) would result from addressing these four threats on the WNF.

3. We also identified five forest ecosystem services as having the potential to create high-value public benefits: Providing air purification, water supply and purification, carbon storage and sequestration, recreation, and safeguarding biodiversity.

4. We then evaluated the information provided in WNF Planning documents, including the Final Environmental Impact Statement (FEIS), the Land Resources and Management Plan (LRMP), and the Record of Decision (ROD), to determine how well the WNF Plan addresses the four major threats identified in the latest USDA Strategic Plans, whether the Plan improves the capacity of the WNF to provide ecosystem services, and what the costs are associated with achieving those benefits.

5. The first threat identified in the two latest USDA Strategic Plans is the risk of loss from catastrophic wildland fire caused by hazardous fuel buildup. The UDSA Strategic Plan recommends consideration of risks, acknowledging that the severity of the damage from fire, and therefore the need for fuel reduction programs, can differ from one location to another. We found that the 2006 Forest Plan fails to establish the risk of forest fires on the Wayne and does not give any indication of the value of potentially protected structures or assets. Consulting other sources, it became clear that risks and potential damage from forest fires are low on the WNF and that ignition of structures during forest fires is most effectively prevented by home-site protection within a small radius of the home. Yet, over the next 10 years, the Forest Service is planning prescribed burns on 21,904 acres and 10,181 acres of mechanical treatments to address a minimal wildland fire risk that can be dealt with more effectively through other measures. Adding to this the environmental impacts resulting from large scale burn programs, we came to the conclusion that the WNF hazardous fuel reduction program creates a net public loss.

6. The second threat identified by the USDA Strategic Plans is the introduction and spread of non-native invasive species (NNIS), which degrade habitat for many endangered species and diminish biodiversity. The WNF FEIS elaborates on how logging, burning, mining, road and trail building, off highway vehicle (OHV) use and other recreational activities create conditions favorable to NNIS on 117,721 acres of the Forest. At the same time the FEIS states that an estimated 94,000 acres of WNF land are already infested with NNIS. This contrasts with projected NNIS treatments on only 1,900 acres of the forest over ten years. Therefore it seems reasonable to conclude that the WNF Plan creates more NNIS problems than it can expect to solve—even considering the use of precautionary measures designed to slow down the

introduction and spread of NNIS from logging, burning, mining, etc. Therefore, no net public benefits can be expected from the WNF Plan regarding NNIS.

7. The third threat identified in the UDSA Strategic Plans is the fragmentation of forests. While the WNF FEIS acknowledges the need for large, continuous blocks of interior forest for some species of birds, it doesn't embrace the unique role that national forests have in safeguarding and expanding this habitat not just for a few birds, but for many other species that currently cannot even be found on the WNF. The FEIS does not provide any concise and comprehensive information on the current status of interior forest fragmentation on the WNF and provides only scattered and incomplete information on how fragmentation will develop as a result of the 2006 WNF Plan. However, the information that could be gleaned from the FEIS and the LRMP shows that there will be increased fragmentation of larger blocks of interior forest on at least 63 percent of the forest. This is mainly as the result of logging, road and trail building, and mining. We came to the conclusion that the WNF Plan does not provide the public with the net public benefit that would result from increased availability of large, continuous interior blocks of forest. However, the Plan does provide for increased availability of some continuous early successional habitat.

8. The fourth threat identified by the two latest USDA Strategic Plans is unmanaged recreation, particularly the unmanaged use of off highway vehicles (OHV). The WNF FEIS acknowledges the existence of illegal trails on the WNF, and states that there are a number of factors contributing to illegal OHV activity, including too few law enforcement officers, lack of signage for official trails, lack of a program to educate trail riders about OHV policies, and no established trail patrol program. But neither the current extent of illegal trails nor the actions planned to remedy the problem are clearly outlined in the WNF Plan. The Plan talks about possibly integrating some of the illegal trails into the official trail system, thereby expanding it, claiming that some of the illegal activity may result from not having available a sufficient number of official trails. Based on that same line of reasoning – that illegal OHV activity can be curbed by developing a system of official OHV trails – the 1988 WNF Plan opened up the WNF for official OHV use. The 2006 FEIS does not offer any evaluation of whether this approach was successful in reducing illegal activity, or whether illegal activity then actually expanded. The WNF Plan doesn't provide enough information to determine whether it may achieve the public benefits of curbing illegal OHV activity, or what costs (including the costs of closing and rehabilitating illegal trails, or integrating them into the official trail system). Whether the Forest Service will be able to curb illegal OHV usage on the WNF and create a public net benefit for society is therefore an open question.

9. To assess the value of the ecosystem services provided to the public by forests such as the WNF, economists have developed various techniques that allow them to put a dollar value on services that are not traded in markets. There is now a big body of peer-reviewed and non peer-reviewed literature that covers many ecosystem services provided by temperate forests. By using a widely accepted method, the value-transfer approach, we were able to provide a rough estimate of the total value of ecosystem services provided by the WNF, which amounts to an average of $381 million per year from ten different ecosystem services. The highest value comes from providing habitat that is not available or extremely rare on private lands, followed by purification of the air, stormwater control, carbon sequestration, and soil retention. The per acre/per year

values we used are from "The Economic Value of New Jersey State Parks and Forests."[1] Another study, "Valuing New Jersey's Natural Capital: An Assessment of the Economic Value of the State's Natural Resources"[2] provided an insight into different components that make up the total ecosystem value of a forest. This study distinguished between the value of forest land, forested riparian areas, and forested wetlands. It showed that the value of wetlands is almost ten times, and the value of forested riparian buffers more than two times the value of other forest land. Ecosystem goods, on the other hand, such as timber, have dramatically lower values per acre per year than ecosystem services. They were valued at $250 or lower per acre per year, whereas all ecosystem services combined were valued at an average of about $1,800 per acre per year.

10. In analyzing how the WNF Plan impacts the capacity of the forest to provide air purification services, we found that Southeast Ohio has one of the highest air pollution levels in the nation and that four WNF counties are in non-attainment with regard to particulate matter. This indicates serious consequences for the health of county residents. Rather than vigorously expanding the capacity of the forest to provide air purification services, the WNF Plan adds pollution to the air and diminishes the forest's capacity for air purification. Air pollutants are mostly added by prescribed burns on 68,119 acres over the next ten years (justified with hazardous fuel reduction and oak hickory restoration) and by OHV use. In EPA's Region 5, which includes Ohio, nine percent of particulate matter (PM) pollution is estimated to come from OHV (compared to five percent from highway vehicles). In addition, 19 percent of volatile organic compounds (VOC) and 19 percent of nitrogen oxide (NOx) also come from OHV. On top of adding more pollution to the already heavily polluted air, the WNF calls for logging on 18,441 acres, taking out older trees which have much higher capacity to purify the air than younger trees. Trees will also be removed to accommodate roads, trails and mining operations (on 2,230 acres). We cannot tell whether, on balance, a public net loss or a public net benefit is generated by the Plan regarding air purification services, since it was beyond our ability to estimate the additional value generated by the trees that are left standing and growing. However, it is clear that the 2006 Forest Plan does not maximize net public benefit with regard to air purification services over the next ten years and will limit the provision of this service over decades to come, since 161,752 acres of the WNF have been declared suitable for timber production. This means logging will eventually limit tree growth and delivery of air purification services on almost 70 percent of the forest in the long run.

11. With regard to water supply and filtration services, we again found that the 2006 WNF Plan both contributes to existing high levels of pollution and diminishes the capacity of the forest to purify water. Additional pollution can be expected from logging (on about 18,441 acres), mining, trails, roads, and recreational facilities (on 2,230 acres), burning (on 68,119 acres), other ground-disturbing activities (for example from utility lines), from legal and illegal use of OHV, and other high-impact forms of recreation. In addition, the capacity of the forest to provide much-

[1] Mates, William J., M.S. and Jorge L. Reyes, M.F., *The Economic Value of New Jersey State Parks and Forests*, New Jersey Department of Environmental Protection Division of Science, Research & Technology, Issued June 2004, Revised version issued November 2006. http://www.nj.gov/dep/dsr/economics/parks-report.pdf

[2] State of New Jersey, Department of Environmental Protection, *Valuing New Jersey's Natural Capital: An Assessment of the Economic Value of the State's Natural Resources.* http://www.state.nj.us/dep/dsr/naturalcap/

needed water purification services is diminished by logging and prescribed burns, which can happen even in the riparian areas that most contribute to water purification. However, there are also positives, since the Forest Service is planning some mine reclamation and soil stabilization projects that will make a positive contribution to water quality. We cannot tell whether on balance, a public net loss or a public net benefit is generated by the Plan regarding water services, especially since it was beyond our ability to estimate the additional value generated by forest that is left standing and growing. However, it is clear that the 2006 Forest Plan does not maximize net public benefit with regard to water supply and purification services, and that the delivery of these services will be limited in the long run by declaring almost 70 percent of the forest suitable for timber production.

12. Global Climate Change is one of the most serious environmental, social, and economic threats the world is facing today. The warming of the atmosphere is linked to increased concentrations of so-called greenhouse gases, including increases in carbon dioxide from changes in land management. Even though forests in the U.S. have acted as net carbon sinks since the 1950s, the annual additions to the sink (sequestration) appear to be declining. The Environmental Protection Agency lists the following forestry practices that can sequester carbon or preserve carbon storage: Afforestation, reforestation, avoided logging, and longer harvest-regeneration cycles. Obviously, planned logging and burning and taking out vegetation for other reasons do not increase the capacity of the WNF as a carbon sink. There may be benefits from reforesting mine land and newly acquired forest land. The WNF Plan neither addresses the WNF potential for carbon storage and sequestration (and their potential economic value) nor analyzes potential impacts from Global Warming on the Forest. We cannot tell whether on balance, a public net loss or a public net benefit is generated by the Plan regarding carbon sequestration and storage. It was beyond our ability to estimate the additional value generated by forest that is left standing and growing. However, it is clear that the 2006 Forest Plan does not maximize net public benefit with regard to storing and sequestering carbon, and that the delivery of these services will be limited in the long run by declaring almost 70 percent of the forest suitable for timber production.

13. Just because the WNF Plan does not maximize net public benefit regarding specific ecosystem services, does not necessarily imply that the Plan as a whole with all of its different aspects creates a net public loss, or fails to maximize overall net public benefits. However, to offset a net loss in one area, there has to be a net benefit somewhere else that is big enough to offset the loss (or a reduced benefit). The Forest Service justifies prescribed burns and timber operations, the biggest contributors to ecosystem service losses, as management tools to reduce hazardous fuel loads, to maintain oak hickory forest cover, and to create more early successional habitat. These are supposedly tools to enhance biodiversity in the forest. An important part of the study, therefore, was to establish whether the benefits provided from reducing hazardous fuel loads, from maintaining oak hickory forest cover, and from creating more early successional habitat are sufficient to offset the losses created by the Plan with regard to ecosystem services. We have already analyzed prescribed burns as a tool to reduce fuel loads on the forest and have come to the conclusion that this program produces a net public loss itself. Therefore, it cannot be used as a justification to offset net losses and the failure to maximize net public benefit regarding ecosystem services related to air, water, and climate. The Forest Service can rightly claim that its

management for oak hickory and early successional habitat will benefit some species by providing for their habitat needs. The crucial question with regard to net public benefit, however, is not whether there are some benefits, but whether the benefits outweigh the costs, and whether net benefit is maximized. Given limited resources, including a limited amount of land, efforts to maintain or improve habitat for biodiversity have to be economically and ecologically wise, and focus on habitat and species that are most rare. The Forest Service is not making a convincing case in its planning documents that maintaining oak hickory Forests is connected to any public need, and why this forest type, that can only be maintained through ongoing logging and burning, should be preferred to allowing natural processes to re-establish themselves. Large, continuous blocks of interior old growth forest are the scarcest type of forest habitat, yet the Forest Service chooses to increase, rather then decrease the fragmentation of that habitat, to provide greatly increased opportunities for the spread of NNIS, which are one of the major threats to native biodiversity, and to provide more early successional habitat which, comparatively, is in plentiful supply on private forest lands in the Eastern United States. With regard to some species, especially the endangered Indiana bat, and several other federally listed species, the Forest Service claims that they will benefit from the 2006 WNF Plan, and that the admitted short term negative effects on these species will be offset by long-term benefits from improving their habitat. But this statement is belied by the fact that the habitat modification program envisioned by the Forest Service will have to go on as long as the Forest Service upholds the maintenance of oak hickory cover and of unnaturally large areas of early successional habitat as a desirable goal. That this is indeed a long-term goal, can be concluded from the fact that nearly 70 percent of the WNF have been declared suitable for timber production, which means that “short-term” impacts on these species will be generated over decades in different parts of the forest, as the Forest Service accommodates commercial timber extraction. We have come to the conclusion that the Forest Service does not establish a public net benefit with regard to enhancing biodiversity. Therefore, contrary to the claims of the Forest Service, there is no net benefit from logging and burning that could offset losses with regard to other ecosystem services.

14. Recreation is considered as an ecosystem service provided by forests. Mining, logging, and burning create conflicts with the use of the forest for recreation. Conflicts can come from noise pollution, smoke, and visual degradation. In addition, different forms of recreation can conflict with each other. For example, OHV usage may disrupt other, less intrusive forms of recreation, like hiking and wildlife viewing. But all forms of recreation may have more or less severe environmental impacts. Which forms of recreation will provide the highest net benefit to society? They are the ones that attract the most users and create the highest consumer surplus, while having low impact on the environment and other uses of the forest and while being inexpensive to provide. On the WNF, nature viewing, hiking sightseeing, and picnicking are the most popular outdoor recreation activities. This is in line with what is most in demand in the region and the rest of the nation. These activities have comparatively low costs and low environmental impact. Yet it seems that OHVs, that have high environmental impact, probably create the most conflicts with other users, and are associated with high costs for trail construction, maintenance, monitoring and enforcement, receive the most attention in the WNF Plan in terms of additional, very expensive trails over the next ten years. While some additional hiking trails are also proposed in the Plan, there is no strong focus on developing low impact, nature based recreation

activities. We therefore conclude that the Plan is not creating a net public benefit with regard to recreation.

15. Why is the Forest Service so keen on maintaining oak hickory forests and creating early successional habitat on the WNF? Why is the Forest Service allowing mining and highly destructive forms of recreation, given all the negative impacts these activities have? And why, on top of all that, does the Forest Service actually pay millions of dollars of taxpayer money to subsidize private logging, mining, and OHV use on WNF land, as we showed with budget data obtained through a Freedom of Information Act request? Why does the Forest Service not just decide to let the forest grow into an old growth forest, which requires minimal "management," and will provide highly valued ecosystem services completely free of charge? These are questions begging for an answer not just for the WNF but also for other National Forests across the nation.

The answer lies in incentives established by Congress and in funding provided by congressional appropriations that support logging, burning, and highly destructive forms of recreation. In the last analysis, it is Congress that determines what activities can happen on the WNF and whether money is spent to increase or diminish net public benefits provided to the public from forest management.

16. The Forest Service, however, does play a part in convincing Congress to continue funding extractive and destructive programs that secure jobs and income for Forest Service employees, and that benefit certain industries. The WNF planning documents (FEIS, LRMP, ROD) submitted to the public by the Forest Service do not provide a systematic, rigorous analysis for important public benefits and costs. Information is often scattered, unfocused, incomplete, or non-existing, especially with regard to ecosystem services. For example, on the important issue of fragmentation, little bits of information are provided here and there that indicate increased fragmentation in some management areas from implementation of the plan, but there is no attempt to systematically and comprehensively analyze the current state of interior forest fragmentation and the impacts of the plan for the forest as a whole. This indicates that fragmentation was either not high on the priority list, even though it should be according to the USDA Forest Strategic Plan, or that the Forest Service preferred not to look at this issue too closely. It was clear that interior forest fragmentation would increase from logging and burning and that exposing this would create opposition to the plan. With regard to carbon sequestration and storage, there is no information at all in the plan, and generally, the high value of ecosystem services to society is a non-issue. On the other hand, a few issues that are important for assessing net public benefits are analyzed at great depth, as is the issue of NNIS. The FEIS exposes how the 2006 plan will greatly increase opportunities for NNIS to spread around the WNF, but that does not lead to the conclusion that it may be better not to take this risk. The planning documents are completely lacking even the most basic budget estimates for what it will cost to implement different programs, and how they will be—or need to be—supported by appropriations, fees, or special funds.

17. Our analysis also addressed macroeconomic aspects of the 2006 Forest Plan, which include issues of employment, income, and economic growth in WNF counties. Obviously, some of the local income and employment comes from logging, burning, and mining. These are the very

activities that are likely to generate higher public costs than benefits. Could it be argued that those activities should nevertheless be pursued in the future, because they support local income and employment? What role do mining, logging, and recreation play in the economies of the WNF counties? Our analysis of macroeconomic data for WNF counties shows that income from logging is mostly below one percent of income generated by all work places in these counties. Income from mining is higher in some of the counties, but cannot be considered a significant contributor to the local economy. Government and health services are much more important.

18. In WNF counties, unemployment and poverty rates are higher and income levels lower than state averages. It is therefore understandable that jobs related to logging, mining, and burning may be considered important for the local economy.

19. However, as we showed in this study, continuing a focus on mining and logging could backfire by stifling recreation-related industries, since resource extraction diminishes the attractiveness of an area for recreation. Burning tens of thousands of acres of forest land likewise has negative impacts on recreation, and also may create an economic burden on WNF communities by making it harder for them to get back into attainment for particulate matter. Business expansion and attraction of new businesses may be limited until the counties are in attainment.

20. By focusing on forest restoration instead of extraction, and by expanding forest habitat that is rare or nonexistent on private lands, WNF counties could benefit economically in a number of ways. They could develop more of the economic potential from nature-based tourism like sightseeing, hiking, and wildlife watching. These activities are in high demand across the nation. A national forest that is healing from the wounds inflicted on it by logging, mining and destructive forms of recreation, would make it more likely that new, cleaner industries and their employees are willing to move into the area, expanding income and employment opportunities.

21. The Forest Service continues to allow mining and logging on national forests not because local economies depend on it, but because Congress is willing to provide the appropriations for it. Congress could just as well provide appropriations for activities that yield a net public benefit and still create jobs for both the Forest Service and WNF counties.

II. Introduction to Economic Analysis of the WNF Plan

A. Economic Framework of Net Public Benefit (Loss) Analysis

The U.S. Forest Service, an agency of the U.S. Dept. of Agriculture manages our national forests. Congress passed the National Forest Management Act (NFMA) in 1972. This act requires that the Forest Service prepare a management plan for each national forest within the direction of the NFMA. The WNF in Ohio adopted its first NFMA forest plan in 1988, which was then amended several times. In 2006, the Forest Service issued a revised plan for the WNF.

In January 2006, the Forest Supervisor, weighing different concerns and issues, states in his Record of Decision (ROD)[3] for the WNF (WNF) Final Environmental Impact Statement (FEIS)[4],

"The 2006 Forest Plan **maximizes net public benefit** and contains strong conservation measures to protect, maintain, and improve soil and water resources, wildlife habitat, and other forest resources within a multiple-use context." (ROD, p.31)

"The Forest Plan outlines environmentally sound management to achieve desired conditions on the land and produce goods and services in a way that **maximizes long-term net public benefits."** (ROD, p. 3) (emphasis added)

The term "net public benefits" is defined in the 1982 NFMA regulations as: "An expression used to signify the overall long-term value to the nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs) whether they can be quantitatively valued or not. Net public benefits are measured by both quantitative and qualitative criteria rather than a single measure or index…"(Sec. 219.3)

In other words, "net public benefit" comprises:

1) **Revenues** (benefits) **and Expenditures** (costs) that can be **valued in Dollars.**
2) **Non-Monetary Costs** (inputs, negative effects) **and Benefits** (outputs, positive effects) expressed in quantitative or qualitative terms.

The following tables show components of public costs and public benefits that might be included in a Net Public Benefit determination:

[3] USDA Forest Service, *Wayne National Forest, Record of Decision, Final Environmental Impact Statement for the 2006 Land and Resource Management Plan (2006 Forest Plan)*, January 2006. http://www.fs.fed.us/r9/wayne/planning/2006_docs/record_of_decision.pdf

[4] USDA Forest Service, *Wayne National Forest, Final Revised Land and Resource Management Plan*, January 2006. http://www.fs.fed.us/r9/wayne/planning/2006_docs/index_2006_plan.html

Table 1: Monetary Costs and Benefits (expressed in $)

Monetary Costs (in $): Forest Service Expenditures **Resulting from Plan Implementation**	**Monetary Benefits (in $): Forest Service Revenues** **Resulting from Plan Implementation**
For example: • Forest Service personnel expenditures • Expenditures related to timber program (sale preparations, timber stand improvements, road building) • Expenditures related to fighting NNIS • Expenditures related to building and maintaining trails	***For example:*** • Recreation fees • Timber revenues **Tax Dollars—** **Making Up the Shortfall Between Revenues and Expenditures**

Table 2: Examples of Non-Monetary Costs and Benefits (expressed in qualitative or quantitative terms)

Non-Monetary Costs: **Inputs, Negative Effects** **(**Expressed in Quantitative or Qualitative Terms) **Resulting from Plan Implementation**	**Non-Monetary Benefits:** **Outputs, Positive Effects** **(**Expressed in Quantitative or Qualitative Terms) **Resulting from Plan Implementation**
For example: • Species habitat degraded or lost • Tons of soil eroded • Acres of soil compacted • Acres of land infested with Non-Native Invasive Species (NNIS) • Scenic quality impaired • Endangered species habitat degraded • Air quality impaired • Recreational value of land diminished • Water quality diminished • Historic/cultural features destroyed	***For example:*** • Species habitat improved or restored • Recreational value of land improved • Mines reclaimed • Water quality improved • Water flow stabilized (reducing flooding downstream) • Air quality improved • Eroding soils stabilized • Soil compaction broken up • Acres of land protected from NNIS infestation • Historic/cultural features identified and protected

Net public benefits are maximized when:

- The **public benefits** derived from the provision of goods and services (as outlined in the Forest Plan) are **higher than the public costs** incurred in providing them; and
- There is **no conceivable other mix of goods and services (or use of resources)** that **could provide any higher net public benefit**.

Simply put, within the constraints of its budget, the Forest Service maximizes net public benefit by preferring activities that generate a high net public benefit (= benefits minus costs) over those that create a lower net benefit or a loss. Net public benefit for any activity increases when costs of achieving that benefit go down and decreases when costs go up. For this analysis, costs and benefits have both monetary and non-monetary components.

Net public benefit cannot be maximized when activities that have a low net public benefit (or that generate a net public loss) are preferred over activities that have a higher net public benefit (large benefit, low cost).

As a federal agency, the Forest Service is limited in its spending, and therefore limited in the activities it can pursue, by the revenues received for the goods and services it provides and by tax dollars made available by Congress either through appropriations or special funds.

Certain programs, such as timber sales, have been controversial in part because of their failure to recoup costs. In every year since the Timber Sale Program Information Reporting System (TSPIRS) was first published in 1988, it concluded that a majority of the 122 national forests, including the WNF, lost money on their timber programs. As we will show below, the WNF is also losing money on mining and OHVs. The taxpayer makes up the difference between Forest Service revenues and expenditures resulting from these programs.

The taxpayer also provides the funding for programs that are not expected to result in revenues to the Forest Service, such as programs that provide recreational benefits or restore habitat for endangered species.

The Congress has the power to direct Forest Service activities by its willingness or unwillingness to provide tax funds (appropriations) for certain activities and benefits. Congress outlines what benefits the Forest Service is expected to provide to the public through the laws that the Forest Service has to comply with, for example the [Multiple Use Sustained Yield Act (MUSYA), Endangered Species Act, the National Historic Preservation Act (NHPA) and the Migratory Bird Treaty Act and Executive Order 13186] (See 2006 ROD for more).

Forest Service activities do not only lead to public benefits. Just like with any human activity, the benefits provided by the Forest Service come with both non-monetary and monetary costs. To alert the public to the environmental costs resulting from activities pursued by public agencies, and allow public input, the National Environmental Policy Act (NEPA) of 1969 directs public agencies, including the Forest Service, to complete an Environmental Impact Analysis (EIS), during which they have to analyze and expose the environmental benefits and costs resulting from their actions, as well as economic impacts. Some possible costs that can occur as a result of forest service activities or programs can be seen in Table 2 above.

From the perspective of the taxpayer, the granting of taxpayer funds to a federal agency, to be economically rational, has to yield public benefits (monetary and non-monetary) in a magnitude that is equal to or exceeds the value of tax funds made available to the agency. Plus any non-monetary costs that result from agency activities.

Otherwise, there would be a net public loss to society from the operation of the agency, which would be inconsistent with Congressional intent.

Table 3 shows a situation of a **Net Public Benefit,** where:

Monetary + Non-Monetary Costs < Monetary + Non-Monetary Benefits.

Table 3 therefore is a graphical expression of the Forest Supervisor's Statement in the WNF Record of Decision (ROD), that "The Forest Plan outlines environmentally sound management to achieve desired conditions on the land and produce goods and services in a way that **maximizes long-term net public benefits.**" (emphasis added) (ROD, p. 3)

In Table 3, not all Forest Service expenditures are covered by revenues (for timber, recreation), so the taxpayer covers some of the difference through appropriations. However, the non-monetary benefits generated by Forest Service activities are much greater than all the monetary and non-monetary costs combined, therefore, overall, a net benefit is generated for society.

Table 3: Monetary and Non-Monetary Costs and Benefits Combined—Leading to a Net Public Benefit

PUBLIC COSTS **Resulting from Plan Implementation**	**PUBLIC BENEFITS** **Resulting from Plan Implementation**
Forest Service Expenditures (in $) ***(Expenditures are covered partly by revenues, partly by Congressional appropriations)***	**Forest Service Revenues (in $)**
Public Costs **Expressed in Quantitative or Qualitative Terms** ***For example:*** • Species habitat degraded or lost • Tons of soil eroded • Acres of soil compacted • Acres of land infested with NNIS • Scenic quality impaired • Endangered Species habitat degraded • Air quality impaired • Recreational value of land diminished • Water quality diminished • Cultural/historic sites destroyed	**Public Benefits** **Expressed in Quantitative or Qualitative Terms** ***For example:*** • Species habitat improved or restored • Recreational value of land improved • Mines reclaimed • Water quality improved • Water flow stabilized (reducing flooding downstream) • Air quality improved • Eroding soils stabilized. • Soil compaction broken up • Cultural/Historic sites identified and preserved.
NET PUBLIC BENEFITS From Plan Implementation	

But is it correct for the Forest Supervisor to conclude that "The Forest Plan outlines environmentally sound management …in a way that **maximizes long-term net public benefits?**" (emphasis added) (ROD, p. 3)

Supposedly that assessment was made taking into account the wealth of information provided in the Final Environmental Impact Statement (FEIS), in which the Forest Service analyzes and exposes the environmental benefits and costs resulting from their actions, as well as economic impacts.

Since non-monetary costs and benefits, as exposed in the FEIS, cannot readily be added up and subtracted from each other (they are stated in quantitative and qualitative terms, rather than

valued in dollars), the decision of the Forest Supervisor that the WNF Plan provides net public benefits cannot be easily scrutinized.

Monetary costs and benefits (= Forest Service revenue and expenditures), on the other hand, would be comparatively easy to establish.

However, the FEIS provided almost no information about the projected budget impacts of the different programs and activities resulting from the 2006 WNF Plan.

With lack of hard budget data and the subjective nature of valuing non-monetary benefits and costs, it is not surprising that many people have not necessarily come to the same conclusion as the Forest Service on whether the 2006 WNF Plan maximizes net public benefit.

From public comment on the WNF Draft Environmental Impact Statement (DEIS)[5], and from the Appeal of the WNF Plan, it can be seen that members of the public have questioned the decision of the Forest Supervisor on several grounds, charging that:

- The WNF Plan is not necessarily in compliance with relevant laws guiding Forest Service activities like the Endangered Species Act.

- Some benefits and costs have been omitted from consideration that should have been included in the environmental impact analysis. Particularly, the WNF Plan neither addresses the impact of planned activities on the release of CO_2, nor analyzes potential impacts from global warming on the forest.

- The Plan does not take into consideration that relative values can change along with changing scarcities and constraints; and therefore, doesn't reflect the current relative values of forest goods and services to society.

- Money is being spent on activities that do not yield net public benefits, especially with regard to timber.

- The Forest Service states that the purpose of the Plan is ecosystem management, but in reality the intent is to increase output of oak hickory from the Forest.

If this criticism is correct, it may imply two things: (1) That net public benefit has not been maximized. (2) That there may not even be a net public benefit, but a loss.

What does it mean when net public benefit is not maximized? It means that a different use of funds, and/or pursuing different activities, could provide society with a higher net public benefit than the one achieved by the WNF Plan.

[5] The planning process for the 2006 WNF Plan and public's involvement in it are briefly described in: USDA Forest Service, *Wayne National Forest, Final Environmental Impact Statement for 2006 Land and Resource Management Plan (2006 Forest Plan)*, p. 1–8 to 1–10.
http://www.fs.fed.us/r9/wayne/planning/2006_docs/final_eis_docs/index%20to%20feis.html

The WNF Plan creating a net public loss to society means that:

Monetary + Non-Monetary Costs > Monetary + Non-Monetary Benefits.

This situation is shown in Table 4.

Table 4: Monetary and Non-Monetary Costs and Benefits Combined—Leading to a Net Public Loss

PUBLIC COSTS **Resulting from Plan Implementation**	**PUBLIC BENEFITS** **Resulting from Plan Implementation**
Forest Service Expenditures (in $) ***(Expenditures are covered partly by revenues, partly by Congressional appropriations)***	**Forest Service Revenues (in $)**
Public Costs **Expressed in Quantitative or Qualitative Terms** ***For example:*** • Species habitat degraded or lost • Tons of soil eroded • Acres of soil compacted • Acres of land infested with NNIS • Scenic quality impaired • Endangered Species habitat degraded • Air quality impaired • Recreational value of land diminished • Water quality diminished	**Public Benefits** **Expressed in Quantitative or Qualitative Terms** ***For example:*** • Species habitat improved or restored • Recreational value of land improved • Mines reclaimed • Water quality improved • Water flow stabilized (reducing flooding downstream) • Air quality improved • Eroding soils stabilized. • Soil compaction broken up
	NET PUBLIC LOSS ***From Plan Implementation***

B. Overview

The purpose of this White Paper is to scrutinize the determination by the Forest Supervisor that there is a net public benefit from implementing the 2006 WNF Plan.

1) We will approach this task by first **identifying public benefits that are related to National Forests**. We took as our guide the two latest USDA Forest Service Strategic Plans (for FY 2004–2008 and for FY 2007–2012).[6] These Strategic Plans have the purpose of identifying current threats and important needs related to the mission of the Service, setting national priorities to guide planning on individual forest.

The WNF Supervisor acknowledges the importance of the Forest Strategic Plan by stating that the 2006 WNF Plan contributes towards its goals. "While forest plans should be consistent with the broad guidance provided in the Strategic Plan, and should consider the information provided by the Resource Planning Act Assessment along with other available and relevant science, neither the Strategic Plan nor the Assessment contain recommended outputs to incorporate in specific forest plans. I (the Forest Supervisor) find the 2006 Forest Plan to be in compliance with the Forest Service Strategic Plan, and to contribute towards its goals, …". (ROD, p. 33)

We will not include in this White Paper an analysis of whether the Forest Service is complying with applicable laws that outline public benefits to be accomplished by the Forest Service. This has been done extensively through public comment on the WNF Draft EIS[7], and through an appeal of the 2006 Plan.[8]

2) We will start with stating the **major threats to national forests identified in the two latest USDA** Forest Service Strategic Plans, assuming that **major public benefits (or reduction of public costs) will result from addressing these threats**.

We will then evaluate the information provided in the WNF FEIS to determine how well the WNF Plan addresses these threats, and whether the Forest Supervisor's conclusion is justified that the Plan provides net public benefits in addressing these threats.

3) We will then look at so-called **ecosystem services** provided by forests. Both MUSYA and the two latest USDA Forest Service Strategic Plans stress the importance of ecosystem services to society.

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[6] USDA Forest Service, *Strategic Plan for Fiscal Years 2007- 2012*. http://www.fs.fed.us/publications/strategic/fs-sp-fy07-12.pdf ;
USDA Forest Service, *Strategic Plan for Fiscal Years 2004–2008*. http://www.fs.fed.us/publications/strategic/fs-sp-fy04-08.pdf

[7] Heartwood and Buckeye Forest Council, *Official Public Comments,* Wayne National Forest and its draft plan revision of the Land and Resource Management Plan, on behalf of their organizations and their membership, June 30th, 2005.

[8] Heartwood and Buckeye Forest Counsel, *Notice of Appeal,* filed pursuant to 36 CFR part 217, of the Record of Decision for the Final Environmental Impact Statement for the Revised Land and Resource Management Plan or the Wayne National Forest, May 12, 2006.

We will describe those services—and, since economists have found ways to express the value of these services in dollars, we will provide some information as to what the dollar-value of those services provided by the WNF might be. This gives us a way to express the value of those different services to society, and to compare the value provided by **ecosystem services** to the value of **ecosystem goods** (like timber).

Putting a dollar value on ecosystem services makes it possible to see more clearly the trade-offs between providing different forest benefits, for example, the trade–offs between air purification and timber.

4) As a next step, we will search the WNF FEIS for information about ecosystem services provided by the WNF, and we will determine whether the WNF is likely to yield net public benefits or net public losses with regard to these services. For example, one ecosystem service provided by forests is air purification. We will look at all the activities proposed in the WNF Plan and determine whether they increase or decrease the capacity of the WNF to provide this service.

5) Forest Service expenditures and revenues associated with the WNF Plan are important components of any net public benefit determination, and the FEIS provides almost none of that information. GreenFire acquired some budget data and information from both the WNF Office (through a Freedom of Information Act request) and from the Minerals Management Service (MMS). The results are presented in this document together with our analysis of those numbers.

6) To assess the economic importance of extractive industries (employment and income effects) to the local economies in counties surrounding the WNF, we analyzed macroeconomic data from the Bureau of Economic Analysis Regional Economic Information System.

7) Based on the results from the analysis above, we will present our recommendations. Basically, these recommendations consist of pointing out Forest Service activities that are likely to generate the largest possible positive difference between public costs and benefits, to maximize public benefits.

III. Does the WNF Plan Reduce the Threats Identified in the USDA Strategic Plans?

A. Introduction

The USDA Forest Service Strategic Plan FY 2007–2012 states: "We will continue our commitment to reducing threats to the Nation's forests and grasslands. These threats include
(1) the risk of loss from catastrophic wildland fire caused by hazardous fuel buildup;
(2) the introduction and spread of invasive species;
(3) the loss of open space and resulting fragmentation of forests and grasslands that impairs ecosystem function; and
(4) unmanaged recreation, particularly the unmanaged use of off-highway vehicles." [9]

The threats outlines in the FY 2007–2012 Strategic Plan are almost identical to the ones in the Strategic Plan 2004–2008 (which is quoted in the WNF FEIS as guiding the Forest Planning for the WNF): "Four threats to conservation—growing fire danger due to hazardous fuel buildups; the spread of invasive species; loss of open space; and unmanaged recreation, particularly the unmanaged use of off highway vehicles—increasingly keep us from delivering clean air, abundant water, and healthy habitat."[10]

We will analyze what the Forest Service is doing on the Wayne to address these issues. As stated above, the Forest Supervisor states in the Record of Decision: "I find the 2006 Forest Plan to be in compliance with the Forest Service Strategic Plan, and to contribute towards its goals …" (ROD, p. 33)

We will assume that contributions towards the goals of the Strategic Plan generate important public benefits.

[9] USDA Forest Service, *Strategic Plan for Fiscal Years 2007–2012*, p. 4.

[10] USDA Forest Service, *Strategic Plan for Fiscal Years 2004–2008*, p. 1.

B. The Risk of Loss from Catastrophic Wildland Fire Caused by Hazardous Fuel Buildup

USDA Forest Service Strategic Plans

"The USDA Forest Service Strategic Plan FY 2007–2012 states: "We will continue our commitment to reducing threats to the Nation's forests and grasslands. These threats include the risk of loss from catastrophic wildland fire caused by hazardous fuel buildup." [11]

The USDA Forest Service Strategic Plan FY 2004–2008 states that "increased population growth in the wildland-urban interface places more citizens and property at risk" and that "many of the traditional approaches to land management and suppression of wildland fire have resulted in dense, diseased, or dying forests, which have contributed to severe fires and increased threats to communities and ecosystems."[12]

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The USDA Forest Service Strategic Plan FY 2004–2008 also states on p. 6: "Consistent with resource objectives, wildland fires are suppressed at a minimum cost, considering firefighter and public safety, benefits, and values to be protected." The Strategic Plan recommends, "developing nationally comparable definitions for identifying at-risk wildland-urban interface communities and a process for prioritizing communities within State or tribal jurisdiction."

Therefore, in fighting and preventing fires, the Strategic Plan recommends consideration of risks, acknowledging that the severity of the damage from fire and the costs of reducing fire risks can differ from one location to another. In other words, the Strategic Plan does not advocate hazardous fuel treatments everywhere, but a focus on areas of high risk.

Forest Fire Risks to Flammable Structures

Can Only Be Effectively Reduced By

PROTECTING THE HOME SITE

- By breaking up forest fuel continuity within 66–200 feet of a house.
- By removal of vegetation immediately adjacent to the house, for example through rock landscaping, cement sidewalks, green grass, or by raking away needles and dried vegetation.
- Using fire resistant materials on the exterior of the structure and by removing dead branches, leaves and needles from roofs and gutters.

"The evidence suggests that wildland fuel reduction for reducing home losses may be inefficient and ineffective."

Nowicki (2002)

[11] USDA Forest Service, *Strategic Plan for Fiscal Years 2007–2012*, p. 4.

[12] USDA Forest Service, *Strategic Plan for Fiscal Years 2004–2008*, p. 5.

Assessing Wildland Fire Risks on the WNF

The WNF Plan preferred Alternative E_{mod} (E-modified) proposes that the Forest Service apply:

- Prescribed fires to up to **21,904 acres** for the purpose of **reducing hazardous fuels** over 10 years.
- Treatment with mechanical methods to another 10.181 acres.

This is in addition to **46,215 acres** that can be burnt for **Oak regeneration**. (FEIS Table 2-4, p. 2-19 to 2-20).

The WNF Supervisor states in the ROD, p. 33:

"The 2006 Forest Plan contains management direction in the form of desired conditions and objectives to increase the amount of **forest restored to, or maintained in, a healthy condition to reduce risk and damage from wildland fires**. The 2006 Forest Plan also focuses on **treating vegetation in high hazard areas within wildland / urban interface areas to reduce risk from wildland fire**.**"**

While at first sight it seems that the WNF Plan is following the direction of the Strategic Plan in planning to reduce risks of wildland fires, what is missing in the FEIS is an economic assessment of the **values to be protected vs. the costs of protecting them**, and of the **risks posed by wildfires on the WNF.**

In the FEIS, p. 3–184, the Forest Service describes natural (historical) fire regime classes that range from Class I (0-35 years of fire frequency with low and mixed severity—that is less than 75 percent of dominant over story replaced) to Class V (200+ year frequency and high stand replacement severity). Then the Forest Service does not tell the reader how the WNF would be rated in that system, so there is **no indication of the frequency or severity of fires on the Wayne.**

The FEIS then states that most of the **WNF** is in **Condition Classes 2 and 3** of the following rating system (FEIS, p. 3-184):

Condition Class 1—Within the natural (historical) range of variability of vegetation characteristics; fuel composition; fire frequency, severity, and pattern; and other associated disturbances.
Condition Class 2—Moderate departure from the natural (historical) range of variability of vegetation characteristics; fuel composition; fire frequency severity, and pattern; and other associated disturbances.
Condition Class 3—High departure from the natural (historical) range of variability of vegetation characteristics; fuel composition; fire frequency, severity and pattern, and other associated disturbances.

In the Appendix D of the FEIS, on p. D-1 to D-2 the following statements can be found that show what the natural (historic) range of variability is that is used as a reference point for assessing the current fire regime on the WNF:

- "Traveling west from Pittsburgh, Penn., David McClure in 1772 noted that 'the woods were clear from underbrush, the oaks and black walnut do not grow very compact, and there is scarcely anything to incommode a traveler in riding, almost in any direction, in the woods of the Ohio. **The Indians have been in the practice of burning over the ground, that they may have the advantage in seeing game at a distance among the trees'**."

- **"In southeast Ohio, frequent burning is believed to have favored the more fire resistant oaks and eliminated understories of mesic species such as American beech and sugar maple."**

- "Beginning at the time of European settlement in the early 1800s, the **general level of disturbance was higher** because land was cleared for agricultural crops. **Fire was used to clear the land and it sometimes escaped to the woods, so that the level of fire disturbance remained similar to the conditions before the settlement of Europeans."**

- "In southeast Ohio, timber harvesting on the uplands was limited until the mid-1800s when the **charcoal iron industry** became prominent in the region. The charcoal industry (ca. 1830–1890) was the primary cause of the clearcutting of many forest stands in southeast Ohio. In 1875 there were 69 iron furnaces in the Hanging Rock region of southeast Ohio and northeast Kentucky. **To supply charcoal for a typical furnace 200 to 600 acres of forest were harvested annually, and the forest was harvested again at 20 to 30 year intervals.** These cuts were essentially coppice harvests, whereby regeneration was of sprout-origin. **This cutting regime ultimately fostered oak regeneration and reinforced its dominance**."

- In southern Ohio the fire-return intervals during the period of the mid-1800s to 1925 was in the range of 3 to 7. … **The fires were probably ignited by people and occurred mostly in the dormant season or early spring,** and only a few (6%) occurred during the summer."

- **"There is little indication that climate patterns caused the fire events since they were human-caused**. The fires appeared to have burned until either weather extinguished them or they encountered barriers. **As shown in Figure D-1, the acreage of land that experienced fire dropped dramatically after the late 1920s and early 1930s when fire control laws were passed and the general protection of the forest ecosystem began**.

In other words, the fire occurrences and frequencies before 1925 are in the context of heavy human intervention, whether by Indians, early settlers or the charcoal industry. The reference point, or "range of variability" is not based on factors like weather and climate. It is therefore a "historical," not a "natural" range of variability.

If there is any suppression of fires after the 1920s, it is likely to be a suppression of human-caused fires, not of naturally occurring wildfires. This is confirmed by the Ohio DNR, who states in a news release from March 16, 2006: "The two most common sources of wildfires in Ohio are human carelessness and arson…" [13]

[13] Ohio Department of Natural Resources, 2006 Ohio Wildfire Exposition Promotes Fire Prevention. http://www.ohiodnr.com/news/mar06/0316wildfireexpo/tabid/13154/Default.aspx

By classifying the WNF as being in Condition 2 or 3, and basing the necessity of treatments on that, the Forest Service basically states that the historical, heavy-handed human intervention that resulted in frequent forest fires and the development of a fire-adapted tree cover is a desirable condition. Consequently, the Forest Service plans to "restore" this human disturbance to the WNF. According to the WNF Plan, 46,215 acres can be burnt for achieving a historic "ideal" oak cover that will only come about as the result of human intervention and modification.

In addition, there is a claim that with the reduction of human-initiated fires and with the passage of fire control laws, there has been a build-up of material on the forest floor that could ignite (see for example FEIS, (p. 3-45), causing catastrophic wildfires that could put at risk human lives and structures and ecosystems (FEIS, p. 3-185), invoking images of raging wildfires burning for days and weeks and destroying huge areas of forest and swallowing up human settlements.

How high are these risks for Ohio, and especially for the WNF?

The Ohio Department of Natural Resources states that **"In contrast** to the **human caused fires of the Eastern U.S**., many **western** wildfires are caused by **lightning,** often burn for extended periods of time, and result in massive loss of natural resources and property."[14] Or, in other words: Fires in the Eastern United States are caused by humans, don't burn very long, and do not result in massive losses of natural resources and property.

That fires in the East are mostly human-caused is also confirmed by Wildland Fire Statistics on the National Interagency Fire Center website.[15]

According to a 2002 USDA publication,[16] there were a total of **481 federal fire occurrences** in the state of Ohio from 1986 to 1996. **These included both natural and human-caused fires**.[17]

Federal fires include fires on the land of the National Forest Service, of the USDI Bureau of Land Management, of the USDI Bureau of Indian Affairs, the USDI Park Service, and the USDI Fish and Wildlife Service. **The total area burnt <u>on all Ohio federal land</u> was 16 square kilometers,** which translates into **3,954 acres over 11 years.** Therefore, on average, each of these federal fires burnt **8.2 acres.**

The WNF had 238,000 acres as of 2003 (FEIS, p. 3–28). Federal ownership on the Forest increased by more than 43,000 acres between 1989 and 1999, according to the FEIS, p. 3–301. There were a total of 279,601.5 acres of federal land in Ohio in Fiscal Year 1996, and 349,725.6 in 1994, according to General Services Administration .[18] We do not know the exact percentage

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[14] Ohio Department of Natural Resources, Wildfire in Ohio. http://www.ohiodnr.com/tabid/5146/Default.aspx)

[15] National Interagency Fire Center. http://www.nifc.gov/fire_info/lightning_human_fires.html

[16] Schmidt, Kirsten M. , James P. Menakis, Colin C. Hardy, Wendel J. Hann, and David L. Bunnell, *Development of Course-Scale Spatial data for Wildland Fire and Fuel Management,* Rocky Mountain Research Station, USDA Forest Service, Fire Sciences Laboratory, P.O. Box 8089, Missoula, MT 59807, Phone: (406) 329-4957, FAX: (406) 329-4877, USDA Forest Service, General Technical Report RMRS-GTR-87, April 2002, p. 30. http://www.fs.fed.us/fire/fuelman/popden/docs/fuelman.pdf

[17] Schmidt et. al., *Wildland Fire and Fuel Management*, p. 8.

[18] U.S. General Services Administration. Table /a/ Comparison of Federally Owned Land with Total Acreage of States, Fiscal Year 1996, and Fiscal Year 1994. http://www.access.gpo.gov/blm/images/1-3-96.pdf

of WNF land to all of the federal land in Ohio for the years of the study (1986 to 1996), but it seems safe to say that it probably comprised a large portion of all the federal land; therefore most of the 481 federal fires happened on the WNF.

What are **wildland fire risks to flammable structures** in the part of Ohio in which the **WNF** is located? Schmidt, et. al, show **very low to low risks.** It should be noted that in assessing risks to flammable structures, Schmidt, et. al. considers **population density, fuels, and weather data.** In assessing wildland fire risks, this **study assumes that all structures are highly ignitable and flammable,** thus, according to the authors, includes a bias towards overestimating, rather than underestimating the risk to structures, because research shows that the risk of ignition of structures is based on the flammability and design of their exterior and on the condition of the immediate surroundings. This is **largely independent of wildland fire behavior in surrounding lands** (see more information about that below). [19]

A map showing **Potential Fire Characteristics (Maximum Annual Days that Potential Flame Length is >eight feet (1989-1996)**, shows Ohio in the category of zero days.[20] Fires with flame length > eight feet, according to the authors, present serious control problems.[21] With zero annual days where potential flame length is > eight feet, fire potential is not high or extreme on the WNF.

A **Fire Condition Classes map** for the year 2000 shows the **WNF** as mostly in Condition 1 or 2, and only one spot that could be part of Wayne Forest land in Condition 3. [22]

The WNF Plan preferred Alternative E_{mod} proposes that the Forest Service apply prescribed fires to up to **21,904 acres of WNF land for the purpose of reducing hazardous fuels over the next 10 years.** In addition, 46,215 acres will be burnt for oak regeneration.

This compares to **3,954 acres over 11 years that burnt because of human or natural causes on all federal lands in Ohio,** fires which are not classified as being highly dangerous or hard to control and mostly not likely to pose a high risk to any flammable structures.

The WNF FEIS confirms that fires are not likely to have a high occurrence or pose a high danger on the Wayne with the following table in the FEIS, p. 3–301.

[19] Schmidt et. al., *Wildland Fire and Fuel Management,* p. 41.
[20] Schmidt et. al., *Wildland Fire and Fuel Management,* p. 40.
[21] Schmidt et. al., *Wildland Fire and Fuel Management,* p. 10.
[22] Schmidt et. al., *Wildland Fire and Fuel Management,* p. 37.

Table 5: All Forest-related Federal Payments to the 12 Counties

Source	Year 1997	Year 1998	Year 1999	Year 2000	Year 2001	Year 2002	Year 2003
PILT	$141,106	$150,237	$156,524	$168,320	$237,758	$267,551	$278,071
Revenue Sharing	$16,380	$13,663	$22,984	-$3,116	$40,419	$61,371	$76,194
Mineral Royalties	$19,209	$14,853	$16,914	$15,858	$23,193	$10,844	$14,822
Coop LE	$35,000	$49,000	$36,500	$32,800	$32,500	$32,500	$32,500
Forest Highways	$586,856	0.00	$250,123	$507,304	$550,000	250,000	200,000
Road Projects	0.00	0.00	0.00	0.00	$49,698	0.00	0.00
Fire Equip Rentals*	$10,000	$10,000	$10,000	$10,000	$10,000	$4,261	$735
Total	**$808,551**	**$237,753**	**$493,045**	**$731,166**	**$943,567**	**$626,527**	**$602,322**
Forest Acres	227,128	228,401	229,654	231,290	232,926	233,638	236,175
Average per acre	$3.56	$1.04	$2.15	$3.16	$4.05	$2.68	$2.55

* - Reductions in this category are directly related to low incidents of fires.

- Average per acre payment over the seven years shown is $2.74

Source: FEIS Table 3—84

Notice the star after Fire Equipment Rentals* and the explanation below the table:

"Reductions in this category are directly related to low incidents of fire."

If fire had actually been suppressed and if fuel been built up to a dangerous level, it is likely that it would have been recognized as an actual or potential severe danger in the FEIS, and as a factor that can create early successional habitat by natural disturbance. **But fire or lightning are not even on the list of natural disturbances for the Wayne**. Only tornadoes, ice storms, floods, windthrow, insect and disease outbreaks, and natural death (WNF FEIS, p. 3–59) are mentioned as factors that could be considered natural disturbances. If there had been indeed a dangerous fuel build-up in the Wayne, would that not have led to some dangerous, uncontrollable fires in the last 80–90 years of supposed fire "suppression"?

The Forest Service Strategic Plan alerts to "the risk of loss from catastrophic wildland fire caused by hazardous fuel buildup."

Based on the information presented above, the WNF doesn't seem to be at risk for catastrophic wildfires.

Can burn programs for hazardous fuel reduction (meant to reduce the risk of catastrophic fires) be justified on up to 21,904 acres on the WNF, when

- there are low occurrences of climate and weather related wildland fires,
- the fires are not likely to be severe,
- comparatively few structures are at risk, and
- only 481 unplanned fires have occurred on 3954 aces in an 11-year time span on all federal lands in Ohio?

What does it cost the Forest Service and the counties with WNF land to fight the unplanned fires that occur naturally (and from human causes) compared to what it costs to plan, enact, and control prescribed burns on many times as much land?

Further, what is the cost/benefit of burning 21,904 acres in protecting flammable structures, compared to taking other measures to protect these structures, which are likely to be much more effective?

Effective Protection from Forest Fires

In 2002, Brian Nowicki conducted a comprehensive review for the Center of Biological Diversity of research related to the effectiveness of various methods to protect flammable structures.[23]

He concluded on p.1: "Current efforts to protect communities from the threat of forest fire are being planned without consideration for what is actually effective at protecting houses and communities from forest fires."

Nowicki (2002) considered the effectiveness of three approaches:

1) Protecting the home site.
2) Creating a Community Protection Zone.
3) Reducing hazardous fuels beyond the Community Protection zone.

Protecting the home site

Forest fires, according to Nowicki (2002) "can ignite houses in three ways":

1) flames of the burning forest can provide enough **radiant heat**, **without reaching the house directly**, to ignite the surface of the house;
2) **flames** of the burning forest can reach the surface of the house **through surrounding vegetation**; and
3) **firebrands** (burning embers from a fire) can be **carried by wind to fall on or near the house.**" (emphasis added) [24]

The first of these threats, **radiant heat,** can be effectively treated by breaking up forest fuel continuity within 20 m (66 feet) to 60 meters (200 feet) of a house. Just a partial removal of trees within 40 meters (132 feet) would be enough to protect the house from a torching and crowning forest fire. A 60 meter (200 feet) protection zone would provide a wide margin of safety for special site conditions like steep slopes or particularly tall trees.[25]

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[23] Nowicki, Brian, *The Community Protection Zone: Defending Houses and Communities from the Threat of Forest Fire*, Center of Biological Diversity, August 2002.
http://www.biologicaldiversity.org/publications/papers/wui1.pdf

[24] Nowicki, *The Community Protection Zone*, p. 2.
[25] Nowicki, *The Community Protection Zone*, p. 2.

The second of these threats, **flames directly reaching the structure through igniting vegetation close to the house, can be dealt with through** removal of vegetation immediately adjacent to the house. This can be accomplished by a minimal break in potential surface fuels, for example through rock landscaping, cement sidewalks, green grass, or by raking away needles and dried vegetation.[26]

The third threat, **ignition by firebrands**, can be addressed by using fire resistant materials on the exterior of the structure, especially for roofs and wooden decks, and by removing dead branches, leaves and needles from roofs and gutters.[27]

Creating a Community Protection Zone[28]
A Community Protection Zone is a zone beyond the home ignition zone that is sometimes created to enhance the ability of firefighters to safely defend community space. The width requirements for that space "are related to the average sustained flame length of the forest fire flame front at the edge of the safety zone."

Creating such a zone involves "thinning the forest to create breaks in the continuity of tree crowns, and removing ladder fuels and small-diameter understory trees. Of course, the community protection zone treatment is dependent on the site conditions, such as forest type, average tree height, and slope."

Using worst-case scenarios, which apply to very few communities in the United States, a maximum width 480 meters (1,600 feet) wide would have to be treated to create a Community Protection Zone around structures.

The benefit of such a zone could be that it reduces the area that needs to be treated within the home ignition zone. **"Nonetheless, the community protection zone is not a replacement for treatment in the home ignition zone.** Treatment of the home ignition zone is an integral and critical component of an effective community protection zone. **That is, the community protection zone will not be effective without implementing the homesite treatment."[29]**

Fuel Treatments Beyond the Community Protection Zone
According to Nowicki (2002) "Vegetation management beyond the structure's immediate vicinity has little effect on house ignitions."[30]

"The evidence suggests that **wildland fuel reduction** for reducing home losses may be inefficient and ineffective. **Inefficient** because wildland fuel reduction for several hundred meters or more around homes is greater than necessary for reducing ignitions from flames. **Ineffective** because it does not sufficiently reduce firebrand ignitions."[31]

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[26] Nowicki, *The Community Protection Zone,* p. 2.
[27] Nowicki, *The Community Protection Zone,* p. 3.
[28] Nowicki, *The Community Protection Zone,* p. 3-4.
[29] Nowicki, *The Community Protection Zone,* p. 4.
[30] Nowicki, *The Community Protection Zone,* p. 5.
[31] Nowicki, *The Community Protection Zone,* p. 5.

"Even highly effective fire prevention or suppression miles from the homesite, cannot adequately protect houses from this threat of ignition," if the home site itself is not adequately protected. [32]

Net Public Benefit Analysis

The Forest Supervisor stated in the ROD: "The Forest Plan outlines environmentally sound management to achieve desired conditions ….in a way that maximizes long-term net public benefits." (p.3)

Have net public benefits been maximized with the WNF hazardous fuel protection program?

Public Costs of WNF Hazardous Fuel Reduction Program

Forest Service Expenses: The WNF Plan does not include any estimate of the Forest Service expenses for the fuel reduction program.

According to budget data obtained by GreenFire Consulting Group, LLC through a Freedom of Information Request, the Forest Service spent between $1.3 and $2.1 million dollars or between 11 and 20 percent of their entire budget on WNF fire programs every single year between 2004 and 2007. It is not clear from the budget information that we were able to obtain, whether this money includes prescribed burns for habitat modification or is limited to hazardous fuel reduction. In addition to the amounts listed above, the Forest Service can "borrow" money from the K-V Fund[33] and other budget line items, and Congress will pay them back, providing a very strong financial incentive to use tax dollars on ineffective fire programs.

Table 6: Appropriations for the WNF Fire Program 2004-2007

	2007		2006		2005		2004	
Suppression	$350,077	4%	$1,074,607	10%	$527,686	5%	$91,958	1%
Hazardous Fuels Reduction	$744,092	9%	$442,469	4%	$569,160	5%	$801,018	7%
Preparedness	$528,164	6%	$551,034	5%	$521,074	5%	$412,767	4%
FIRE TOTAL	**$1,622,333**	**20%**	**$2,068,110**	**20%**	**$1,617,920**	**14%**	**$ 1,305,743**	**11%**
Total WNF Budget	$7,843,000	100%	$10,749,000	100%	$11,625,000	100%	$11,950,000	100%

[32] Nowicki, *The Community Protection Zone*, p. 3.
[33] For explanation of K-V fund see chapter below: "Follow the Money".

This table above shows what the Forest Service has spent on burning in the years 2005–2007. We don't know how many acres were "treated," so we cannot extrapolate from those numbers to what it would cost to burn the tens of thousands of acres projected in the Forest Plan.

Additional Ecosytem/Environmental Damage from prescribed burns on 21,904 acres for **hazardous fuel reduction** (over ten years) **compared to 3,954 acres of unplanned burns** that happened over a period of 11 years: (We have only included the acres burnt as part of the hazardous fuel reduction program, and not the 46,215 acres that will be burnt for oak regeneration):

- **Wildland and prescribed fires increase risk of invasions of** some exotic non-native invasive species (NNIS). This leads to more damage through NNIS, or more money being spent on fighting them (for more information see chapter on NNIS below)
- **Air pollution** related to burns increases (for more information see chapter on air pollution below).
- **Negative impacts on Indiana Bat and other sensitive species (**see chapter on biodiversity below).
- **Loss of recreational values** (see chapter on recreation).

Public Benefits of WNF Hazardous Fuel Reduction Program:

Public benefits are **not clearly established in the WNF Forest Plan**. The Forest Plan fails to establish:

- The value of potentially protected structures.
- The risk of occurrence of forest fires on the Wayne.
- That prescribed burn programs are the most effective and efficient way to address the risks that may occur.

Evidence provided above indicates that:

- **Risks and potential damage from forest fires are low on the WNF,**
- Reducing fuels load beyond 200–480 feet from structures is not essential in preventing ignition of structures, and
- Home site protection is the most effective and efficient way to protect structures.

This indicates that **benefits from the WNF hazardous fuel reduction program** may be **minimal,** and there would have been other ways to achieve the same minimal benefits **at a much lower cost** (through home site protection).

Net Public Benefit or Loss from Hazardous Fuel Reduction Program?

If benefits (avoided catastrophic fires, damage to human structures) are not substantial, then **the WNF burning program is likely to lead to a public loss where public costs exceed public benefits.**

But even if there was some net public benefit, since there are other, more effective and less costly ways to achieve whatever benefits there might be from this program, it would not be correct for the Forest Supervisor to state that net public benefits have been **maximized, since putting money into home site protection, or just keeping on fighting unplanned fires, may have provided a much higher net public benefit than fighting fire with fire.**

Table 7: Reducing the Threat of Catastrophic Wildland Fires

Reducing Threat of Catastrophic Wildland Fires	
Public Costs Related to Reducing Wildfire Risks with Prescribed Burns	**Public Benefits Related to Reduction of Wildfire with Prescribed Burns**
1. No Expenditure Information available in WNF Plan. **2. FOIA request shows** $2.1 million dollars spent on hazardous fuel reduction in 2007. **3. Additional Ecosystem Damage (Costs expressed in quantitative or qualitative terms)** from prescribed burns on 21,904 acres over ten years (compared to actual 3954 acres of unplanned burns over 11 years). • Species habitat degraded or lost • Loss of recreational value. • Air pollution impacts. • Increased risks of NNIS. **4. Foregone Benefits** • Much greater reductions in fire risks and damage could have been achieved if money had been spent on more effective and less costly ways to achieve the goal (protection of the home site.) • If money is spent in areas of the country where there is not much risk of catastrophic fire, then that money is taken away from protecting areas with higher risks.	**"Buildings and Communities Protected"** **The size of the benefit depends on:** • **The level of risk of wildfires—**it is low**.** • **How much risk is reduced by the measures taken by the Forest Service—**likely not much, since risk reduction mainly happens through home site protection. **NET PUBLIC LOSS**

C. The Introduction and Spread of Invasive Species

USDA Forest Service Strategic Plans

"The USDA Forest Service Strategic Plan FY 2007–2012" states on p. 4: "We will continue our commitment to reducing threats to the Nation's forests and grasslands. These threats include… (2) the introduction and spread of invasive species."

The USDA Forest Service Strategic Plan FY 2004–2008 states (emphasis added): [34]

- "Invasive species—particularly insects, pathogens, plants, and aquatic pests—pose a **long-term risk to the health of the Nation's forests** and grasslands by interfering with natural and managed ecosystems, degrading wildlife habitat, reducing the sustainable production of natural-resource-based goods and services, and increasing the susceptibility of ecosystems to other disturbances such as fire and flood."
- "**Habitat fragmentation** (the division of forest and grassland habitat into smaller, more isolated patches) **limits containment and eradication** of invasive species."
- "The **best defense** against invasive species is **either preventing** their introduction **or aggressively eradicating** newly detected pest species."

The USDA Forest Service Strategic Plan FY 2004–2008 acknowledges that there are several external factors outside the control of the Forest Service that might affect progress toward this long-term objective, including the following:[35]

- Increasing demands on the agency's human and financial resources and the resulting reduced ability to work with and through other jurisdictions and stakeholder groups.
- Accelerated susceptibility and mortality of forest trees from drought, insects, and pathogens.
- Introduction of new species of insects, pathogens, and invasive plants into the United States.

Assessment of the NNIS Threat in WNF FEIS

The WNF FEIS, to a large degree, echoes the concerns raised by the USDA Forest Service Strategic Plan FY 2004–2008, and shows the damage and risks associated with NNIS for the nation, for Ohio, and especially for the WNF.

NNIS in General

- "Worldwide, NNIS are considered to be the second-leading threat to biodiversity; only habitat loss is a greater threat." (FEIS p. 1–18)
- "NNIS plants are estimated to infest 100 million acres in the United States, and invade an additional three million acres annually."(FEIS p. 1–18)

[34] USDA Forest Service, *Strategic Plan for Fiscal Years 2004–2008,* p. 9.
[35] USDA Forest Service, *Strategic Plan for Fiscal Years 2004–2008,* p. 10.

- Estimated damages and losses due to non-native invasive species (NNIS) are $137 billion per year. This figure includes losses to commercially important sectors (e.g., agriculture and livestock), but not the more intangible, non-market impacts, including impacts to natural ecosystems (FEIS p. 3–154).
- NNIS are the primary threat to 49 percent of all imperiled or federally listed species. (FEIS, p.3–154)

Forest Service
Can Best Prevent
Introduction and Spread
of Invasive Species
by
Reduction in

Habitat Fragmentation
Vegetation Disturbance
Soil Disturbance

NNIS in Southeast Ohio and on the WNF

- The presence of NNIS plants continues to increase in southeast Ohio, including kudzu, purple loosestrife, multi-flora rose, Japanese honeysuckle, garlic mustard, and tree-of-heaven. (FEIS p. 1–18).
- The FEIS contains a list of 47 non-native plant species (Table 3–36) that are currently known to pose substantial threats on the WNF. (FEIS, p. 3–157)
- From NNIS mapping projects that started in 2002 (and had not been completed by the time of the completion of the FEIS), it is estimated that approximately one-third of the forest, or 94,000 acres, of the WNF are infested with NNIS. (FEIS p. 3–157)
- Treatment and prevention of NNIS on the Wayne consists of (FEIS, p. 3–157)
    - Project designs and mitigations to limit NNIS,
    - Some mechanical treatment,
    - One biological control site,
    - Education,
    - Detection surveys for species yet unknown to occur on the Forest.
- **Herbicides** had not been used on the WNF to treat NNIS; however, the use of herbicides to treat NNIS is considered in the proposed 2006 Forest Plan (FEIS, p. 3–158)

Introduction and Spread of NNIS
(FEIS 3-163/164, emphasis added):

- Non-native invasive plant species tend to invade and establish themselves in areas where **disturbance** has occurred, such as **vegetation removal, canopy opening, or soil exposure**.
- Once they are established in an area, they can continue to **spread along areas of continued disturbance**, such as **roads, trails** (both official and illegal user-created trails), **and streams.**
- NNIS are transported into new areas by people, vehicles and machinery, animals, birds, wind, water, fire, and rain.
- The 2006 WNF Plan outlines methods that are to be incorporated in project analysis, planning, implementation, and monitoring to prevent spread of current NNIS infestations and to prevent new invasions.

NNIS Effects of Roads and Facilities Management
(FEIS, pp. 164–166)

- Roads are fragmenting agents that increase forest edge habitat. Road construction, maintenance, and use provide continuous soil disturbance, and act as corridors for NNIS dispersal.
- The preliminary data from the Wayne's NNIS inventory and mapping project on the Athens District (NRIS Terra database, housed at Supervisor's Office), along with field experience, show that non-native species have high densities along oil and gas roads, old haul roads, and other access roads.
- Aside from effects on the natural ecosystem, these invaders also detract from visual quality along roadsides, which may affect tourism.

As the following table shows, the preferred Alternative E_{mod} will create 1,288 acres of disturbances through road construction and reconstruction, skid trails and landings, and parking lots.

Table 8: Measures of Projected Road and Facilities Management Activities that Could Create Potential NNIS Habitat in the Next Decade (in acres)

	A	B	C	D	E	E Modified	F
Temporary road construction	118	130	146	146	145	146	140
Permanent Road Construction	52	68	74	74	74	74	71
Permanent Road Reconstruction	145	223	317	311	311	318	284
Timber Transportation (skid trails and landings)	198	441	739	718	718	740	634
Parking Lots	10	10	10	10	10	10	10
Total Road and Facilities Disturbance	**523**	**872**	**1286**	**1259**	**1258**	**1288**	**1139**

Source: FEIS Table 3–37

NNIS Effects from Recreation Management
(FEIS, pp. 166–167)

- NNIS occur along roads and trails where there is concentrated soil disturbance, and in other areas with bare or disturbed soil, including trailheads, parking lots, developed and dispersed recreational sites, popular fishing locations, and other heavily used areas.
- Currently the Wayne has 116 miles of ATV trail, 74 miles of horse trail, 97 miles of trail shared by mountain bikers and hikers, and 61 miles of exclusive hiking trail.
- Construction of new ATV trails will involve heavy equipment and have impacts similar to road construction. Construction of horse, bike, and hiking trails may be constructed by hand or with heavy equipment, depending on various variables. Trails built by hand will have lower NNIS invasion potential than heavy machinery construction.

As the following table shows, the preferred Alternative E_{mod} will create 325 acres of disturbances through trail and recreational facilities construction.

Table 9: Measures of all Projected Recreation and Facilities Management Activities That Could Create Potential NNIS Habitat in the Next Decade (in Acres)

	A	B	C	D	E	E Modified	F
ATV/OHV trails	223	223	150	187	150	150	110
Foot trails	9	9	18	18	18	18	18
Mountain bike trails	36	36	36	36	36	36	36
Horse trails	36	36	61	61	61	61	61
Recreation Facility Construction	60	60	60	60	60	60	60
Total Recreation and Facilities Disturbance	**364**	**364**	**325**	**362**	**325**	**325**	**285**

Source: FEIS Table 3–38

NNIS Effects from Hazardous Fuel Treatments
(FEIS, pp. 167–169)

According to the FEIS, the more acres burned by fire, the greater the chance of spreading existing NNIS populations or introducing new invasive species. The alternative the Forest Service chose to implement, E_{mod}, proposes disturbances on 32,085 acres. (FEIS Table 3-39).

According to the FEIS, prescribed burns have less chance of spreading or introducing NNIS than wild fires since they are often mosaic in pattern and seldom result in large areas of bare soil. However, prescribed fires still involve the following activities that can facilitate NNIS establishment and dispersal:

- Soil disturbing activities during fireline construction and from emergency roads cut through the forest to stop a prescribed burn that moved outside its boundaries, as has happened in recent prescribed burns in the Shawnee State Forest.
- Vegetation and canopy reduction through burning.
- The reduction of soil protecting litter.
- The NNIS risks of Mechanical Hazardous Fuel Removal will increase when construction of temporary trails and roads for motorized equipment access are needed.

Fire has also been considered a tool to control NNIS, but projects in the Northeastern U.S. have found that fire alone rarely solves an invasive species problem, but has to be used in conjunction with other management tools to be successful. (FEIS, p. 3–168)

As the following table shows, the preferred Alternative E_{mod} (E modified) will create 32,085 acres of disturbances through fuel reduction programs. (FEIS, p. 3–168)

Table 10: Measures of Projected Fuels Reduction-Related Activities That Could Create Potential NNIS Habitat in the Next Decade (in Acres)

	A	B	C	D	E	E Modified	F
Prescribed fire hazard fuel reduction	61,355	55,905	32,394	27,520	21,508	21,904	23,582
Mechanical hazard fuel reduction	10,181	10,181	10,181	10,181	10,181	10,181	10,181
Dozer line construction	15	15	14	14	14	14	14
Total Fire Disturbance	**71,551**	**66,101**	**42,589**	**37,715**	**31,703**	**32,085**	**33,777**

Source: FEIS Table 3–39

NNIS Effects from Vegetation and Habitat Management
(FEIS, pp. 169–172)

- The 2006 WNF Plan proposes prescribed burns to regenerate oak communities. Prescribed fire impacts on NNIS have been addressed above.
- Timber management and harvesting techniques such as those described below may help spread NNIS plants through use of heavy machinery, canopy removal and earth disturbance.
    1. Movement of forest products on skid trails, logging roads.
    2. Some timber harvests are designed to increase the vigor of the residual stand and thus reduce mortality from future outbreaks of NNIS, such as the gypsy moth.
    3. Herbicide use and timber stand improvement activities for oak regeneration will create increased light environments within the forest that can increase NNIS risks.
    4. Pine site preparation may require use of equipment and disturbance of small amounts of soil.

As the following table shows, the preferred Alternative E_{mod} will create 82,046 acres of disturbances through logging and burning for habitat modification.

Table 11: Measures of Projected Habitat and Vegetation Management Activities That Could Create Potential NNIS Habitat in the Next Decade (in Acres)

	A	B	C	D	E	E Modified	F
Uneven-aged timber harvest	5,000	5,000	16,120	15,470	14,590	14,556	13,500
Even-aged timber harvest	0	6,160	1,830	1,980	2,020	1,925	1,570
Thinning	0	0	940	1,230	1,540	1,460	970
Prescribed Fire	8,464	13,914	37,425	42,299	48,311	47,915	46,237
Herbicide Application	800	4,376	7,236	9,005	11,155	10,994	10,846
Crop Tree Release	1,150	3,250	3,239	2,786	2,142	2,113	1,719
Grape Vine Control	1,500	3,720	4,148	3,544	2,711	2,683	2,212
Pine Site Preparation	200	200	200	200	200	200	200
Total Vegetation and Habitat Disturbance	**17,114**	**36,620**	**71,138**	**76,514**	**82,669**	**82,046**	**77,254**

Source: FEIS Table 3–40

NNIS Effects from Energy and Mineral Development
(FEIS, pp. 172–173)

NNIS Effects mainly come from:

- Road construction and maintenance for mineral exploration and development.
- Production site preparation and pipeline installation.

NNIS Effects from Special Uses (FEIS, p. 173)

NNIS Effects may come from:

- Soil disturbance during utility corridor construction and maintenance, which creates soil disturbance. Open light environments in utility corridors are favorable to NNIS.
- Special use requests for road construction to provide access to private land, or grazing permits for livestock

NNIS Effects from Land Ownership Adjustment (FEIS, p. 173)
Whether land acquisition will increase the potential for NNIS on the WNF depends on past disturbances of the property.

NNIS Effects from Threatened and Endangered Species (TES) Management (FEIS, p. 174)
Ground disturbing activities during TES management or reintroduction can increase NNIS by providing new areas for establishment or spread. Conversely, protection of TES areas, including reduced ground disturbance, can decrease NNIS potential.

NNIS Effects from Soil and Watershed Management (FEIS, p. 174)
Over the short term, an increase of NNIS would likely occur in watershed improvement areas due to ground disturbance. The decrease in bare soil with watershed restoration (decrease in erosion, acid mine drainage and flooding activities) overtime could decrease NNIS establishment and spread.

Summary of NNIS Effects of different WNF Plan Activities According to WNF FEIS
According to FEIS Table 3–41, a total of 117,721 acres of WNF land are projected to be exposed to increased risks of establishment and spread from NNIS from implementation of the preferred Alternative E_{mod}.

"The driving forces in this comparison are prescribed burning for hazardous fuel removal and vegetation management (burning and timber harvesting.)" (FEIS p. 3–174)

Table 12: Management Activities That May Create Potential NNIS Habitat (in Acres) by Alternative

	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. E Modified	Alt. F
Roads and Facilities	523	872	1286	1259	1258	1288	1139
Recreation and Facilities	364	364	325	362	325	325	285
Fire Management	71,551	66,101	42,589	37,715	31,703	32,099	33,777
Vegetation and Habitat	17,114	36,620	71,138	76,514	82,669	81,846	77,254
Energy and Minerals	1,441	1,441	1,441	1,441	1,441	1,441	1,441
Special Uses	100	100	100	100	100	100	100
Soil and Watershed	622	622	622	622	622	622	622
Total	**91,715**	**106,220**	**117,501**	**118,013**	**118,118**	**117,721**	**114,618**

Source: FEIS Table 3–41

Net Public Benefit Analysis

The Forest Supervisor stated in the ROD:

"The Forest Plan outlines environmentally sound management to achieve desired conditions …in a way that maximizes long-term net public benefits." (ROD, p. 3)

Does this apply to the WNF with regard to reducing the threat of **introduction and spread of invasive species?**

Public Costs of WNF Plan Activities Regarding NNIS

Forest Service Expenses: The WNF Plan does not include any estimate of the Forest Service expenses for monitoring or treatment of NNIS, or the costs of mitigation measures.

The WNF Plan considers use of herbicides in the treatment of NNIS. Neither costs of herbicide treatments nor their environmental impacts (for example from burning areas that have been sprayed) are exposed in the FEIS.

NNIS risks increase on 117,721 acres with the selected Alternative E_{mod}. These increased risks are mainly the result of logging, prescribed burns, mining, and the building of roads, trails, and recreation facilities, all of which create conditions for NNIS to establish themselves and to spread. Mitigation measures proposed by the 2006 Plan may reduce this risk somewhat, but cannot eliminate it.

Increased NNIS on 117,721 acres have an especially severe effect on endangered species, biodiversity, visual quality, and recreation.

Public Benefits of WNF Plan Activities Regarding NNIS

Control measures for NNIS are planned on 1,900 acres over the next 10 years. (Table 2–4 FEIS, p. 2–19) To put this number intro perspective: The Forest Service estimates that 94,000 acres have **already** been infested with NNIS before implementation of the 2006 WNF Plan.

Net Public Benefit or Loss from WNF Plan Activities Regarding NNIS?

With a projected **treatment of only 1,900 acres for NNIS**, an estimated **94,000 acres already infested**, and **increased risks of NNIS produced on 117, 721 acres** (by creating conditions that are conducive to the spread of NNIS especially through logging and burning), it seems reasonable to conclude that the WNF Plan **creates more NNIS problems than it can expect** to solve.

The USDA Forest Service Strategic Plan FY 2004–2008 states on p.9 (emphasis added): "The best defense against invasive species is **either preventing** their introduction **or aggressively eradicating newly detected pest species."** The WNF Plan neither proposes to prevent nor to aggressively eradicate NNIS. The plan instead **expands opportunities for NNIS to establish themselves and to spread** on the WNF.

Control measures on only 1,900 acres, when 94,000 are estimated to be already infested and favorable conditions for additional infestations are created on 117, 721 acres, are not the best use of taxpayer money if the strategic plan calls for prevention measures and aggressive eradication efforts.

In other words, with regard to NNIS, the Public Costs outweigh the Public Benefits, and therefore there is a net public loss. **On balance, the WNF plan does more harm than good when it comes to NNIS.**

Table 13: Reducing the Threat of the Introduction and Spread of Invasive Species

Public Costs Created by 2006 WNF Plan	Public Benefits Created by 2006 WNF Plan
1. No Expenditure Information in WNF Plan about - Costs of actively fighting already existing and new infestations. Control measures are planned on 1,900 acres. - Cost of implementing NNIS-related standards and guidelines. **2. Increased NNIS risks because of Forest Service Activities on 117,721 acres have an especially severe effect on:** - Endangered Species - Visual Quality /Recreation - Biodiversity Main Activities Contributing to the Increased NNIS Risk: - Logging - Burning - Road Building - Illegal OHV Trails (tolerated by Forest Service) - Trail Construction - Use of Trails by OHV, Horses, Mountain Bikes, Hikers - Minerals Extraction	**Reduced Spread of NNIS Because of Control Measures.** **There will be some benefit from:** - Applying mitigation measures, and - From actively controlling NNIS (on 1,900 acre). **NET PUBLIC LOSS**

D. The Loss of Open Space and Resulting Fragmentation of Forests and Grasslands that Impairs Ecosystem Function

USDA Forest Service Strategic Plans

"The USDA Forest Service Strategic Plan FY 2007–2012"states on p. 4: "We will continue our commitment to reducing threats to the Nation's forests and grasslands. These threats include **…(3) the loss of open space and resulting fragmentation of forests and grasslands that impairs ecosystem function."**

While the Forest Service Strategic Plan FY 2007–2012 spells out the connection between loss of open space and fragmentation, the Strategic Plan FY 2004–2008 only mentions the loss of open space as a specific threat. However, fragmentation is mentioned several times in the document as an important issue that the Forest Service must address. And on page p. 31, the Forest Service Strategic Plan FY 2004–2008 states: **"**The increasing human population will expand urban areas and cause increased fragmentation of private forests and grasslands. **As a result, most extensive tracts of intact ecosystems will be on public lands."**

The urgency of addressing fragmentation of forestland is also evident in the 2000 RPA (Renewable Resources Planning Act) Assessment of Forest and Range Lands[36] and in the 2007 Update to this document. [37]

The 2000 RPA Assessment of Forest and Range Lands states on p. 28:

- Fragmentation of a forest type into smaller pieces disrupts ecological processes, reduces the availability of habitats for some wildlife species, and puts stress on forest health.

- "The distances between and among forest fragments can interfere with pollination, seed dispersal, wildlife movement, and breeding."

- "Ultimately, excessive fragmentation can contribute to the loss of plant and animal species that are unable to recolonize after an area is disturbed."

- "While detrimental to some wildlife species, fragmentation will improve the habitat for other species; especially those that prefer forest edges."

[36] USDA Forest Service, *2000 RPA Assessment of Forest and Range Lands*. http://www.fs.fed.us/pl/rpa/rpaasses.pdf

[37] USDA Forest Service, *Interim Update of the 2000 Renewable Resources Planning Act Assessment*, April 2007. http://www.fs.fed.us/research/rpa/2005rpa/RPA_Interim_Update_April2007_low_resolution.pdf

- The number of forest land owners is increasing and the average size of ownership is decreasing for land in the smaller sized parcels. Smaller tract sizes and multiple ownerships make landscape-level planning and management more difficult.

The RPA 2007 Update states on p. 46**:** The fragmentation of forest area into small pieces affects habitat quality and thus **biological diversity.**

Forest Service Can Best Prevent FRAGMENTATION OF FOREST

By

- **Closing of Roads and Trails**
- **Avoiding Disturbances From**
  Logging
  Mining
  Road and Trail Construction

Assessment of Fragmentation in WNF FEIS

Plan Activities Affecting Fragmentation
The FEIS acknowledges that **timber harvesting and roads can result in habitat fragmentation**, creating a greater number of habitat patches that are smaller in size than the original contiguous tract of habitat. (FEIS, p. 3–179)

The following table (part of FEIS Table 2–4) shows miles of road construction projected in The WNF Plan for the preferred Alternative E_{mod}:

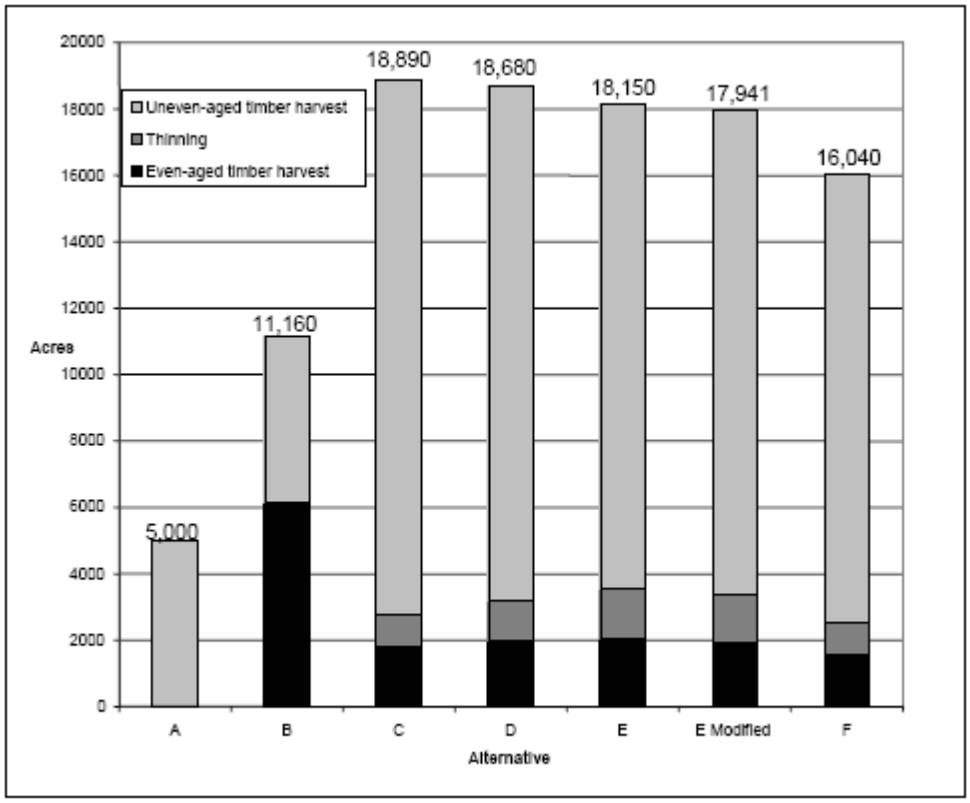
Table 14: Transportation Management

Transportation Management							
Mgmt. Activity	A	B	C	D	E	E_{Mod}	F
Temporary Road Construction	41 mi (118 ac)	45 mi (130 ac)	50 mi (146 ac)	50 mi (146 ac)	50 mi (145 ac)	50 mi (146 ac)	48 mi (140 ac)
Permanent Road Construction	17 mi (52 ac)	22 mi (68 ac)	24 mi (74 ac)	24 mi (74 ac)	24 mi (74 ac)	24 mi (74 ac)	23 mi (71 ac)
Permanent Road Reconstruction	47 mi (145 ac)	73 mi (223 ac)	104 mi (320 ac)	103 mi (317 ac)	101 mi (311 ac)	103 mi (318 ac)	93 mi (284 ac)
Road Decommissioning	10 mi (29 ac)	10 mi (29 ac)	10 mi (29 ac)	10 mi (29 ac)	10 mi (29 ac)	10 mi (29 ac)	10 mi (29 ac)

Source: FEIS Table 2-4

The following Table shows acres of projected timber harvest.

Table 15: Total Acres of Timber Harvest projected for first decade



Source: FEIS Table 3-50.

The FEIS states that **habitat edge** created by fragmentation can be **favorable for some species**, but it can also **reduce habitat quality and quantity for other species.** (FEIS p. 3-180)

Ownership in the WNF is highly fragmented. "Despite an active land acquisition program, the Wayne still has one of the most **fragmented ownership patterns of any national forest**: currently 24 percent National Forest System ownership within the proclamation boundary of the Marietta Unit, 27 percent within the Athens Unit, 33 percent ownership within the Ironton Ranger District, and 28 percent for the entire Forest." (FEIS, 1-20) The Forest Service is planning to acquire up to 40,000 acres of land over the next decade. (LRMP Appendix D, p. 12)

The FEIS, on p. 3-71, states that **large interior forest blocks** of NFS land can be found within the **Future Old Forest** (**FOF, FOFM), Historic Forest (HF, HFO), and DR** management areas.

The FEIS then states on p. 3-76: "Each **Historic Forest Management Area** (HF or HFO) represents an extensive tract of interior forest habitat ranging in size from 7,500-17,000 acres in size." According to the information given in the FEIS, with selected alternative $E_{mod,}$ two blocks

of interior forest totaling about 31,000 acres would be located on the Ironton Ranger District. Two blocks, totaling about 16,000 acres, would be located on the Athens Unit.

These numbers are stated **without any indication of whether they constitute an increase or decrease in patch size** during the planning period, in other words**, it is not clear whether fragmentation will increase or decrease** during the time period considered – and what the time period is.

As far as Diverse Continuous Forest (DCF and DCFO) Management areas are concerned, Table 3-16, on p. 79 of the FEIS, shows that for the selected Alternative E_{mod}, and indeed **for all alternatives**, the **number of forest blocks larger than 500 acres diminishes quite drastically compared to Alternative A** (Alternative A is the no-action alternative, which means it continues the direction of the previous plan as amended).

The table does **not show how many more patches smaller than 500 acres** are created.
This table thus indicates an increase in fragmentation.

Table 16: Number of Interior Blocks in DCF and DCFO by Alternative

Interior Forest Block Class (acres)	A	B	C	D	E	E Modified	F
500-1,000	24	3	15	18	15	15	8
1,000-1,500	12	4	9	7	3	3	5
1,500-2,000	7	1	3	1	1	1	2
2,000-2,500	6	1	4	3	2	2	2
2,500+	8	2	7	4	2	2	3

Source: FEIS Table 3—16

According to the FEIS, p. 3-71 the "interior forest habitat availability in the **Diverse Continuous Forest (DCF and DCFO)** management areas was displayed **because the purpose of these two management areas is to provide mature forest habitat for forest interior species** that require canopy disturbance to maintain habitat suitability."

DCF and DCFO management areas include the possibility of **even-aged hardwood forests on 10-25% of the area**, and of **1-5% even–aged pine forests** (LRMP, p. 3-3).

According to the FEIS, p.3-179, **"even-aged management may fragment mature, contiguous forest** until the stand once again reaches a successional stage that is no longer an ecological barrier to interior mature forest species."

The use of even-aged timber harvests probably explains the increased fragmentation of this management area, displayed in Table 3-16.

It is not clear how this increase in fragmentation could serve the indicator species that are supposed to thrive in this area: The cerulean warbler (canopy nester), worm-eating warbler (ground nester) and pileated woodpecker (cavity nester) were selected by the Forest Service as management indicator species since they are closely associated with mature forest habitat. (FEIS p. 3-68) These species, according to the FEIS, are examples of forest interior species, and the likelihood of their occurrence increases with the size of the mature forest area. They are considered **area-sensitive species**, or species whose occurrence or reproductive success is reduced in smaller habitat patches. (FEIS p. 3-68)

While the FEIS shows that **"mature" forests of 80 years and older will increase on the WNF after 100 years under all alternatives** (Table 3-17, p. 3-83), there is no comparable table or figure that shows **how forest block size overall develops** under different Alternatives and in different management areas.

For example, no statements regarding fragmentation are made with regard to **Forest and Shrubland Mosaic** (FSM and FSMO), which allows for **75-85% even-aged hardwood forest** and **1-10% even-aged pine forest** (LRMP, p. 3-19). This Management Area did not exist in the previous Forest Plan, and covers **54,580 acres** with the selected alternative E_{mod} (FEIS, p. 2-18). It is very likely that this area will be more fragmented than in the past, even though it may also have some larger component of "mature" trees.

The FEIS is also silent with regard to fragmentation effects from **the Grassland-Forest Mosaic (GFM),** a new Management Area that allows for **40-50% even aged hardwood forest**, and **1-10% even aged pine forest,** according to the Land and Resource Management Plan (LRMP, p. 2-23). It is very likely that this area of **5,334 acres** (FEIS, p. 2-18) will be more fragmented than in the past, even though it may also have some larger component of "mature" trees.

The FEIS states on p. 63 that some species require contiguous patches of early successional habitat, and that "unlike existing conditions, where early successional habitat consists of small patches distributed haphazardly across the landscape," patches of early successional forest under most alternatives "would be of appropriate sizes for area-sensitive species such as the yellow-breasted chat." In other words, the Forest Service claims to reduce fragmentation of early successional habitats through even-aged management, even though this is obviously at the cost of increasing fragmentation of interior, old growth forest habitat. The Forest Service does not present any relative value analysis to demonstrate that the early successional "appropriately sized" habitat is more scarce than unfragmented interior forest habitat.

Table 17: Timberland Area by Stand-Age Class in the East

Stand-age class	Percentage
0-19	23%
20-39	19%
40-59	23%
60-79	17%
80-99	8%
100-199	4%
200+	**0%**
Uneven aged	6%

Source: RPA Interim Update, p. 100, Figure 25

River Corridor Management Area: Even in the River Corridor Management Area **12-20% might be in even-aged hardwood forest**, and **1-10% in even-aged pine forest** (LRMP, p. 3-35). This management area covers **12,544** acres (FEIS, p. 2-18). It is therefore very likely that fragmentation increases in these management areas as well.

The FEIS does address some bird species, but does not include any information about other species, like amphibians and larger mammals (for example black bears) and their dependencies on large unfragmented interior forest patches.

Evaluation of WNF Plan Impacts on Fragmentation

The FEIS clearly **lacks a focus on dealing with the issue of fragmentation** of interior, old growth forest land. This is evidenced by the fact that the WNF FEIS **does not provide any concise and comprehensive information on the current status of fragmentation** on the WNF, and only **very incomplete information on how fragmentation will develop for different Alternatives.**

The information that is provided shows that fragmentation of interior forest will increase, while there also may be an increases in unfragmented early successional habitat, which has not been demonstrated to be scarce on a regional level.

The table below, based on FEIS Table 2 – 3, summarizes information that we gleaned from the FEIS about likely trends in fragmentation in different Management Areas:

Table 18: Trends in Fragmentation in Different Management Areas

Management Area Name	Management Area Map Abbrev.	Acres Allocated	Percent of Total Area	Fragmentation
Diverse Continuous Forest	DCF	**55,267**	**23.31%**	**Increases** according to FEIS Table 3-16
Diverse Continuous Forest with Off-Highway Vehicles	DCFO	**22,626**	**9.54%**	**Increases** according to FEIS Table 3-16
Historic Forest	HF	**26,278**	11.08%	Cannot be inferred from FEIS
Historic Forest with Off-Highway Vehicles	HFO	**21,274**	8.97%	Cannot be inferred from FEIS
Forest and Shrubland Mosaic	FSM	**54,580**	**23.02%**	**Likely to Increase** based on MA direction for even-aged management
Grassland-Forest Mosaic	GFM	**5,334**	**2.25%**	**Likely to Increase** based on MA direction for even-aged management
Future Old Forest	FOF	**16,478**	6.95%	Cannot be inferred from FEIS
Future Old Forest with Mineral Activity	FOFM	**10,154**	4.28%	Cannot be inferred from FEIS
River Corridor	RC	**12,544**	**5.29%**	**Likely to Increase** based on MA direction for even-aged management
Developed Recreation	DR	**4,078**	1.72%	?
Timbre Ridge Lake	TRL	**796**	0.34%	?
Special Areas	SA	**7,546**	3.18%	?
Research Natural Areas	RNA	**117**	0.05%	?
Candidate RNA	CA	**981**	0.41%	?
Total		**238,053**		

Adding up the areas that show increased fragmentation based on FEIS Table 3-16 for DCF/DCFO, and the areas likely to have increased fragmentation based on Management Area direction, **leads to the conclusion that roughly 63 percent of the WNF is likely to be subjected to increases in fragmentation of interior forest land from logging alone.** No information is made available on what is happening on the remaining 37 percent.

Not only does the FEIS not provide complete information about fragmentation or the development of WNF mature forest patch sizes, it also does not show the level of fragmentation at the landscape scale on **private land, on state forests, or in the region. This information would be helpful in assessing the relative value of unfragmented forest and grassland on the WNF.**

However, based on information contained in the UDSA Strategic Forest Plans and the RPA, it can be assumed that private land is getting increasingly fragmented. Therefore, if public landowners are not moving to create large, continuous blocks of forest, those habitats are very unlikely to be available anywhere else. Early successional habitat, on the other hand, is plentiful in the East (see table 17 above), and the Forest Service did not provide evidence that patch sizes on private lands are inadequately sized.

With fragmentation being considered a major threat in the Strategic USDA Forest Service Strategic Plan FY 2007–2012, being mentioned as a major concern in Forest Service Strategic Plan FY 2004-08, and both the 2000 RPA and the 2007 RPA Interim Update, **the WNF plan should be expected to contribute to the reduction of this threat.** This is not the case, even though the Forest Supervisor states "I find the 2006 Forest Plan to be in compliance with the Forest Service Strategic Plan, and to contribute towards its goals…" (ROD, p. 33)

The lack of information on this issue indicates that fragmentation was not a major concern for the Forest Service in designing the WNF plan, and it is unlikely that it was considered adequately in weighing the public benefits and costs that go into the **determination of net public benefits** by the Forest Supervisor.

Net Public Benefit Analysis

The Forest Supervisor stated in the ROD: "The Forest Plan outlines environmentally sound management to achieve desired conditions on the land and produce goods and services in a way that maximizes long-term net public benefits." (ROD, p. 3)

Does this apply to the WNF with regard to reducing fragmentation?

Public Costs From WNF Plan Regarding Fragmentation

1. **Forest Service Expenses**: There is a stated goal of adjusting land ownership within the forest proclamation boundary to enhance public benefits and improve management effectiveness (LRMP, p.4-17). The Plan authorizes the Forest Service to acquire up to 40,000 acres of additional land. This could potentially work towards reducing fragmentation, but only if that consolidated land is managed for that purpose, which is not the case with the current plan.

2. **Increased fragmentation on at least 63 percent of the WNF.**

3. **This increased fragmentation translates to ecosystem/environmental damage.**
   - Increased risks of NNIS
   - Increased threats to biodiversity—reduced habitat availability for any species that rely on large, uninterrupted tracts of interior forest.
   - Since large, uninterrupted forest tracts are becoming more and more scarce and are unlikely to be provided on private lands, the value lost to society from increases in their fragmentation on WNF land is very high.

Public Benefits from WNF Plan Regarding Fragmentation

1. Possible benefits could result from reduced ownership fragmentation through land acquisition.
2. There is no evidence in the Wayne Forest Plan of reduced fragmentation. If there are areas that will have larger interior patches of uninterrupted forest, this information is not provided in the FEIS.
3. There may be some larger patches of grassland and early successional habitat, but these come at the cost of increased fragmentation of more valuable interior forests.

Net Public Benefits or Costs from WNF Plan Regarding Fragmentation?

Based on the fact that

1. Interior forest fragmentation increases on much of the WNF, and
2. Private lands are continuing to be fragmented more and more, and
3. Public lands are currently best positioned to provide unfragmented, interior forests,

it seems reasonable to conclude there is **a net public loss with regard to the issue of fragmentation.** The only way that there could be net public benefit would be for fragmentation on the remaining 37 percent of WNF forest land to be so drastically reduced that this would more than compensate for increases in fragmentation of 63 percent of the WNF land. This is very unlikely to be the case.

Since unfragmented, large areas of interior forest are so scarce (because of increasing fragmentation on private land) it can be safely concluded that **net public benefit has not been maximized** by the WNF Plan. A change in forest plan direction that would lead to reduced—rather than increased—fragmentation on WNF land could increase net-benefits to society.

Table 19: Reducing the Loss of Open Space and Resulting Fragmentation of Forests and Grasslands That Impairs Ecosystem Function

<table>
<tr><th colspan="2">Reducing Fragmentation</th></tr>
<tr><th>Public Costs Created by 2006 WNF Plan</th><th>Public Benefits Created by 2006 WNF Plan</th></tr>
<tr><td rowspan="2">1. Costs of logging to create larger blocks of early successional habitat.

2. Costs of land acquisition for ownership consolidation.

2. Fragmentation of interior forests increases from logging and mining, trails, and roads on at least 63 percent of the forest.
Loss of habitat crucial for interior forest dependent species that require large patches of undisturbed forest.
This habitat has very high scarcity value since private lands cannot provide it, and society must rely on public lands to provide it.</td><td>1. Possibly some less fragmented blocks of early successional habitat.

2. Ownership consolidation has potential to reduce fragmentation of habitats, but only if land is managed for that instead of for timber.</td></tr>
<tr><td>NET PUBLIC LOSS</td></tr>
</table>

E. Unmanaged Recreation, Particularly the Unmanaged Use of Off-Highway Vehicles

USDA Forest Service Strategic Plans

"The USDA Forest Service Strategic Plan FY 2007–2012" states on p. 4: "We will continue our commitment to reducing threats to the Nation's forests and grasslands. **These threats include … (4) unmanaged recreation, particularly the unmanaged use of off-highway vehicles."** (emphasis added)

The USDA Forest Service Strategic Plan FY 2004—2008 states on p.1: Four threats to conservation—growing fire danger due to hazardous fuel buildups, the spread of invasive species, loss of open space, **and unmanaged recreation, particularly the unmanaged use of off highway vehicles —**increasingly keep us from delivering clean air, abundant water, and healthy habitat. (emphasis added)

The Forest Service Strategic Plan addresses **unmanaged trails for OHV** as a particular threat. Therefore, **this section** will concentrate on how the Forest Service deals with **unmanaged OHV trails.**

In addition, **OHV use in general (both managed and unmanaged) will be included in the analysis of OHV effects on WNF ecosystem services further below.**

Forest Service Can Best Prevent
Illegal OHV Activity

by

- **Routine Monitoring and Patrolling**
- **Education of Riders about Forest OHV Policies**
- **Adequate Signage and Marking of Designate Trails.**
- **Closing of Illegal Trails**
- **Closing of Official Trails if They Invite Illegal Activity**

WNF FEIS Analysis of the Issue of Illegal ORV Use

Clearly, the WNF Supervisor is aware of the problem of illegal OHV use on the WNF.

The WNF contains many illegal, user-developed trails:

- The FEIS states on p.1-19: "Forest Plan direction restricts OHVs to designated trails, but the OHV areas **contain many illegal, user-developed trails**. Illegal trails, along with **inadequate signing on some legal trails, cause confusion among OHV riders as to which trails may be used.**"

- "Regardless of which alternative is selected, **some illegal OHV use can be expected to occur. Though the Forest currently provides a system of designated trails for motorized use, illegal off-trail riding continues. Illegal off-trail riding has created many user-developed routes on the Forest."** (FEIS, p. 3-224)

:

- "Recreation supply and demand will invariably shift with time. As demand exceeds supply, conflicts among user groups will become greater, the visitor's recreation experience will be reduced**, illegal trail use will escalate**, and **impacts to natural and visual resources will rise."**(FEIS, p. 3-216)

.

There is lack of law enforcement, patrolling of trails, signage and education:

According to FEIS, p. 3-224**,** some contributing factors for illegal OHV activity are:

- Trail **demand is greater than the current supply**
- Existing **trails do not provide the challenge** some riders are seeking
- **Lack of Law Enforcement Officers to patrol trails**
- **No established trail patrol program to educate/inform riders of Forest OHV policies and to routinely monitor or patrol trails**
- **Lack of adequate signing or marking of existing designated trails.**

- "To help absorb displaced non-motorized users, the Wayne limited motorized trail use to a few management areas that cover approximately 19 percent of the Forest. The remaining 81 percent is open to nonmotorized recreation use."(FEIS, p. 3-223)

- **"Accelerated motorized recreation use could strain the Forest's limited law enforcement program**. Heavily used areas require more routine patrol, and create an uneven distribution of law enforcement officers (LEO) across the Forest. **Less used recreation areas would lack the enforcement oversight they deserve**, and therefore, may experience more vandalism or visitor non-compliance. This effect would be mitigated through the use of more Forest protection officers (FPO) and developing partnerships with State and local law enforcement to assist in patrolling the Forest's motorized trail system." (FEIS, p. 3-223)

Other forest uses and ecosystem functions are impacted negatively by illegal ORV trails:

- "Many other Forest users are concerned with the impacts of OHV use on other resources due to **illegal OHV use and/or inadequate maintenance of OHV trails**." (FEIS, p. 2-6)

- "Cultural features such as historic barns, log structures, iron furnaces, covered bridges, and mineral developments also contribute to the landscape character. These contrast with

areas of **significant environmental abuse**, such as abandoned mines, acid seeps, roadside trash dumps, **and the effects of illegal motor vehicle use**." (FEIS, p. 3-232)

- **"Without routine trail monitoring, maintenance, and/or rehabilitation, adverse effects to soils, water quality, aquatic habitat, wildlife habitat, vegetation, and scenic resources would inevitably occur."** (FEIS, p. 3-224)

Current and Planned Trails:
The FEIS does **not have information** about the **length of illegal trails** on the WNF.

However, there is a table in the LRMP p. 46, that shows how many legal trails exist today and are planned to be built in the future.

Table 20: Trail Construction Objectives

Type of Trail	New Trail Construction[2] (Miles)	Current Trail (Miles)	Trail Density Limit (Miles per Sq. Mile)
OHV	50 - 124	116	2.4 – 3.5
Hiking	5 – 30	81	Up to a total of 2.5 mi /sq mi (this figure includes all types of non-motorized trails)
Horseback	5 – 50	75	
Mountain Bike	15 - 30	0	

Source: FEIS Table 2—5

What the Forest Service Plans to Do About Illegal Trails

Accommodating OHV

- ***Closing of illegal trails:*** A Forest-wide Objective (11.2h) in the Proposed Revised Forest Plan sets a goal **of closing a minimum of 20 miles of illegal ATV trails per decade.** (FEIS, p. 3-167)

- ***Provide more legal trails (assuming illegal trails result from lack of legal trails***). The WNF FEIS reports that some ORV users maintain the problem of illegal trails is the result of insufficient availability of legal trails on the WNF, and that they therefore want to see an expansion of the trail system.

  "The demand for a longer motorized trail system will continue to be voiced by the Forest's largest group of trail users – its OHV constituents. If the Wayne provided the miles of motorized trails needed to meet public demand, this group maintains, **the expansion would reduce trail overcrowding, lower maintenance costs, minimize illegal off-trail activity and resource impacts, while increasing rider safety and enjoyment."** (FEIS, p.3-224)

- ***Turn some illegal trails into legal trails:*** The WNF FEIS reports that some of the illegal trails may be incorporated into an expanded system of legal trails (currently there are 116 miles of legal trails, to be expanded by 50-124 miles).

  "Though many user-developed routes may be found on the Forest, they are not condoned. **However, some user-developed trails could be considered for system trail designation if they are well located and could be easily incorporated into the existing designated trail system**. Many user developed trails are causing adverse effects to natural resources and pose a risk to rider safety. When user-developed trails are identified and cannot be reasonably incorporated into the existing designated trail system, **they will be closed and rehabilitated.**" (FEIS, p. 3-224)

Costs of Dealing With Illegal Trails:

- "Certainly, **the miles of user-developed trails the Forest could incorporate or rehabilitate/close in a given year is dependent on its budgetary and personnel capabilities."** (FEIS, p. 3-224)

- "Currently it costs the Forest **an average of $22,000 to construct a mile of motorized trail and $3,500 annually to maintain it.** It should be noted that these are baseline costs used for alternative comparison. They do not include the cost of NEPA analysis or construction/maintenance costs associated with trail facilities such as bridges, restroom facilities, parking areas, camping areas, and signs. These and other variables (environmental, topography, weather, etc.) may affect overall project cost." (FEIS, p. 3-228)

- The table below gives construction and maintenance costs for new OHV trails, but does not address specifically the costs of closing, rehabilitating, or integrating illegal trails.

Table 21: Estimated Construction and Maintenance Costs of New OHV miles by Alternative

Management Activity	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. E Modified	Alt F.
Cost of New OHV Trail Construction ($22,000/mile)	$4,048,000	$4,048,000	$2,728,000	$3,388,000	$2,728,000	$2,728,000	$2,002,000
Cost of Maintaining New OHV Trails ($3,500/mile)	$664,000	$664,000	$434,000	$539,000	$434,000	$434,000	$318,500
Total	**$4,712,000**	**$4,712,000**	**$3,162,000**	**$3,927,000**	**$3,162,000**	**$3,162,000**	**$2,320,500**

Source: WNF Recreation Project File, 2004

Source: FEIS Table 3—57

Evaluation of WNF Plans to Reduce Illegal Off-Highway Vehicle Use

Even though the WNF FEIS announces the costs of trail construction and maintenance per mile, the FEIS **does not contain enough information for conducting a thorough analysis of public benefits and costs of actions necessary to control illegal ORV use on the WNF.**

Missing Information on Illegal OHV trails:
Information which the Forest Service should provide includes:

- Total miles of illegal, user developed trails.
- The miles of illegal, user developed trails that the Forest Service plans to rehabilitate and incorporate into the expansion of the official trails system.
- The costs of integrating/rehabilitating these illegal trails.
- The costs of closing and rehabilitating 20 miles of user created trails per decade.
- The costs of effective enforcement, patrolling, education, and signage to fend off illegal activity
    - On both old and new official trails.
    - On existing illegal trails and possible future ones.

No Evaluation of Past Experience:
The creation of the current network of official trails was the response to the existence of illegal trails on the Wayne Nation Forest prior to the 1988 Plan, and an attempt to rein in that illegal activity by creating official trails. There is no assessment in the FEIS whether this has worked. Questions which the Forest Service should answer include:

- How many miles of illegal trails were there before 1988?
- How many miles of illegal and legal trails are there now?
- Does the existence of official trails curb illegal use or invite more illegal use?
- If they do not curb illegal use, what justification is there for expanding the network of official trails?
- If there is insufficient enforcement now, what will be the effect of insufficient enforcement once the legal trail network has been expanded?

Insufficient Funds:
It sounds like the FS **does not currently have sufficient funds to manage the existing trails well** and to **prevent the creation and use of new illegal trails.** Therefore:

- Priority should be given to secure adequate enforcement, education and signage on existing official trails before more new trails are constructed or integrated into the legal trail system.
- Planning on only closing 20 miles of illegal trails in ten years may not make a big impact, depending on how large the network of illegal trails is.

Net Public Benefit Analysis

The Forest Supervisor stated in the ROD: "The Forest Plan outlines environmentally sound management to achieve desired conditions on the land and produce goods and services in a way that **maximizes long-term net public benefits."**

Does this apply to the WNF with regard to Illegal ORV Use?

Public Costs of Reducing Illegal ORV Use

Unknown: The costs of integrating/rehabilitating illegal trails into a network of legal trails.
Unknown: The costs of closing and rehabilitating 20 miles of user-created trails per decade.
Unknown: The costs of enforcement, patrolling, signage and education to fend off illegal activity on both old and new official trails, and preventing the creation of new illegal trails
Known: Forest Service projects to spend $2, 728,000 on new trail construction and 343,000 on their maintenance. (FEIS Table 3-57)

Public Benefits of Reducing Illegal ORV Use

By naming the illegal ORV trails as one of four major threats in both of the latest Forest Service Strategic Plans, the Forest Service has made it clear that the reduction of that threat by adequate management and/or closing/rehabilitation of those trails would provide substantial public benefits. They would consist of:

- Reduced environmental damage (especially to endangered species, air quality, soil and water, which will be dealt with at more depth in chapters below).
- Increased recreational value for non-OHV users.

Net Public Benefit or Loss from Reducing Illegal ORV Use?

With the high priority given to this issue in the Forest Service Strategic Plan, we can probably assume that the **benefits of closing/rehabilitation of illegal OHV trails and of securing adequate enforcement, signage, and education, will outweigh the costs**, and therefore there will be a public net benefit to society from those actions.

However, that may not be always the case. If the strategy of curbing illegal use includes constructing and securing new official trails (to absorb illegal use that supposedly arises from an insufficient supply of official trails), the additional construction costs, maintenance costs, and cost of securing compliance combined may exceed the public benefits derived from them (assuming these measures are indeed effective in decreasing illegal ORV use).

If, however, creating more trails (and integrating current user-created trails into the official network) ends up increasing, rather than decreasing illegal activity, then the current plan will not even achieve the desired benefits, but still there will be a tremendous investment (cost) and damage to ecosystem services and to the recreation experience of other users.

Because neither the extent of illegal trail creation nor the actions planned to remedy the problem are clearly stated in the WNF Plan, it is impossible to really assess the extent of the public net benefits derived from that plan.

Also, the plan makes no attempt to quantify the ecosystem damage caused by illegal ORV trails use, and therefore further undermines attempts of assessing the benefits from reigning in illegal ORV use.

In other words, the information given in the WNF FEIS is inadequate to determine public costs and benefits.

Table 22: Scenario 1-Reducing Illegal Activity by <u>Adding More Official Trails is Effective</u>

REDUCING **Illegal Use of Off-Highway Vehicles**	
Public Costs Created by 2006 WNF Plan	**Public Benefits Created by 2006 WNF Plan**
1. Budget Costs: • **Unknown:** The costs of integrating/rehabilitating illegal trails into a network of legal trails. • **Unknown:** The costs of closing and rehabilitating 20 miles of user-created trails per decade. • **Unknown:** The costs of securing adequate enforcement, patrolling, signage and education to fend off illegal activity on both old and new official trails, and preventing the creation of new illegal trails. • **Known:** $2, 728,000 on new trail construction and 343,000 on their maintenance. **2. Environmental Costs/Ecosystem Damage from Constructing New Trails** (Affecting soil, air, water, biodiversity, other recreational uses)	**1. Public Benefits:** Extent unknown (dependent on resources committed to control illegal OHV use).Benefits are reduced damage to o Soil o Water o Air o Biodiversity o Non-motorized Recreation
Net Public Benefit? **When trail rehabilitation, trail closing, integrating illegal trails into the official trail system, and enforcement, patrol, education, and signage cost society less than what is created in benefits.**	**Net Public Cost?** **When trail rehabilitation, trail closing, integrating illegal trails into the official rail system, and enforcement, patrol, education, and signage cost society less than what is created in benefits.**

Table 23: Scenario 2- Reducing Illegal Activity Adding Official Trails <u>Leads to More Illegal Activity.</u>

<table>
<tr><th colspan="2">REDUCING
Illegal Use of Off-Highway Vehicles</th></tr>
<tr><th>Public Costs Created by
2006 WNF Plan</th><th>Public Benefits Created by
2006 WNF Plan</th></tr>
<tr><td rowspan="2">1. Budget Costs:
• Unknown: The costs of integrating/rehabilitating illegal trails into a network of legal trails.
• Unknown: The costs of closing and rehabilitating 20 miles of user-created trails per decade.
• Unknown: The costs of securing adequate enforcement, patrolling, signage and education to fend off illegal activity on both old and new official trails, and preventing the creation of new illegal trails.
• Known: $2, 728,000 on new trail construction and 343,000 on their maintenance.

2. Environmental Costs/Ecosystem Damage from Constructing New Trails (Affecting air, water, biodiversity, other recreational uses)

3. Environmental Costs/Ecosystem Damage from Induced Illegal OHV Use (Affecting air, water, biodiversity, other recreational uses)
Resulting from more illegal activity after expansion of official trails, because of lack of enforcement, education and other measures to induce compliance.</td><td>1. Public Benefits:
Extent unknown (dependent on resources committed to control illegal OHV use).
Benefits are reduced damage to
o Soil
o Water
o Air
o Biodiversity
o Non-motorized Recreation
(Assuming some illegal trails are closed and some illegal activity is prevented)</td></tr>
<tr><td>Public Net Loss</td></tr>
</table>

IV. Forest Ecosystem Goods and Services Valuation

A. Introduction

As mentioned above, the WNF Supervisor declared in his Record of Decision, p. 3, that "The Forest Plan outlines environmentally sound management to achieve desired conditions … in a way that **maximizes long-term net public benefits."** (emphasis added)

The term "net public benefits" is defined in the 1982 NFMA regulations as "An expression used to signify the overall long-term value to the nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs) whether they can be quantitatively valued or not. Net public benefits are measured by both quantitative and qualitative criteria rather than a single measure or index…"

One important aspect of positive effects (benefits) provided by forests are ecosystem services, which, by some definitions, include the provision of ecosystem goods.

Ecosystem Services, broadly defined, may include[38]:

- Provisioning services (providing forest products, goods)
- Regulating services (regulating climate, water flow)
- Cultural services (aesthetic, cultural experiences associated with forest)
- Supporting services (nutrient cycling, pollination)

Goods or commodities include for example timber, fuelwood, game animals, medicinal plants, and other non-timber forest products.

The USDA Forest Service Strategic Plan FY 2007-2012, p. 5, has this to say about Ecosystem Services (emphasis added):

> "Ecosystem services are goods and services that we derive from forests and grasslands that **are often not valued in the marketplace**. Forests and grasslands are valued for basic goods, such as food and wood fiber. **But these ecosystems also deliver important services that are often perceived to be free and limitless—air and water purification, flood and climate regulation, biodiversity, and scenic landscapes, for example."**
>
> "According to one international study, 60 percent of the worldwide ecosystem services evaluated in the study are being degraded or used unsustainably."

The USDA Forest Service Strategic Plan FY 2004-2008, states on p.1:

[38] Mates and Reyes, *New Jersey State Parks and Forests*, p. 27.

> "Through conservation, we can improve the current and future quality of life for the American people **by protecting and enhancing clean air, abundant water, and healthy habitat on our Nation's forests and grasslands**."

In what follows, we will first describe ecosystem services (not including ecosystem goods) provided by forests more fully, to give the reader a better understanding of those services. We will then analyze in more detail what weight is put on the provision of some of those services in the WNF Plan.

B. Ecosystem Services Provided by Forests

The following list and description of Ecosystem Services is adapted from "The Economic Value of New Jersey State Parks and Forests": [39]

1. ***Supply of Fresh, Clean Water.*** There is a limited amount of fresh water available on this planet. When it rains or snows water that evaporated from the oceans starts again on its journey to the oceans. How useful this water is to humans depends a great deal on services provided by forests and other natural systems (like grasslands and wetlands). When rain comes down on forest land, the leaves of trees and underbrush slow it down on its way to the ground. The underlying soil absorbs some of it, and releases some of it into groundwater. If it weren't for the trees and the forest soil, the water would quickly accumulate and run off, rapidly swelling intermittent and perennial creeks and streams. Instead, forest ecosystems release the water slowly, and therefore make it available for longer periods of time in the areas where the rain came down. The forest soil and mineral layers below it will also filter and clean the water of pathogens, nutrients, metals, and sediments that it may have picked up. Thus the water becomes drinkable, fishable and swimmable. If forests and other natural systems are not available to provide a regular, steady flow of clean water, humans have to provide these services for themselves, often at great expense.

2. ***Mitigation of Flooding****:* Because forests trap and slowly release rain water, they protect downstream human settlements from flooding that results when large amounts of stormwater run off quickly. If forests do not provide this buffering function, great damage may result downstream, or humans must invest in expensive protective measures.

3. ***Biodiversity and Genetic Treasures.*** A forest ecosystem is composed of a rich diversity of plants, animals, insects, fungi and bacteria. We have very incomplete understanding about what role each of these different elements play within the forest ecosystem, or how a forest ecosystem interacts with other natural and human-influenced systems. It may one day be very useful to us to be able to rely on natural functions and interactions that we do not now understand, and to have available to us the rich genetic treasures that may help us adapt to changing environments.

[39] Mates and Reyes, *New Jersey State Parks and Forests*. p. 28.

Maintaining the diversity also keeps open the potential of discovering new medicines and food products.

4. ***Climate Regulation****:* Forests have major impacts on local climate by changing wind currents, rainfall patterns and local temperatures. They also have a role in global climate regulation. Carbon is stored in trees, undergrowth and forest soil.

5. ***Improving Air Quality***: Forests improve air quality by filtering out particulates and toxic compounds from the air.

6. ***Biological Control:*** Forests have an important role in regulating species populations, including control of invasive and unwanted species, like pests, predators, weeds, disease vectors, etc.

7. ***Aesthetics and Recreation****:* Intact forest ecosystems are valued by people who fish, hunt, gather, hike, canoe, watch wildlife, or take photos. Some people contribute financially to the protection of forest ecosystems and of the treasures they provide, even though they don't intend to ever go there themselves.

8. ***Cultural and Spiritual Importance:*** Forest ecosystems, habitats, and landscapes may be highly valued by humans because of the cultural, historical, spiritual, or even religious connections they have with them.

9. ***Wildlife Habitat:*** Some plant and animal species depend for their survival on the availability of large, contiguous 'patches' of forest. This is true for example for some migratory birds. When forests become diminished in size and heavily fragmented, those species populations start to decrease. Intact forests, therefore, become critical for the survival of species that human beings value for aesthetic or even economic reasons.

10. ***Soil Formation and Retention****:* Forest ecosystems build the soil that then provides many of the services mentioned above, including water storage and filtering, and providing a medium for plant growth. Forests create and enrich soil through the processes of weathering and decomposition. They also retain the soil and prevent it from being washed away by water running off. When forest cover is removed, that leads to increased sedimentation in rivers, lakes and river deltas, which must sometimes be removed at a great expense.

11. ***Pollination:*** Forests provide pollinators essential to the reproduction of plant populations.

C. The Value of Ecosystem Services on the WNF

The USDA Forest Service Strategic Plan FY 2007-2012, p.5, states that:
"Ecosystem services are goods and services that we derive from forests and grasslands **that are often not valued in the marketplace**."

"**Not valued in the market place"** means that they cannot be bought and sold in markets, and therefore no market price exists for them. However, ecosystem services may be described in quantitative or qualitative terms. For example, a statement could be made that older, larger trees contribute more to air purification than younger, smaller trees. Or it could be stated that after logging, sedimentation increases by a certain amount for a specified time period.

But these quantitative or qualitative statements do not give any indication about the value of an ecosystem service. For example, if we know that soil erosion and sedimentation will increase as the result of logging, should we go ahead with the logging anyway, or stop it because of the erosion? Is the value of the additional timber higher or lower than the additional damage done by increased erosion and sedimentation?

If a decision is made to go ahead with logging, we can conclude that the decision maker considers the value of what is lost to be lower than the gains from logging, in this case the value of the timber.

But is this correct? Because of the lack of market data, any decision in which both market and non-market services are considered becomes very subjective, and almost impossible to scrutinize by any objective standards. An example is the decision of the Forest Supervisor of choosing a preferred alternative by weighing costs and benefits described in the FEIS, and coming to the conclusion that this alternative maximizes net public benefit.

The fact that there are no market prices for some of the ecosystem services can create a bias towards undervaluing them, or to assume their value to be zero.

To fill this gap and help make decisions involving ecosystem services more transparent, economists have developed a set of techniques that help establish dollar-values for ecosystem services. These techniques are described in some detail on the following website: www.ecosystemvaluation.org.

To give a few examples that illustrate how dollar values can be established when there are no market prices for ecosystem services:

1) Using what it would cost to build a water treatment plant to establish a minimum value for the water purification services provided by a forest.

2) Using what it would cost to build levies and dams for flood control to establish a minimum value for flood control services provided by forests.

3) Surveying people for their willingness to pay for measures to protect endangered species habitat.

5) Assessing the damage that was avoided because of certain forest ecosystem services (like damage from land slides or floods), and using that as a value of these services.

6) Surveying people regarding the costs they incurred, including the time they spent, to travel to a forest, and use these to estimate a minimum value for that forest.

A large number of peer-reviewed studies, as well as non peer-reviewed studies using such methods of ecosystem valuation have been conducted for forests in temperate climates, like the WNF. Usually each study looks at one specific ecosystem service, like climate regulation or water purification, and establishes the value of that service per acre/per year with one of those methods described above.

The results from this primary research can be used for estimating the value of ecosystem services in other locations, by multiplying the acreage of that forest with the per acre values established in the primary studies.

In the scientific literature, this approach is called the "value transfer method."

"Value transfer is the adaptation of existing valuation information to new geographic or policy contexts. The transfer method involves two steps:

- Obtaining one or more estimates for the value of a given non-marketed ecoservice from one or more prior studies carried out in a different geographic area or under a different policy regime.
- Applying those values from the original 'study site(s)' to a new 'policy site'…."[40]

We found two recent studies that applied the value transfer approach to Forest in New Jersey:

1) William J. Mates, M.S. and Jorge L. Reyes, M.F., **The Economic Value of New Jersey State Parks and Forests,** New Jersey Department of Environmental Protection Division of Science, Research & Technology, Issued June 2004, Revised version issued November 2006.

   This study uses both peer-reviewed and non peer-reviewed studies to determine per-acre values for different ecosystem services provided by New Jersey forests.

2) State of New Jersey, New Jersey Department of Environmental Protection, **Valuing New Jersey's Natural Capital: An Assessment of the Economic Value of the State's Natural Resources**.[41]

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[40] Mates and Reyes, *New Jersey State Parks and Forests,* p. 29/30.

[41] State of New Jersey, *Valuing New Jersey's Natural Capital.* http://www.state.nj.us/dep/dsr/naturalcap/
Summary: http://www.state.nj.us/dep/dsr/naturalcap/nat-cap-overview.pdf
Part I: Overall Results http://www.state.nj.us/dep/dsr/naturalcap/nat-cap-1.pdf
Part II: Ecosystem Services http://www.state.nj.us/dep/dsr/naturalcap/nat-cap-2.pdf
Part III: Ecosystem Goods http://www.state.nj.us/dep/dsr/naturalcap/nat-cap-3.pdf

The ecosystem part of the Natural Capital study (which, besides forests, includes wetlands, agricultural lands, river corridors, coastal areas, etc.) is based on research conducted by Robert Constanza and others at the University of Vermont. Their research included an extensive review of peer-reviewed ecosystem valuation research.

This review is documented in an Appendix B and C to Part II of the New Jersey Natural Capital Study,[42] which lists all the studies that were utilized in this project, and their individual results in valuing specific ecosystem services on a per-acre basis.

For some of the ecosystem services, a large number of primary studies were available. For others there were just a few studies, or none at all. If there were multiple studies available for a particular ecosystem service, the team determined the average of all those results. If there were no studies available, that ecosystem service would not be included.

The per-acre values derived from primary studies were then multiplied with the acres of the different components (forests, wetlands, etc) of New Jersey's natural resources.

In using the value transfer method, the acreage to which the values per acre are to be applied is fairly simple to determine. However, questions may arise as to whether local climatic, biological, geological, and economic circumstances, and the management regime for a forest, are really comparable. In other words, is it justifiable to use the values derived from very specific, localized studies and to apply them to another location?

The authors of the "Valuing New Jersey's Natural Capital" study affirm that "with the increasing sophistication and volume of empirical studies in the peer-reviewed literature, value transfer has become an increasingly practical way to inform decisions when primary data collection is not feasible due to budget and time constraints, or when expected payoffs are small." [43]

In other words, much less time and expense is involved in using the value transfer method, than what it would take to conduct primary research at a study site. And with the number of peer-reviewed studies increasing (reflecting many diverse situations) the accuracy of this method is also improving.

Therefore, in assessing the value of ecosystem services for the WNF, we will use the value transfer method, and use as a basis the per-acre values that were applied in valuing New Jersey's Parks and Forest and New Jersey's Natural Capital. Each study delineates ecosystem services in slightly different ways. The New Jersey Parks and Forest Study gives a range of values for each ecosystem service:

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[42] State of New Jersey, *Valuing New Jersey's Natural Capital***,** Part II: Ecosystem Services, p. 89-127.
[43] State of New Jersey, *Valuing New Jersey's Natural Capital***,** Part II: Ecosystem Services, p. 10.

Table 24: Per Acre Values for Ecosystem Services from New Jersey Parks and Forests Study

Ecosystem Service *(2004 $ PER ACRE PER YEAR)*	**Minimum**	**Middle***	**Maximum**
Waste removal-air	$179	$190	$200
Stormwater control	164	174	185
Pollination	59	162	265
Carbon sequestration	83	155	222
Soil retention	60	73	88
Hydrological services (supply and filtration of water)	22	65	126
Carbon storage	16	30	43
Soil formation	3	4	5
Biological control	2	2	2
Cultural / spiritual	1	1	1
Subtotal	589	856	1,137
Habitat / refugia	820	923	1,025
Total	**1,409**	**1,779**	**2,162**

Source: William J. Mates, et.al, The Economic Value of New Jersey State Parks and Forests, Issued June 2004, Revised version issued November 2006, (Table 12, p. 42)

The WNF area that is managed by the Forest Service is 238,000 acres. Not all of that land is forested. There are also roads, parking lots, buildings, abandoned mines, and other non-forested areas such as rocky areas, or grasslands.

The **New Jersey State forests were assumed to be 90% forested**; the other 10% was assumed to comprise roads, parking lots, buildings, and other non-forested areas such as rocky areas.

Assuming, as the New Jersey study does, that only 90% of the WNF area is indeed forested, that leaves 214,200 acres that could provide ecosystem services.

Table 25: Value Transfer of Per-Acre Value of Ecosystem Services to WNF (from New Jersey State Parks and Forests – Study)
(Assumed: 214,200 forested acres on WNF)

Ecosystem Service	Minimum	Middle	Maximum
Waste removal-air	$38,341,800	$40,698,000	$42,840,000
Stormwater control	$35,128,800	$37,270,800	$39,627,000
Pollination	$12,637,800	$34,700,400	$56,763,000
Carbon sequestration	$17,778,600	$33,201,000	$47,552,400
Soil retention	$12,852,000	$15,636,600	$18,849,600
Hydrological services	$4,712,400	$13,923,000	$26,989,200
Carbon storage	$3,427,200	$6,426,000	$9,210,600
Soil formation	$642,600	$856,800	$1,071,000
Biological control	$428,400	$428,400	$428,400
Cultural / spiritual	$214,200	$214,200	$214,200
Subtotal	**$126,163,800**	**$183,355,200**	**$243,545,400**
Habitat / refugia	$175,644,000	$197,706,600	$219,555,000
Total	**$301,807,800**	**$381,061,800**	**$463,100,400**

Please note that these numbers above do not include recreational values.

This study assumes that sustainable harvest of timber does not interfere with ecosystem services, but doesn't define "sustainable." The study does not investigate how logging affects ecosystem services.

Since there is interference with ecosystem functions through logging, and probably most or all of the studies that were done involve forests that are also logged (since there are hardly any left that are not logged)—that only underscores that the **estimates for values used in these studies for ecosystem services are rather conservative.** They would be higher if there was no interference with ecosystem services through logging and other disturbances.

It is possible that the ecosystem values for the WNF should be adjusted downward, due to the fact that it is so heavily disturbed. For example, its capacity to provide habitat/refugia (the highest per-acre value of all the ecosystem services) may currently be limited due to heavy fragmentation. However, the numbers do show what the potential value of ecosystem services from the WNF may be, if this Forest is allowed to recover, and to develop a larger capacity for provision of these highly valued services.

The "Valuing New Jersey's Natural Capital" study breaks down ecosystem services somewhat differently from the NJ Parks and Forests study, for example, **it does include recreational services as part of the mix.** It **does not include carbon storage services.**

The following table details the per acre values for different ecosystem services on a large number of land cover types from the New Jersey Natural Capital Study.

Table 26: Per Acre Values for Ecosystem Services from "Valuing New Jersey's Natural Capital" – Study Part II
(2004 $ PER ACRE PER YEAR) http://www.nj.gov/dep/dsr/naturalcap/nat-cap-2.pdf, p. 30 (Table 5)

		Ecosystem Services (2004 US$ acre^{-1} yr^{-1})												
Land Cover	**Area (acres)**	**Gas/Climate Regulation**	**Disturbance Regulation**	**Water Regulation**	**Water Supply**	**Soil Formation**	**Nutrient Cycling**	**Waste Treatment**	**Pollination**	**Biological Control**	**Habitat/Refugia**	**Aesthetic & Recreation**	**Cultural & Spiritual**	**Totals**
Coastal & Marine	**953,892**													
Coastal Shelf	299,835				521		723			20			35	$1,299
Beach	7,837		27,276									14,847	*24*	$42,147
Estuary	455,700		286		49		10,658			39	314	292	15	$11,653
Saltwater Wetland	190,520		310					5,413			201	26	180	$6,131
Terrestrial	**4,590,281**													
Forest	1,465,668	54			163	5		44	162	2	923	122	1	$1,476
Grass/Rangelands	583,009	3		2		3		44	13	12		1		$77
Cropland	90,455								8	12	831	15		$866
Freshwater Wetlands	814,479	134	3,657	2,986	1,544			838			113	1,406	890	$11,568
Open Fresh Water	86,232				409							356		$765
Riparian Buffer	15,146		88		1,921							1,370	4	$3,382
Urban Greenspace	169,550	336		6								2,131		$2,473
Urban or Barren	1,365,742													$0
Total	5,544,173	247,419,233	3,383,364,105	2,434,015,054	1,738,649,004	9,249,760	5,073,680,354	1,803,819,315	245,781,449	34,692,849	1,701,061,233	1,993,241,115	777,821,072	19,442,794,544

Notes:

1. Row and column totals are in acre$ yr^{-1} i.e. Column totals ($/yr) are the sum of the products of the per acre services in the table and the area of each land cover type, not the sum of the per acre services themselves.
2. Shaded cells indicate services that do not occur or are known to be negligible. Open cells indicate lack of available information.

The "Valuing New Jersey's Natural Capital" Study offers another interesting detail that is not included in the New Jersey Parks and Forest Study, by separating out forested wetlands and riparian areas from other forest land.

"One hundred foot-buffers were created around rivers of fourth and fifth order, and fifty foot buffers were created around third order watercourses. **A geometric union overlay was then conducted between the LULC and buffer layers. All resulting polygons falling within the buffer were classified as riparian unless they were coded as wetlands, which was given precedence due to its higher ecoservice value."** (emphasis added)[44]

Both the per acre ecosystem values for **forested wetlands** and **riparian areas** are **much higher than the values for general forest areas.**

Table 27: Per Acre Ecosystem Services Value of Forestland, Forested Freshwater Wetland and Forested Riparian Buffers

ECOSYSTEM SERVICES	**(2004 $ PER ACRE PER YEAR)**	**(2004 $ PER ACRE PER YEAR)**	**(2004 $ PER ACRE PER YEAR)**
	FOREST	**FRESHWATER WETLAND (Forested)**	**RIPARIAN BUFFER**
Nutrient cycling			
Disturbance regulation		$,3657	$88
Water regulation		$2,986	
Habitat/refugia	$923	$113	
Aesthetic/recreational	$122	$1,406	$1,370
Waste treatment	$44	$838	
Water supply	$163	$1,544	$1,921
Cultural/spiritual	$1	$890	$4
Gas/climate regulation	$54	$134	
Pollination	$162		
Biological control	$2		
Soil formation	$5		
	$1,476	**$11,568**	**$3,383**

Source: "Valuing New Jersey's New Jersey Natural Capital Study", Part II, Table 5, p. 30

In the "Valuing New Jersey's Natural Capital" study the value of ecosystem services from forest land alone (not counting river corridors and wetlands) is about the same as the lower bound estimate of $1, 409 per acre for forests in the New Jersey Parks and Forest study.

[44] State of New Jersey, *Valuing New Jersey's Natural Capital***,** Part II: Ecosystem Services, p. 15.

D. Ecosystem Goods

Ecosystem goods provided by forests could be any tangible forest products, including for example:

- Timber
- Fuelwood
- Non-timber forest products, like ginseng or mushrooms, or plant materials for wreaths.
- Fish and Game
- Water

The value of ecosystem goods derived from forests in the "Valuing New Jersey's Natural Capital" study is displayed in Table 5 below, and is based on the value of water, wood, and game/fur.[45]

Table 28: Value of Forest Ecosystem Goods

Ecosystem Goods		**2004 $ PER ACRE PER YEAR**
	Raw water*	$118.03
	Wood*	$113.26
	Game/Fur*	$8.19
Total		**$238.00**

*** Derived from Table 34, Annual Value of New Jersey's Natural Capital by Ecosystem "Valuing New Jersey's Natural Capital Study", Part III**

Table 29: Per Acre Value of Ecosystem Goods for Forestland, Forested Freshwater Wetland and Forested Riparian Buffers

2004 US $	$ per acre/year	$ per acre/year	$ per acre/year
	FOREST	**FRESHWATER WETLAND (Forested)**	**RIPARIAN BUFFER (Forested)**
ECOSYSTEM GOODS	**$238**	**$244**	**$118**

Source: "Valuing New Jersey's Natural Capital Study", Part I (Overall Results), Table 5, p. 17

[45] State of New Jersey, *Valuing New Jersey's Natural Capital*, Part III: Ecosystem Goods.

E. Comparison of Per Acre Values of Ecosystem Goods and Ecosystem Services

Table 30: Per Acre Values of Ecosystem Goods and Services for Forestland, Forested Freshwater Wetland and Forested Riparian Buffers

2004 US $	FOREST	FRESHWATER WETLAND (Forested)	RIPARIAN BUFFER
	Per acre/year	Per acre/year	Per acre/year
ECOSYSTEM GOODS	$238	$244	$118
ECO SYSTEM SERVICES	$1,476	$11,568	$3,383

Source: "Valuing New Jersey's Natural Capital Study", Part I (Overall Results), Table 5, p. 17

The stark discrepancy between the value of ecosystem goods and ecosystem services is not unique to New Jersey. It has been reported in the Renewable Resources Planning Act Assessments of the past. [46]

Basically these numbers show that **an acre kept in forest is worth more than an acre cut down for wood.**

In the following chapters, we will take a closer look at how the 2006 WNF Plan affects the capacity of the WNF to provide ecosystem services.

[46] Moskowitz, Karyn, *Economic Contributions and Expenditures in the National Forests*, Prepared for the American Lands Alliance and the John Muir Project of Earth Island Institute Washington, D.C. January 1999.

V. Effects of WNF Plan on Ecosystem Services

A. Is WNF Plan Improving Air Quality?

How Forests Improve Air Quality

One of the ecosystem services that forests can provide is the improvement of air quality by filtering out particulates and toxic compounds from the air.

According to the Environmental Protection Agency's website on "Vegetation and Air Quality",[47]

- "Common pollutants that trees and vegetation can remove include **nitrogen oxides, sulfur oxides, particulate matter, and ground-level ozone."**

- "Research shows that large trees remove considerably more pollution than smaller ones: a healthy tree with a trunk-diameter of 30 inches removes about 70 times more pollution than a tree with a three-inch trunk."

Forest Service Can Increase
FOREST CAPACITY TO IMPROVE AIR QUALITY

By Letting
Trees Get Big and Old

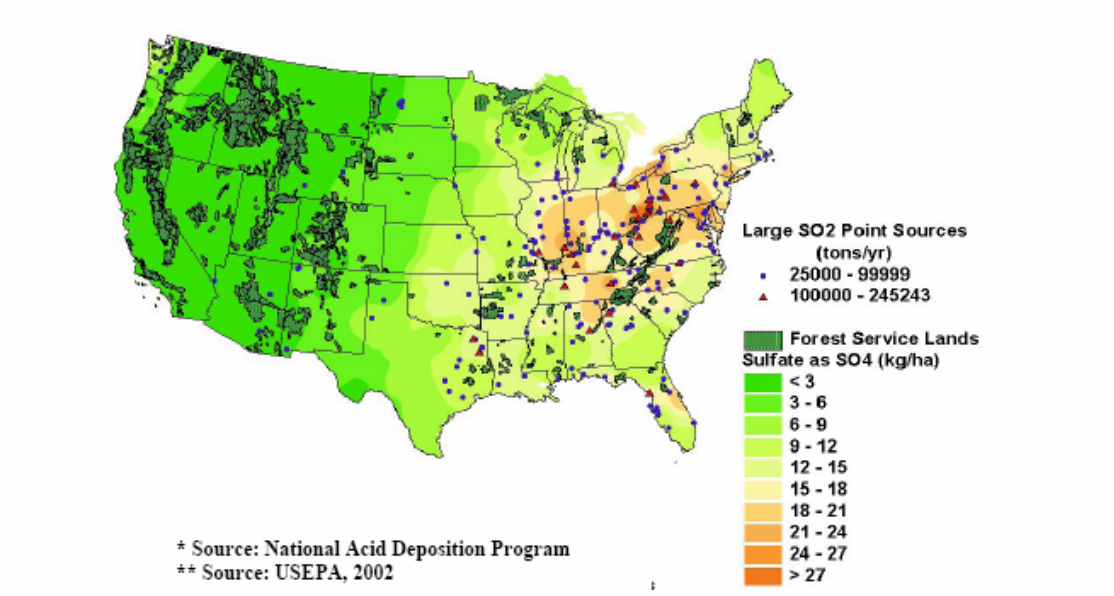
Air Pollution in WNF Region

The FEIS states that:

- The WNF lies within a region characterized by some of the highest levels of air pollution in the nation. Three of these pollutants—**sulfates, nitrates, and mercury—**cause the overwhelming majority of impacts on ecosystems. (FEIS, p. 3-29)
- This region has **some of the highest levels of acid rain and mercury deposition**. (FEIS, p. 3-30)

[47] U.S. Environmental Protection Agency, Vegetation and Air Quality. http://www.epa.gov/hiri/strategies/level3_vegairquality.html

Figure 1: Sulfate Deposition During 1999 and Largest Sulfur Dioxide Point Sources



Source: FEIS Figure 3-6

- "Sulfur dioxide and nitrogen oxides are precursors to important components of **ozone and regional haze**, resulting in inhibited visibility during hot sunny weather with stagnant atmospheric conditions."(FEIS, p. 3-29)
- "Sulfur dioxide and nitrogen oxide affect foliage and reduce the growth of species sensitive to these pollutants." (FEIS, p. 3-29)
- "The Wayne lies near some of the largest sulfur dioxide (SO_2) emitters in the nation. **The resulting acidic sulfate deposition is the heaviest in the nation**, and the **Forest experiences high levels of acid deposition stemming from these and other nearby sources."** (FEIS, p. 3-29)

Particulate Matter Pollution in WNF Counties

According to the WNF FEIS, of the 12 counties in Ohio that contain WNF land, all but one, Washington County, is considered in attainment for these pollutants by EPA standards. **Washington County** is a non-attainment area for the eight-hour ozone and fine particle pollution standard as of Sept.14, 2005.9 (FEIS, p. 29)

While the 2006 WNF FEIS lists only one county as a non-attainment area for particulate matter, on the Environmental Protection Agency's Region 5 site for Fine Particle (PM 2.5) designations, **four WNF Counties are included as being in non-attainment: Washington, Scioto, Gallia (in part), and Lawrence.**[48]

[48] U.S. Environmental Protection Agency, Region 5, Particulate Matter (PM 2.5), Non-attainment Counties. http://www.epa.gov/pmdesignations/regions/region5desig.htm—Last updated on Tuesday, October 30th, 2007.

The following table shows population numbers for the affected counties:[49]

Table 31: Population of WNF Counties in Non-Attainment

County	Whole/Part	Population (2000)
Gallia	Part	3,625
Lawrence	Whole	62,319
Scioto	Whole	79,195
Washington	Whole	63,251
Total		**208,390**

Source: EPA Website on Particulate Matter (PM-2.5)

According to the Environmental Protection Agency (EPA): "Air pollutants called particulate matter include dust, dirt, soot, smoke and liquid droplets directly emitted into the air by sources such as factories, power plants, cars, construction activity, fires and natural windblown dust."[50]

EPA states the following about health and other effects from particulate matter: "Based on studies of human populations exposed to high concentrations of particles (sometimes in the presence of SO2) and laboratory studies of animals and humans, there are major effects of concern for human health. These include effects on breathing and respiratory symptoms, aggravation of existing respiratory and cardiovascular disease, alterations in the body's defense systems against foreign materials, damage to lung tissue, carcinogenesis and premature death. The major subgroups of the population that appear to be most sensitive to the effects of particulate matter include individuals with chronic obstructive pulmonary or cardiovascular disease or influenza, asthmatics, the elderly and children. Particulate matter also soils and damages materials, and is a major cause of visibility impairment in the United States."[51]

"For particulate matter, monitored in many countries as PM10 (particles collected by a convention that has 50% efficiency for particles with an aerodynamic diameter of 10 m), no safe threshold for exposure has been identified. … PM10 consists of a mixture of particle components, including traffic- and combustion-derived carbon-centered ultrafine particles (less than 100 nm in diameter), secondary particles (nitrates and sulfates), wind-blown dust of

[49] U.S. Environmental Protection Agency, Particulate Matter (PM-2.5) Nonattainment Area Counties, Listed by State, County, Area, As of March 12, 2008. http://www.epa.gov/air/oaqps/greenbk/qnay.html
[50] U.S. Environmental Protection Agency, Criteria Pollutants. http://www.epa.gov/oar/oaqps/greenbk/o3co.html#ParticulateMatter
[51] U.S. Environmental Protection Agency, Criteria Pollutants. http://www.epa.gov/oar/oaqps/greenbk/o3co.html#ParticulateMatter; see also: AIRNow, Particle Pollution and Your Health. http://airnow.gov/index.cfm?action=particle.airborne

geological origin, potentially containing endotoxin, and biological particles (e.g., spores, pollen) with their associated allergens."[52]

Ohio counties that are considered "non attainment" have to develop a "State Implementation Plan (SIP)," identifying the major sources of pollution and finding ways to bring the counties into attainment. A non-attainment designation under the Clean Air Act may lead to the loss of economic development opportunities and other drastic consequences. According to the U.S. Chamber of Commerce:[53]

- "New and upgraded facilities in, or near, non-attainment areas are required to install the most effective emissions reduction controls without consideration of cost. Operators of existing facilities may also be required to install more restrictive control technologies than are otherwise required for similar units in areas that are in attainment."
- "Prior to permitting the construction of new facilities, a state must offset any emissions increases by achieving reductions at existing facilities."
- "The added regulatory and paperwork burdens, as well as expenses associated with constructing new facilities, or expanding existing ones, limit the amount of economic investment in non-attainment communities."

This translates into costs to the taxpayer to prepare and execute the SIP, a potential slow down of economic expansion for existing businesses, and reluctance of new companies to locate in an area.

Air Pollution from Prescribed Burning

The WNF FEIS, rather than elaborating on **how air pollution affects the forest**, or **what the forest can contribute to absorbing some of the pollutants** that are so prevalent in the region, instead **analyzes the impacts that prescribed burns and other activities on the Wayne have on air quality**.

- The FEIS identifies **particulate matter in the smoke from prescribed fire** as the major impact on air quality **resulting from management** of the WNF. (FEIS, p. 3-30)
- According to the FEIS, timber harvest and motorized recreation also affect air quality with dust and increased emissions. However, these impacts are expected to be negligible compared to background levels of air pollution from power plants and automobiles. (FEIS, p. 3-31)

The FEIS comes to the conclusion that: **"There is currently no evidence to suggest that air quality in Ohio and near the WNF should constrain Forest management options or actions**." (FEIS, p. 3-31)

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[52] Strong, Vicki, Environmental Air Pollution, *Am. J. Respir. Crit. Care Med.*, Volume 162, Number 2, August 2000, S44-S47. http://ajrccm.atsjournals.org/cgi/content/full/162/2/S1/S44

[53] U.S. Chamber of Commerce, Consequences of Non-Attainment. http://www.uschamber.com/issues/index/environment/nonattainmentconseq.htm

Then the Forest Service adds another sentence: “In general, management actions improve forest health, which should allow the Forest to better withstand the stress caused by air pollution.” (FEIS, p. 3-31) No evidence is provided for that statement.

In other words, the FEIS does not approach the issue from the perspective of how the WNF could contribute to the purification of the air that is heavily polluted.

Instead, the approach of the Forest Service is to justify polluting activities by establishing that the additional pollution created by planned Forest Service activities doesn’t contribute enough air pollution to make a noticeable difference to the already heavily polluted air.

However, if prescribed burning helps to keep the area in "non attainment," there will not just be health effects, but economic impacts as well. As was shown in greater detail above, four WNF counties are now in non-attainment for particulate matter. This translates into costs to the taxpayer to prepare and execute the SIP, a potential slow down of economic expansion for existing businesses in these and surrounding counties, and reluctance of new companies to locate in an area.

The WNF Plan projects the following activities over ten years that affect air quality (Table 2-4, FEIS p. 2-19):

- Prescribed burns for oak regeneration on 46,215 acres
- Prescribed fire for hazardous fuel reduction on 21,508 acres.

This adds up to **67,723 acres** that will be burnt by the Forest Service in a ten year period.
In comparison, from 1986 to 1996, there were a total of **481 federal fire occurrences** in the state of Ohio (including both natural and manmade fires). **The total area burnt on all Ohio federal land was 16 square kilometers,** which translates into **3954 acres over 11 years.** [54]

67,723 acres to be burnt by the Forest Service on the WNF (over ten years) compares to 3954 acres that burnt on all federal lands in Ohio from 1986 to 1996. Assuming for a moment that all of these 3954 federal acres had burnt on the Wayne, that would be 5.8 percent of the 67,723 acres that the Forest Service intends to burn—and there will still be **additional unplanned fires** not initiated by the Forest Service. Even considering that the prescribed burns may prevent some or even all of the unplanned fires that would otherwise occur, there is still a huge increase in total acres burnt. Also, whatever unplanned fires may be prevented through prescribed burns could be offset by **controlled burns getting out of hand.**

To alleviate concerns, the Forest Service maintains that

1. Measures will be taken to minimize effects (Burn plans)
2. Effects will be of short duration and only occur in a limited area.

“Smoke from prescribed fires adds to air pollution from all other sources. As long as fires conform to prescription, however, smoke should not result in non-conformance with air quality standards, and public exposure to smoke should be minimal and sporadic. Project-level

[54] Schmidt et. al., *Wildland Fire and Fuel Management*, p. 30.

mitigation should ensure proper lofting, dilution, and transport of pollutants from populated areas. Any visibility concerns should be short-term and not a continuing problem for any area. Additionally, some wildlife species are sensitive to smoke, and proper smoke mitigation methods in such cases would be addressed at the project level." (FEIS p, 194)

But, obviously, smoke goes somewhere after it is dispersed from the burning location, even if it is a small amount. There is no "away." The crux of many environmental issues is that most polluters think their contribution cannot possibly have an impact large enough to make a difference. But, when everyone thinks like this and acts accordingly, the effect of the combined actions is nevertheless substantial.

How prescribed burns may add up to have a substantial impact on air quality can be seen from the following table, that shows acres of prescribed burns for National Forests west and southwest of the WNF. Altogether, 3.5 million acres of national forest could be burned in those seven forests alone in the next decade. This is an astounding 5,519 square miles, or a square of land 75 miles long per side.

Table 32: National Forest Prescribed Burns in WNF Region

National Forests West or Southwest of WNF	**Prescribed Burns Per Year**	**10 Year Total**
Hoosier *	1,990 acres/year	19,900 acres
Daniel Boone *	32,900 – 42,250/year	329,000—422,500
Shawnee *	12,400 acres/year	124,000 acres
LBL*	10,000 acres/year	100,000 acres
Mark Twain*	68.800 acres/year	688,000 acres
Ozark*	120,000 acres/year	1,200,000 acres
Ouachita *	180,000 acres/year	1,800,000 acres
TOTAL	**426,090 acres/year**	**4,260,900 acres** using Boone low range
TOTAL	**435, 440**	**4,354,400 acres** using Boone high range

* Numbers are from recent Forest Plans for these National Forests

Even the Forest Service implicitly acknowledges that there may be substantial localized effects from burns. The Supervisor decided to remove 853 acres of land from the Historic Forest Management Area, which involves a lot of burning, to accommodate the Nelsonville Bypass.

The reason? "Prescribed fire in this area may have allowed the smoke from prescribed burning to cross the highway creating a safety hazard. Changing the management prescription will eliminate this predictable safety concern." (ROD, p. 17)

"Voices for the Forest," a grassroots group that acts to protect the Shawnee State Forest located west of Portsmouth, Ohio, has the following information on their website regarding the health effects form prescribed burns: [55]

- *Wildfire Smoke a Guide for Health Officials* concluded that individual effects of smoke can range from irritation of the eyes and respiratory tract to asthma, bronchitis, reduced lung function, premature death and more. Sensitive populations include individuals with asthma and other respiratory diseases, cardiovascular disease, smokers, the elderly and children.

  This guide noted that smoke tends to fill valleys where people usually live. Smoke levels are hard to predict and change constantly and quickly. Additionally, it explained that being indoors does not protect you entirely from the smoke. It sometimes reduces the air pollution by about one-third. In non-conditioned homes, anywhere from 70–100 percent of fine particulate will penetrate indoors from the outside air. In leaky homes and buildings, the guidance of staying indoors may offer little protection.

- Though it is recognized that wildfires generate higher levels of particulate pollution per acre than prescribed fires because of higher fuel consumption, it is also true that the cooler, smoldering fires often associated with prescribed burning can create as much as twice the smoke per unit of fuel consumed. So, the tradeoff is not always clear.

- The American Lung Association's Website reads, "Particle pollution (Particulate) in the form of tiny, invisible matter is quietly but effectively killing tens of thousands of Americans every year." Particle pollution or matter is produced during prescribed fires.

  USDA Forest Service Technical Report states: "Over 90 percent of the particulate emissions from prescribed burns are small enough to enter the human respiratory system. These particulates can contain hundreds of chemical compounds, some of which are toxic. The repeated, lengthy exposure to relatively low smoke concentration over many years can contribute to respiratory problems and cancer."

- Additionally, the USDA report noted that the burning of poison ivy could cause immediate skin rashes that are more widespread on the body than from direct contact with the plants and if you breathe the smoke, your respiratory system can be affected.

- Scioto County (this is also a WNF County – note added by GreenFire) has a serious problem with particulate pollution. The 2004 American Lung Association grade card gave Scioto County an F. The "Sensitive Population" total in Scioto County was 27,000. This only includes persons with asthma, bronchitis, emphysema and cardiovascular

[55] Voices For the Forest, Burning Points –Health & Safety Concerns. http://www.voicesfortheforest.org/burns.html

disease. Another 15,313 were listed as under the age of 14 and 11,711 listed as over 65. Total population was 78,041. Moreover, currently Scioto County is out of compliance with the EPA's guidelines of particle pollution in the air.

In addition to health effects on humans, there could be negative effects on endangered Indiana bats from smoke related to prescribed burns. (FEIS, p. 3-120/123)

Air Pollution from OHV

Once the OHV trails proposed in the 2006 WNF Plan are in place, there will be additional air pollution generated from the use of OHV's. A 2008 study by the Center for Biological Diversity shows that these vehicles generate very high levels of pollution. "A two-stroke all-terrain vehicle or motorcycle can emit as much pollution (hydrocarbons, carbon monoxide, and nitrogen oxides) in one hour as more than 30 automobiles operating for one hour…" Hydrocarbons, carbon monoxide, and nitrogen oxides, as well as particulate matter from the dust that is generated on OHV trails, are known to be linked to respiratory disease, cancer, and premature death.[56]

With regard to air pollution attributed to off-highway vehicles, the American Lung Association website has the following information about **EPA Region 5**, which includes Illinois, Indiana, Michigan, Minnesota, Ohio and Wisconsin:[57]

- **Volatile Organic Compounds (VOC):** 19 percent from OHV, 28 percent from highway vehicles
- **Nitrogen Oxide (NOx):** 19 percent of from OHV, 33 percent from highway vehicles.
- **Particulate Matter (PM):** 9 percent of from OHV, 5 percent from highway vehicles

Forgone Ecosystem Benefits as the Result of Logging Activities

As was stated above, larger trees remove considerably more pollution than smaller ones.

Increasing logging on the WNF, as projected by the WNF plan, would therefore reduce the capacity of the WNF to remove pollutants from the air on **18,441acres** of the forest (even- and uneven aged harvest, thinning, creating openings—FEIS Table 2-4) These acres would be in various stages of recovery from clear-cutting or selective cutting, and would not be allowed to grow into (or stay) in a mature state where their capacity to remove pollution is largest. In addition to these 18,441 acres, there could be salvage logging on many more acres (see Chapter: Follow the Money) below for more on salvage logging.

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[56] Kassar, Chris and Paul Spitler, *Fuel to Burn*, Center for Biological Diversity, May 2008, p. 15. http://www.biologicaldiversity.org/campaigns/off-road_to_ruin/pdfs/Fuel_to_Burn_Final.pdf,

[57] American Lung Association, Regional Differences on Sources for Ozone and Particle Pollution, Region 5. http://lungaction.org/reports/sota04_region5.html

While logging 18,441 acres will reduce the capacity of the forest to purify air, this effect may be offset by tree growth in areas that are not being logged during the next 10 years. Yet, the air purification capacity of the forest will be lower than it could be.

Logging may have an effect on the buffering capacity of forest soil for acid rain. As shown above, Southeast Ohio depositions are the highest in the nation. Slope gradients range from 15 to 80 percent on the WNF, with dominant gradients between 25 and 55 percent (FEIS, p. 3-21). Soil layers are usually thinner on steeper soils. Any disturbance through timber harvest, road construction, prescribed burns, trail construction, trail use (legal and illegal), and mineral development will therefore have an impact on the capability of the soil to absorb and buffer acid rain.

Forgone Ecosystem Benefits as the Result of Mining, Road and Trail Building

As was stated trees remove pollution. Road building, mining and trail building may remove vegetation for a long time to come, and therefore reduce the capacity of the WNF to remove pollutants from the air.

FEIS Table 2-4 shows the following for **Roads, Mining and Trails:**

Temporary Road Construction: 50 miles (146 acres)
Permanent Road Construction: 127 miles (392 acres)

Surface Coal Mining: 1250 acres
Oil and Gas Well Development: 121 acres

OHV: 124 miles (150 acres)
Hiking Trail Construction: 30 miles (18 acres)
Horse Trail Construction: 50 miles (61 acres)
Mountain Bike Trail: 30 miles (36 acres)
Recreational Facility: 60 acres

Value of Lost Capacity for Air Purification

The WNF's Capacity to purify the air is reduced by vegetation removal for:

- Logging (18,441acres)
- Mining (1,371 acres)
- Roads (538 acres)
- Trails and Recreational Facility (325 acres)

The total acres of land affected: 20, 675 acres over 10 years

Above, we showed dollar values for different ecosystem services that forests can provide. One of these services is the purification of air. The New Jersey Parks and Forest Study included above showed the value of that service to range from $179-$200 per acre per year.

Table 33: Per Acre Values for Ecosystem Services

Ecosystem Service *(2004 $ PER ACRE PER YEAR)*	Minimum	Middle*	Maximum
Waste removal-air	$179	$190	$200

New Jersey State Parks and Forests – Study (Table 12, p. 42)

We will use these figures to estimate the value of the damage done to this ecosystem service through logging and the building of trails and roads as the 2006 WNF Plan is implemented.

LOGGING: Over ten years, 18,441 acres of vegetation could be logged, which amounts to an average of 1,844 acres per year. In assessing the changes in lost capacity for air purification resulting from this, we consider the following:

- The trees that are logged are likely to be the ones that the Forest Service considers "mature" (trees that are > 80 years, or >60 years for pines). These are trees that, if they had been left standing, would over time have increased more than proportionately in their capacity to reduce air pollution. As we stated above, a healthy tree with a trunk-diameter of 30 inches removes about 70 times more pollution than a tree with a three-inch trunk. This means that the **opportunity costs of cutting these trees** with regard to air pollution **increases over time** (opportunity cost is a lost benefit).
- On the other hand, the areas that have been logged will grow back. However, because of the fact that larger diameter trees increase disproportionately in their capacity to purify air, the regrowth over ten years cannot be expected to make up for what is lost by cutting the older trees.
- Since it is beyond the capacity of this study to estimate the opportunity costs from logging older trees, versus the increase in air purification capacity from regrowth, we will just assume here that they balance each other out. It should be clear to the reader, however, that this means the ecosystem costs of logging are underestimated rather than overestimated.
- The ecosystem value of air purification from forests is between $179 to $190 per acre per year.
- In the table below we assumed that the logging of 18, 441 acres will be evenly spread out over ten years, that is, every year 1,844 acres will be logged. The fact that the trees are gone will affect ecosystem service capacity not just in the year of the logging, but in the years following as well. For every acre of trees removed—from the year that the trees were first removed, to the end of the ten-year period—there is a loss of air purification capacity to be considered that is equal to the area that is initially logged. This is based on the fact that regrowth cannot match the lost air purification capacity from cutting the old trees within a ten year period.
  Adding up all the acres of **lost air pollution capacity over the ten-year period** yields a total of **108,796** acres.

Table 34: Acres of Diminished Air Purification Capacity Over Ten Years from Logging

LOGGING	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	TOTAL
Acres Removed	1,844	1,844	1,844	1,844	1,844	1,844	1,844	1,844	1,844	1,844	
		1,844	1,844	1,844	1,844	1,844	1,844	1,844	1,844	1,844	
			1,844	1,844	1,844	1,844	1,844	1,844	1,844	1,844	
				1,844	1,844	1,844	1,844	1,844	1,844	1,844	
					1,844	1,844	1,844	1,844	1,844	1,844	
						1,844	1,844	1,844	1,844	1,844	
							1,844	1,844	1,844	1,844	
							1,844	1,844	1,844	1,844	
								1,844	1,844	1,844	
									1,844	1,844	
										1,844	
Accumulated Acres of Diminished Air Purification Capacity over 10 years	1,844	3,688	5,532	7,376	9,220	11,064	14,752	16,596	18,440	20,284	108,796

- Multiplied with the **values per acre per year for air purification services**, this amounts to **forgone benefits** over ten years that amount to in between **$19,474,484 and $21,759,200 from logging** on the WNF over a ten –year period.

Table 35: Diminished Value of Air Purification Ecosystem Service from Logging

Ecosystem Service Value	Minimum	Middle*	Maximum
Waste removal-air	$179	$190	$200
Acres of Reduced Air Purification Capacity over 10 Years	108,796	108,796	108,796
Value of Damage to Ecosystem Service from WNF Logging on 18,441 acres over 10 Years	$19,474,484	$20,671,240	$21,759,200

MINING. ROADS AND TRAILS: Over ten years, 2,230 acres of vegetation are removed for mining, roads, and trails and recreational facilities.

- This comes to an average of 223 acres per year**.** In our calculation, we assume that the removal of vegetation is spread out evenly over the ten years, and that the acres stay vacant for the rest of the ten-year period after they have been cleared, and therefore will not produce any air purification services. As far as temporary roads are concerned, we assume that they do not revert back to a natural state within the 10 years under consideration.
- The accumulated acreage of diminished air purification capacity from mining, roads, and trails over ten years is **12,250 acres**.

Table 36: Acres of Diminished Air Purification Capacity Over Ten Years from Trails, Mining, Roads, Recreational Facility

TRAILS, MINING, ROADS' REC. FACILITY	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	**TOTAL**
Acres Removed	223	223	223	223	223	223	223	223	223	223	
		223	223	223	223	223	223	223	223	223	
			223	223	223	223	223	223	223	223	
				223	223	223	223	223	223	223	
					223	220	220	220	220	220	
						223	223	223	223	223	
							223	223	223	223	
								223	223	223	
									223	223	
										223	
Accumulated Acres of Diminished Air Purification Capacity over 10 years	**223**	**446**	**669**	**892**	**1,115**	**1,335**	**1,558**	**1,781**	**2,004**	**2,227**	**12,250**

- The damage to the air purification service on 12,250 acres (over ten years) from mining, road and trail building amounts to in between **$2,192,750 and $2,450,000**

Table 37: Diminished Value of Air Purification Ecosystem Service from Mining, Roads and Trails

Ecosystem Service	Minimum	Middle*	Maximum
Waste removal-air	$179	$190	$200
Acres of Reduced Air Purification Capacity	12,250	12,250	12,250
Value of Damage to Ecosystem Service from Mining, Roads and Trails over 10 Years	**$2,192,750**	**$2,327,500**	**$2,450,000**

Net Public Benefit Analysis

The Forest Supervisor stated in the ROD: "The Forest Plan outlines environmentally sound management to achieve desired conditions … in a way that maximizes long-term net public benefits."(ROD, p. 3)

Does this apply with regard to improvement of air quality as an ecosystem service provided by forests?

Public Costs from WNF Plan Regarding Air Purification

Forest Services Expenditures that could be related to improving air quality are:

- Related to designing burn plans so that smoke is dispersed quickly and health effects are minimized (but this is only a benefit from a local perspective).
- Expenditures for the acquisition of non-forest land that is added to the WNF, and allowed to grow into a forest. As the forest grows up, the capacity to purify air increases.
- Expenditures related to decommissioning trails and roads or mining features, and re-integrating that land into the forest.

There are many **expenditures** related to Forest Service activities that **increase air pollution** and reduce the capacity of the forest to remove pollutants from the air. These costs are not included here, because they are related to other programs, that is, their intention in to modify habitat and reduce fuel loads, therefore, they will be included as costs of those programs.

What we will include under public costs, however, are the negative externalities generated by those activities.

Increased air pollution from OHV's: We assume that more trails will invite increased usage.

Air pollution impacts from prescribed burns on 67,723 acres of WNF land: Pollution will have effects both on **human health** and **forest species** like the endangered Indiana bat.

Reduced capacity of the forest to purify air: This is the result of tree-removal from logging (estimated damage between $19,474,484 and $21,759,200), and from road and trail building, mineral activity, etc. (estimated the damage between $2,192,750 and $2,450,000.

Public Benefits from WNF Regarding Air Purification

Benefits regarding improved air quality could result from:

- Designing burn plans that make sure that smoke is dispersed quickly and health effects are minimized in the local area. However, this is only a local benefit, since air pollution is only dispersed, not eliminated.
- Acquisition of non-forest land that is added to the WNF, and allowed to grow into a forest. As the forest grows up, the capacity to purify air increases. The WNF Plan authorizes acquisition of up to 40,000 acres.
- Decommissioning trails and roads or mining features, and re-integrating that land into the forest (70 acres of oil well reclamation, and 29 acres of road decommissioning according to FEIS Table 2-4).
- The Forest Service claims that over a 100 year period, the average age of trees in the WNF will increase substantially (FEIS, p.3-83), but we do not know how much of that increase will happen in the next ten years. **Any net tree growth (additional growth from standing trees not affected by removal of vegetation through logging, and through other disturbances)** would add to the air purification capacity of the WNF. This benefit would be generated without any additional cost to the Forest Service, since all that is required is that that Forest Service leaves those trees standing.
- **Re-growth** after removal through logging or burning

Net Public Benefit or Loss Regarding Air Purification Services?

It is not clear whether a public net benefit with regard to air purification services will arise over the next ten years. For that to happen, the air purification benefits from net forest growth on the WNF (additional growth of standing trees over ten years minus what is logged, destroyed by natural disturbance, or turned into roads, trails and mining sites) have to also outweigh additional air pollution effects on human health and effects on wildlife from prescribed burning and ORV's. Particulate matter in the air can have serious health impacts, which lead to increased health costs and to economic consequences, such as lost work days.

However, even if there is still a net benefit after accounting for all the costs, it is clear that the 2006 Forest Plan **does not maximize net public benefit** with regard to air purification services over the next ten years, and will limit the provision of this service over decades to come, since 161,752 acres of the WNF have been declared suitable for timber production (FEIS Table 2-4). This means that in the long run, logging will limit tree growth on 161,752 acres, almost 70 percent of the forest, and therefore the delivery of air purification services. The Forest Service aims at providing a continuous, and rising, supply of timber over time. Table B-2 in Appendix B of the LRMP shows that the Allowable Sales Quantity (ASQ) for this coming decade is 83 million board feet (MMBF), 88 MMBF for the second decade, but is then scheduled to increase

to 148 MMBF in the third decade and stay at this level from then on. This is a 78 percent increase from the first decade.

Table 38: Public Benefits and Costs from Improving Air Purification Ecosystem Services on the WNF

Ecosystem Service: Improving Air Quality?	
Public Costs Created by 2006 WNF Plan	**Public Benefits Created by 2006 WNF Plan**
1. Unknown Expenses Related to • Mitigation of localized air pollution effects from prescribed burns effects (Burn Plans). • Cost of acquisition of non-forest land that is added to the WNF, and allowed to grow into a forest. • Decommissioning trails, roads or mining features. **2. Forest's Capacity to Purify the Air is Reduced by Vegetation Removal for:** • Logging (18,441acres) • Mining (1,371 acres) • Roads (538 acres) • Trails and Rec Facility (325 acres) **Total: 20,675 acres over 10 years** **$ Estimate of Damage to Air Purification Service** • Mining, road and trail building $**2,192,750** to **$2,450,000** • Logging**: $19,474,484** to **$21,759,200** **3. Air Pollution from** • Prescribed burns on 67,723 acres • Dust and fumes from OHV engines • Dust and fumes from logging and logging equipment. • Serious health effects, including death may result especially from the particulate pollution related to prescribed burns. • Effects on endangered species	**The Forest's Capacity to Purify Air is Increased by:** • **Any net tree growth** on the WNF (additional growth from standing trees unaffected by removal of vegetation through logging, mining, etc., or natural disturbance). • **Tree growth on non-forest** land added to WNF land through acquisition. • **Land reclaimed** from roads, trails, and mining sites that is re-integrated into the forest. (70 acres of oil well reclamation, and 29 acres of road decommissioning according to FEIS). • **Re-growth after logging or burning.**
Net Public Benefit?	**Net Public Loss?**

The Big Picture

Looking at net public benefit with regard to air purification is a partial analysis. Just because the WNF Plan does not necessarily produce a net public benefit regarding this issue, does not imply that the overall plan with all of its different aspects creates a net public loss.

However, to offset a net loss in one area (or to justify a less than maximum net public benefit) there has to be a net benefit somewhere else that is big enough to offset the loss.

How does the Forest Service justify prescribed burns and timber operations which generate most of the negative impacts on air purification? They are justified as management tools to reduce hazardous fuel loads, to maintain oak hickory forest, and to create more early successional habitat.

We have already analyzed prescribed burns as a tool to reduce fuel loads on the forest, and have come to the conclusion that this program produces a net public loss itself. Therefore, it cannot be used as a justification to offset the net loss from increased air pollution and from a reduced capacity of the forest to purify the air.

We will analyze the Forest Service's goals of maintaining oak hickory forest and to create more early successional habitat in the section on Biodiversity below. As we will show, these programs do not produce net public benefits either.

OHVs are another contributor to air pollution, and to the reduced air purification capacity of the forest. While this activity is enjoyed by those who exercise it, it also affects other recreation activities in a negative way. We will look at these issues in the Ecosystem Services chapter on Recreation below.

B. Is the WNF Plan Increasing Water Purification, Flow Regulation, and Control of Flooding?

Forest Ecosystem Services Regarding Water

When rain falls on forested land, some of the water will run off and swell intermittent and perennial creeks and streams. Some of the water will be intercepted by leaves and other tree and plant surfaces, and eventually be absorbed into the soil. Some of it will be taken up by tree roots and the roots of other vegetation on the forest floor. Some of the water will slowly enter the groundwater, being filtered through soil and mineral layers, and eventually released into surface waters through springs, and by feeding into streams and rivers. Some of the water will evaporate from the leaves of trees and understory vegetation.

This process yields multiple benefits for humans:

> **Water Purification:** Water that may be contaminated with air pollutants is purified by being filtered through soil and mineral layers, and by contact with leaves. Water that is not purified by such natural processes may have to be purified in water treatment plants at considerable cost.
>
> **Flow Regulation:** Without the forest ecosystem absorbing and slowly releasing some of the water during rainfall, all water would run off very quickly, swell creeks and streams, and be on its way to the ocean. Because the forest ecosystem holds some of that water and releases it slowly, it is available to humans more steadily and continuously. To replace this flow regulation service, humans would have to provide other water catchment and storage facilities.
>
> **Flood Control:** When large amounts of rain fall in a short period of time and there is not enough buffering through forests, wetlands and grasslands, water can quickly run off and cause flooding downstream. To replace this natural flood control, humans may have to build dams and levies to protect human settlements.

What improves the capacity of a forest to deliver these services are matures trees, plentiful understory vegetation and thick layers of soft, un-compacted soil, rich in organic matter and humus capable of absorbing, holding and filtering rainwater. Forest stream corridors and wetlands are especially important with regard to filtering out sediments, nutrients and pollutants.

The following example illustrates the economic importance of ecosystem services: In 1989, New York City's drinking water no longer met federal drinking water standards because of residential and commercial development in the 1.26 acres of watershed that provides New York City's drinking water. Faced with having to put about $6 billion into a water filtration plant (and an additional $300 million into yearly operating costs), New York City instead sought approval from the EPA to meet the federal drinking water standards by implementing a variety of measures to better protect the watersheds from which its drinking water comes. This measure

cost about $1.5 billion. The net savings of around $4.5 billion indicate the value of the ecosystem services provided by a properly managed and preserved watershed.[58]

New York City is not the only city in the United States that gets its drinking water from forests. "According to the Chief of the U.S. Forest Service, the two main purposes for creating the National Forest System were to maintain abundant forest reserves and to supply abundant water; as of 1999, over 3,400 communities with over 60 million residents relied on National Forest lands located in 33 states for their drinking water."[59]

A cursory look at counties with WNF land shows that their water supplies are from watersheds, rivers and streams connected to the WNF. [60] The FEIS includes some information on WNF watersheds on p. 3-8 to 3-11.

Forest Service Can Increase

FOREST CAPACITY TO PURIFY WATER AND REGULATE WATER SUPPLY

By

- **Leaving Soil Undisturbed** (From Logging, Mining, OHV, and Burning).
- **Not Compacting Soil** (Through Logging, Mining, OHV).
- **Not Disturbing Vegetation**, but….
- **Allowing the Forest to Develop Layers of Vegetation with** Large Trees, Understory and Forest Floor Vegetation to
- **Slow Down, Take Up, and Evaporate Rainwater.**

The State of Water Resources on the WNF

[58] Mates and Reyes, *New Jersey State Parks and Forests*, p. 31.
[59]Dombeck, Mike (Chief of the U.S. Forest Service). *The United States Forest Service: The World's Largest Water Company*, Outdoor Writers Association of America Conference Sioux Falls, SD June 21, 1999. http://www.uwsp.edu/cnr/gem/Dombeck/MDSpeeches/CD%20COPY/The%20World's%20Largest%20Water%20Company.062199.htm
[60] See for example: Ohio State University, Washington County. http://ohioline.osu.edu/aex-fact/0480_84.html Reports for other counties can be accessed at http://extension.osu.edu/natural_resources_and_environment/ohio_water_resources.php

When the Forest Service began acquiring land in southeast Ohio in 1935, the original goal was to provide for the restoration of key watersheds that had been heavily impacted by farming and mineral extraction in the 1800s. (FEIS, p. 1-20)

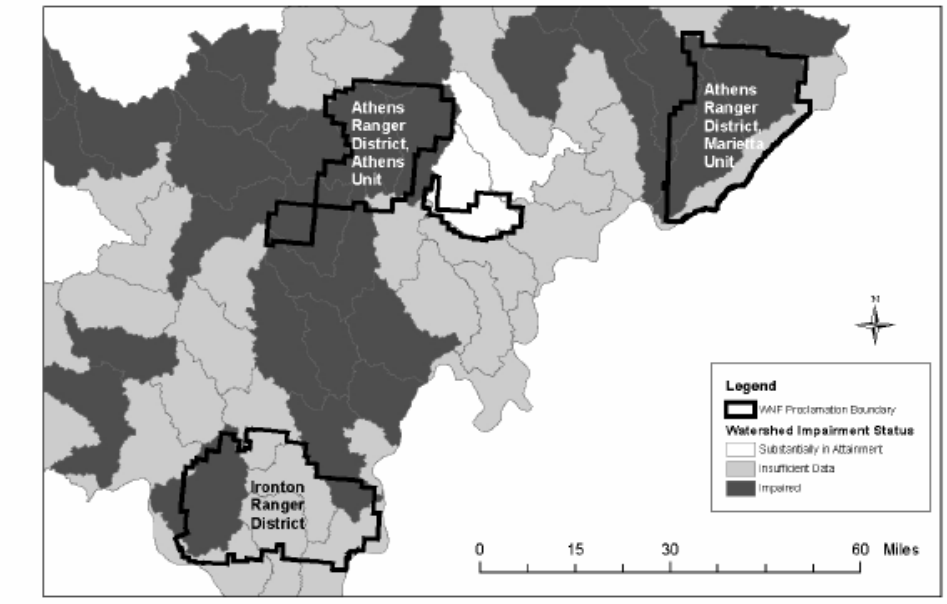
There are 32,194 acres of mostly forested riparian corridors on the WNF. (FEIS, p. 3-89) More than 280 miles of perennial streams run through the WNF. (FEIS, p.1-4)

About 90 percent of the natural wetlands that existed in Ohio at the time of European settlement have been destroyed, and very few natural wetlands or bottomland forests are found on the WNF today. Mining for coal, clay, and limestone is responsible for damage to riparian areas. Because of strip-mining, many streams were rerouted, channelized, impounded, or polluted with mine wastes. Acid mine drainage affects many streams on the Athens unit, and some on the Ironton Ranger District. (FEIS p. 3-15)

Assessments conducted by the State of Ohio and the Forest Service indicated that only 11 percent of streams on the WNF met State water quality standards. Forty-eight percent were impaired and 41 percent had not been assessed by the Ohio EPA or the Forest Service. (FEIS, p. 2-23)

Impairment is caused primarily by agriculture and abandoned mine lands. Impairment for the Marietta Unit is primarily due to nutrients, siltation, and flow alteration due to non-irrigated crop production, pasture lands, and onsite wastewater systems (septic tanks). The impairment on the Athens and Ironton units is primarily due to acidity, metals, and sedimentation from previous mining. (FEIS, p. 2-23 and p. 3-11)

Figure 2: Impairment within WNF proclamation boundary and 5th level watersheds



Source: WNF FEIS Figure 3-4

The FEIS further states that: **"Sedimentation originating from both private and NFS land is the primary cause of reduced water quality in watersheds where no previous mining occurred."** (FEIS p. 3-17) No further information was given in the FEIS about the root causes of the sedimentation.
Also: "Current data are insufficient to quantify water quality conditions for intermittent and ephemeral stream miles." (FEIS p. 2-23)

WNF ownership, and therefore control of water resources, is highly fragmented, as shown in the following table.

Table 39: Comparison of NFS ownership among the 5th level watersheds and the relative degree of influence Forest Service management activities could have on 5th level watershed integrity.

	Percent NFS ownership in 5th level watersheds					
	0	0-10	10-20	20-30	30-40	40-50
Number of 5th level watersheds	9	11	5	3	2	1
Degree of influence	N/A	Low	Low	Moderate	Moderate	High

Source: WNF FEIS, Table 3-5

In 1999, Forest Service (Region 9) and the United States Army Corps of Engineers (Huntington District) jointly inventoried abandoned and inactive mines on the Monongahela and WNFs. The inventory "for the Athens and Ironton Units identified over 5,000 mining and health and safety related features. The majority of features identified are mining features that require treatment and/or reclamation." (Table 3 – 3, FEIS, p.3-13)

Table 40: Mining and health and safety related features on the WNF.

Portals	Gob Piles	Slumps	Subsidences	Seeps	Ponds	Highwalls	Structures	Rubbish Piles
1467	208	319	220	452	1999	99	206	614

Source: WNF FEIS, Table 3-3

The WNF has a program for restoring abandoned mine lands, in cooperation with other federal, state and local agencies Since 1997, the following restoration activities have been accomplished, according to the FEIS, p.3-7:

- Reclamation of 25 acres of gob piles
- Closure and reclamation of 21 subsidence areas
- Closure or bat gating of 7 open mine portals
- Enhancement of three acres of wetland
- Construction and/or installation of various systems to treat acid mine drainage.

Comparing these accomplishments with Table 3-3 shows that a lot still needs to be done:

- ***Reclamation of 25 acres of gob piles:*** How many of the 208 Gob Piles in Table 3-3 were removed, how many still need to be reclaimed?

- ***Closure and reclamation of 21 subsidence areas:*** 199 still to go!
- ***Closure or bat gating of 7 open mine portals:*** 1460 still to go!
- What about the other "Mining and Health and Safety Features" mentioned in Table 3-3?

The Ohio EPA has prioritized Ohio's watersheds for TMDL (Total Maximum Daily Load) development. According to the Ohio EPA, a TMDL is currently being developed for Monday Creek and Sunday Creek. Not all of the WNF 5th level watersheds are identified as TMDL priority watersheds. (FEIS, p. 3-10/11)

The FEIS projects that OHV use is likely to continue increasing, and acknowledges that "Unmanaged recreation, especially the undesirable impacts from unmanaged OHV use, has been identified by the Chief of the Forest Service as one of the key threats facing the national forests and grasslands. Concerns have been expressed over the amount of unplanned roads and trails, erosion, lack of quality OHV recreation opportunities, degradation of water quality, and destruction of habitat from unmanaged OHV activity. (FEIS 3-219)

WNF Plan Activities Affecting Water Resources

The WNF FEIS states that the Forest Service intends to **improve soil quality** on the WNF **on about 10 acres per year, especially in riparian areas**. This will help reduce sediment delivery to stream channels, floodplains, and wetlands. Actions include **slope stabilization, erosion control structures**, **and abandoned mine reclamation**. (FEIS, p. 3-25)

The WNF FEIS also states that **reclamation of abandoned mine land sites** on the WNF may sometimes require new road or temporary road construction, which could lead to an increased sediment load entering streams. According to the FEIS, a significant percentage of mine reclamation work, and resulting soil disturbance, happens in riparian areas. (FEIS p. 3-16)

The WNF FEIS contains information about impacts on water resources that can result from implementation of the 2006 WNF Plan related to habitat modification (involving logging, prescribed burning), hazardous fuel treatments (prescribed burning), trail and road building, and mineral activities. The following is a summary of FEIS p. 3-16 to 3-18:

- **Temporary and Permanent Roads and Trail:** Impacts include soil erosion and sedimentation, and increased runoff because of compaction.

- **Timber harvesting, site preparation, timber stand improvement projects, and skid trail construction:** Disturbance related to these activities can increase erosion and sedimentation while decreasing soil productivity. Loss of the protective leaf litter, and reduced transpiration and raindrop interception increase run-off. Timber removal from riparian areas and riparian corridors may also contribute to destabilization of streambanks, reduce shading and therefore increase water temperatures resulting in changes of habitat suitability for sensitive species.

- **Mineral Exploration (Coal, Oil, Gas):** They can lead to soil erosion and sedimentation, soil compaction, and increasing run-off. Potential seepage or spillage of toxic substances from mining facilities or disposal areas may also pose a threat to water quality.

- **Prescribed Burns:** Expose soil to erosion because vegetative cover is removed. Decreased soil productivity and increased sedimentation may result.

According to FEIS: **"Less than one percent of the cumulative effects analysis area would likely be affected by ground-disturbing activities on NFS land."** (Emphasis added, FEIS, p. 2-23) The table included below shows what activities the Forest Service considers ground-disturbing.

The **cumulative effects analysis area** used in Table 41 covers the 31 fifth-level watersheds that fall at least partially within the WNF proclamation boundary. These watersheds encompass **2,613,184 acres** of land in southeastern Ohio. (FEIS, p. 3-19). For comparison, the **WNF area is 238,000 acres**, and there will be **3,530 acres of ground disturbing activities** in that area.

The WNF FEIS does not state how many acres of ground disturbance are expected **on non – WNF land in the cumulative effects area,** therefore this cumulative effects analysis is incomplete.

Table 41: Potential Acreage Affected by Forest Service Ground Disturbing Activities Within the Cumulative Effects Analysis Area

	A	B	C	D	E	E Modified	F
Trail Construction	303.5	303.5	265	302	265	265	225
Recreation Facility Construction	60	60	60	60	60	60	60
Road Construction or Reconstruction	315	421	540	537	530	538	495
Skid Trails and Landings	198	441	747	739	718	740	634
AML Restoration	522	522	522	522	522	522	522
Energy Minerals Development	1,371	1,371	1,371	1,371	1,371	1,371	1,371
Utility Line Construction	50	50	50	50	50	50	50
Fireline Construction	15	15	14	14	14	14	14
Total Acres Affected	2,834.5	3,183.5	3,569	3,595	3,530	3,560	3,371
Percentage of Cumulative Effects Analysis Area	0.11	0.12	0.14	0.14	0.14	0.14	0.13

Source: WNF FEIS Table 3-6

In addition to the ground-disturbing activities listed in the table above, logging and burning have an effect on water quality and run-off (as acknowledged by the FEIS on p. 3-16/18). The WNF Plan projects the following activities over ten years that will affect the capacity of the forest to intercept rainwater, and will increase soil compaction and erosion:

- **Prescribed burns** for oak regeneration on **46,215 acres.**
- **Prescribed burns** for hazardous fuel reduction on **21, 508 acres**.

- **Timber Harvest** on **16,481 acres** of the forest (even- and uneven aged harvest).
- **Commercial thinning** on **1,460 acres.**
- **Development of Permanent Openings on 500 acres** (numbers are from Table 2-4, FEIS).

In addition, activities with the potential to add toxic materials into the water could result from

- **Herbicide applications** on **10,215 acres**
- **Herbicide applications as one method to control NNIS** (< 1,900 acres)

The River Corridor Management Area is classified as **suitable for timber production,** and **surface occupancy** of National Forest System land is allowed for the **exploration and development of federally owned energy minerals**, but controlled surface use is applied in the riparian corridor. **Standards/Guidelines for River Corridor Management Area:**

- **S-RC-VEG-1:** Apply uneven-aged management (single-tree or group selection) on at least 75 percent of the management area.
- **S-RC-VEG-2:** Apply even-aged management (thinning, shelterwood, clearcut or two-aged harvest) on up to 25 percent of the area to provide visual and wildlife habitat diversity. (LRMP, p. 3-36)

The FEIS states that: "In order to accomplish short-term and long-term land management activities, soil erosion and sediment transport may be an unavoidable consequence. However, Forest-wide **standards and guidelines** integrated into all alternatives **minimize effects** to soil stability and downslope and downstream areas." (Emphasis added, FEIS, p. 3-20)

Evaluation of Loss of Capacity to Produce Water Related Ecosystem Services

The WNF Plan describes the following activities that could affect water-related ecosystem services:

- **Prescribed Burns** for oak regeneration on **46,215 acres**
- **Prescribed Burns** for hazardous fuel reduction on **21, 508 acres**
- **Timber Harvest** on **18,441 acres** of the forest
- **Mining**, **Roads**, **Trails** and other ground disturbing activities according to FEIS Table 3-6, totaling **3,560 acres**

The following table shows the **negative impacts on water** from WNF Plan activities **in relation to the cumulative effects area** (FEIS, p. 3-19) and **to the WNF area** over a ten-year period. While the effects may seem small in relation to the cumulative effects area (chosen by the Forest Service as frame of reference, see above), they are not so insignificant when set in relation to the WNF area. The reader should also keep in mind that these effects are on top of an already fairly bad situation:

Table 42: Forest Service Activities impacting water resources as percent of cumulative effects area and WNF area

Activities	**Acres**	**Percent of Cumulative Effects Analysis Area (2,613,184 Acres)**	**Percent of WNF Area (238,000 acres)**
Ground-disturbing activities from FEIS Table 3-6	3,560	0.14%	1.50%
Vegetation Removal (logging)	18,441	0.7 %	7.7%
Prescribed Burns for Oak Regeneration: 46,215 Fuel Reduction: 21,904	68,119	2.61%	28.62%

Above, we showed dollar values for different ecosystem services that forests can provide. Services related to the supply and filtration of water range between $22 and $126 per acre per year.

Table 43: Per-Acre Values for Water-Related Ecosystem Services

Ecosystem Service ***(2004 $ PER ACRE PER YEAR)***	**Minimum**	**Middle***	**Maximum**
Hydrological Services (supply and filtration of water)	$22	$65	$126

Source: New Jersey State Parks and Forests – Study (Table 12, p. 42)

We will estimate the value of the damage done to this ecosystem service **through building of trails and roads and other disturbances on 3,560 acres** (based on FEIS table 3-6). The activities listed in that table imply permanent removal of vegetation or soil disturbance that is not likely to heal quickly.

A total of 3,560 acres over 10 years comes to an **average of 356 acres per year.** In our calculation, we assume that the removal of vegetation is spread out evenly over ten years, and that the acres stay vacant of vegetation cover or disturbed by compaction for the rest of the ten-year period after they have been cleared, and therefore will not produce water-related ecosystem services.

Table 44: Cumulative acres affected over ten years by ground disturbance on 3,560 acres

	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year	**TOTAL Acres**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	
Acres Removed	**356**	**356**	**356**	**356**	**356**	**356**	**356**	**356**	**356**	**356**	
		356	**356**	**356**	**356**	**356**	**356**	**356**	**356**	**356**	
			356	**356**	**356**	**356**	**356**	**356**	**356**	**356**	
				356	**356**	**356**	**356**	**356**	**356**	**356**	
					356	**356**	**356**	**356**	**356**	**356**	
						356	**356**	**356**	**356**	**356**	
							356	**356**	**356**	**356**	
								356	**356**	**356**	
									356	**356**	
										356	
Total Acres Vacant	**356**	**712**	**1,068**	**1,424**	**1,780**	**2,136**	**2,492**	**2,848**	**3,204**	**3,560**	**19,580**

This results in an estimate of damage to water-related ecosystem services from ground disturbing activities (not including logging) ranging between **$430,760 and $2,467,080.**

Table 45: Value of damage to hydrological services from 3,650 acres of ground disturbance

Ecosystem Service Value	**Minimum**	**Middle***	**Maximum**
Hydrological services (supply and filtration of water) per acre per year	$22	$65	$126
Acres of Reduced Air Purification Capacity over 10 Years	19,580	19,580	19,580
Value of Damage to Ecosystem Service from WNF ground disturbing activities on 3,650 acres (FEIS Table 3-6)	**$430,760**	**$1,272,700**	**$2,467,080**

We did **not attempt** to estimate the damage to water-related ecosystem services **from logging and burning**, since this analysis would require expert knowledge related to different aspects of water-related ecosystem services that we do not have. For example, we do not know what role early successional vegetation plays on recently cut forest land in providing water-related services, or how important the soil and mineral layers are in comparison to vegetative cover in providing these services.

A more thorough analysis of this issue would also address the fact that ecosystem services from forested wetlands and river corridors are more valuable than from other parts of the forest. (See above, Table 27). There are 32,194 acres of mostly forested riparian corridors on the WNF (FEIS, p. 3-89), and the River Corridor management areas are open for logging. To adequately assess the water-related ecosystem damage from logging would require differentiating between logging in the river corridor from logging in other areas.

Water resources on the WNF, according to information provided in the WNF Plan, are greatly impaired, and the ability of the Forest Service to effect change for the better is limited by ownership fragmentation within the proclamation area. Every effort by the Forest Service to reclaim land affected by past mining, to restore wetlands, and to undo damage done by illegal and legal OHV trails is laudable, and will contribute to improvement of the WNF capacity to provide water-related ecosystem services.

The WNF FEIS does not contain information about how much of these goals are going to be achieved with this plan. There is one sentence:

"The Forest Service intends to improve soil quality on the WNF **on about 10 acres per year, especially in riparian areas**. This will help reduce sediment delivery to stream channels, floodplains, and wetlands. Actions include **slope stabilization, erosion control structures**, **and abandoned mine reclamation**." (FEIS. p. 3-25)

It is not clear whether this encompasses reclamation of illegal and repair of legal OHV trails, and how many wetland areas are going to be restored. How much of a dent are the 10 acres per year going to make?

According to FEIS Table 2-4, 128 depleted or orphan wells (from mineral activities) **on 70 acres** will be reclaimed.

It seems unlikely that the benefits from these improvements on 10 acres + 70 acres per year are going to outweigh the additional damage created from new ground disturbing and vegetation removal activities over that period. Can **positive impacts on 10 +70 acres per year** outweigh the negative impacts on water that are generated from:

- 3,560 acres of ground disturbance (Table 3-6 included above) ,
- roughly 18, 441 acres from logging and timber-related activities (Table 2-4),
- 46,215 acres of prescribed burns for oak regeneration (Table 2-4),
- 21,508 acres prescribed burns for hazardous fuel reduction (Table 2-4)

The approach that the Forest Service is taking with regard to water resources is similar to the one regarding air: **Keep on doing things that damage the capacity of the forest to provide these services, while trying to minimize negative effects**. This is done on top of all the damage that the WNF has already sustained. The fact that the additional damage is considered small, compared to what has been done in the past and is presently done by other land holders, is used as a justification to keep on doing things that add to that damage.

Net Public Benefit Analysis

The Forest Supervisor stated in the ROD, p.3: "The Forest Plan outlines environmentally sound management to achieve desired conditions … in a way that maximizes long-term net public benefits."

Does this apply with regard to improvement of air quality as an ecosystem service provided by forests?

Public Costs Regarding Water-Related Ecosystem Services

Forest Services Expenditures:

Expenditures that could be related to **improving** forest ecosystem services related to water in the long run:

- Mitigation measures designed to reduce soil erosion and compaction from logging, mining and burning,
- Expenditures for the acquisition of non-forest land that is added to the WNF, and allowed to grow into a forest. As the forest grows up, the capacity to provide water-related ecosystem services increases.
- Expenditures related to decommissioning trails and roads or mining features, and re-integrating that land into the forest,
- Expenditures related to repairing trails and controlling illegal OHV activity.

There are many expenditures related to Forest Service activities that increase water pollution and reduce the capacity of the forest to remove pollutants from water. These expenditures are not included here, because they are related to other programs; that is, their intention is to modify habitat and reduce fuel loads. Therefore, they will be included as costs of those programs.

What we will include under public costs, however, are the negative externalities generated by those activities.

Increases in water pollution can be expected from:

- Prescribed burns for oak regeneration on 46,215 acres
- Prescribed burns for hazardous fuel reduction on 21, 508 acres
- Timber Harvest on 18,441 acres of the forest (even- and uneven aged harvest)
- Mining, road construction, trails and other ground disturbing activities from FEIS Table 3-6, totaling 3,560 acres

Negative Impacts on <u>capacity of forest to deliver ecosystem services</u> related to water could be expected from:

- Prescribed burns for oak regeneration on 46,215 acres
- Prescribed burns for hazardous fuel reduction on 21, 508 acres
- Timber Harvest on 18,441 acres of the forest (even- and uneven aged harvest)
- Mining, road construction, trails and other ground disturbing activities from FEIS Table 3-6, totaling 3,560 acres. Our estimates of damage to water-related ecosystem services from these ground disturbing activities (not including logging) range between $430,760 and $2,467,080.

Public Benefits Regarding Water-Related Ecosystem Services

Benefits could result from improvements to water quality by mine reclamation, wetland restoration and other reclamation work: FEIS states that this work will be done, but does not give a clear picture about

- how much has been done already,
- how much still needs to be done,
- how much will be done according to plan.

Some of this work may temporarily increase erosion and sedimentation.

Benefits from net forest growth on the WNF that increases the capacity of the forest to provide these services (additional growth of standing trees over ten years minus what is logged, destroyed by natural disturbance, or turned into roads, trails and mining sites).

Reforestation on newly acquired lands (up to 40,000 acres) could increase the Forest's capacity to provide water-related ecosystem services.

Re-growth after logging or burning will add a small amount to the Forest's capacity to provide water-related services over the next ten years.

Net Public Benefit or Loss from WNF Plan Regarding Water Services?

It is not clear whether a net public benefit with regard to water-related ecosystem services will arise over the next ten years. For that to happen, the benefits from net forest growth on the WNF (additional growth of standing trees over ten years minus what is logged, destroyed by natural disturbance, or turned into roads, trails and mining sites) have to outweigh additional water pollution effects from prescribed burning, logging, ORV's and other ground disturbing activities.

Even if it could be shown that there is a net public benefit for the next 10 years, it still would be clear that net benefits had not been maximized, because of the various activities described above that diminish the capacity of the forest to deliver water-related services. Logging will limit the provision of these services over decades to come, since 161,752 acres of the WNF have been declared suitable for timber production. (FEIS Table 2-4) The Forest Service aims at providing a continuous supply of timber over time. This means that in the long run, logging will continue in different areas of the forest, and will affect water-related services, on almost 70 percent of the forest.

By <u>not</u> logging and burning, the Forest Service could have allowed the ecosystem service capacity of the forest to grow (much more), instead of damaging it. It would not have cost anything to do that.

Table 46: Public Benefits and Costs from Improving Water-Related Ecosystem Services on the WNF

Ecosystem Service: Improving Water Quality, Water Regulation and Flood Control	
Public Costs Created by 2006 WNF Plan	**Public Benefits Created by 2006 WNF Plan**
1. Unknown budget costs: How much money will go into: • Mine reclamation • Wetland restoration • Minimizing effects of logging, burning, mining, trail and road construction. • Reclamation of illegal ORV trails **2. WNF's capacity to provide ecosystem services (water purification, regulation, flood control) is diminished because of:** • **Vegetation removal** on **18,441 acres** (especially relevant: logging within river and stream corridor) • **Burning** on **68,119 acres** • **Possibly increased illegal ORV use** (dependent on resources devoted to curbing it) • **Other ground disturbing activities (including mining, road and trail construction, etc.) on 3,560 acres.** The damage for this alone could range in value from $430,000 to $2,467,080. **3. These same activities also increase water pollution directly.** **4. Herbicide use on 10,215 acres may affect water quality.**	**1. Improved Water Quality:** 10 acres per year from stream bank reclamation. 70 acres from reclamation of depleted and orphan wells **2. Unknown:** Acres of wetland restored **3. Additional tree growth on undisturbed land** versus tree and vegetation removal from logging, burning and natural disturbances **4. Reforestation on newly acquired land** (up to 40,000 acres) **5. Re-growth after logging or burning**
Net Public Benefit?	**Net Public Loss?**

Big Picture View

The Forest Service spends hundreds of thousands of dollars to log and burn, and in the process damages the delivery of water-related ecosystem services.

This could only make economic sense if there was a benefit generated from logging and burning that outweighs the damage done to this ecosystem service.

The Forest Service claims that maintaining oak hickory forests, controlling hazardous fuel build-up, and creating early successional habitat provide such justifications. As far as hazardous fuel build-up is concerned, we have dealt with that above and have shown that that program creates no net public benefit.

We will analyze the other justifications – maintaining oak hickory forests and creating early successional habitat—in the biodiversity chapter below and show that they, likewise, cannot provide a rationale for damaging water-related ecosystem services.

C. WNF Plan and Climate Regulation

Introduction

Global Climate Change is one of the most serious environmental, social and economic threats that the world is facing today. The warming of the atmosphere is linked to increased concentrations of so-called greenhouse gases, including carbon dioxide, methane, nitrous oxides, and chlorofluorocarbons. The 2007 Interim Update of the 2000 Renewable Resources Planning Act (RPA) Assessment states that approximately three-quarters of the carbon dioxide emissions are from fossil-fuel combustion, and one quarter are from land use changes.[61]

Global climate is influenced by changes in land cover. Large-scale conversions of forestland into agricultural land or urban development reduce carbon storage and the potential for sequestration and thus contribute to the build-up of carbon dioxide in the atmosphere.

Global warming can affect forests by introducing new **invasive plants, insects, and animals** that expand their range as temperatures increase. Also, the forest could be put under **increased stress** from extreme weather events, changed weather patterns and seasons (warmer winters, for example), and increased likelihood of drought and forest fires. [62]

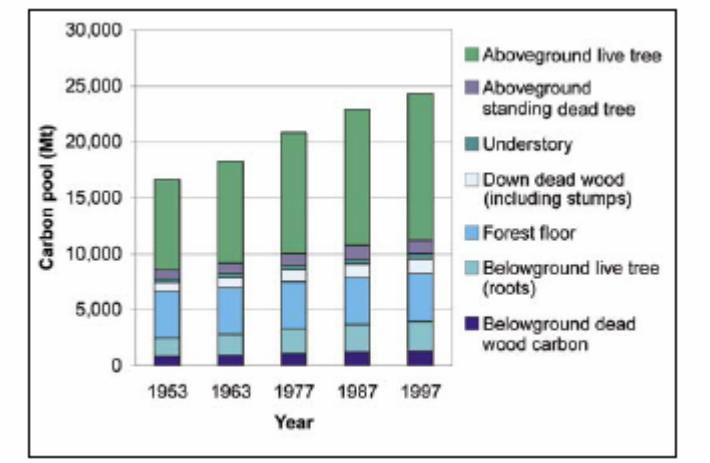
The Role Of Forests in Carbon Storage and Sequestration

Forests in the U.S. have been carbon sinks since 1953.[63] That means that on balance, on an aggregate level, they have absorbed rather than released carbon over the past 50 years.

Carbon can be stored above ground in live and standing dead trees, in the forest understory, in downed dead wood, on the forest floor, belowground in the roots of live trees, and belowground in dead wood carbon.

[61] USDA Forest Service, *Interim Update of 2000 RPA Assessment, 2007,* p. 69.
[62] USDA Forest Service, *Interim Update of 2000 RPA Assessment, 2007,* p. 70, 77.
[63] USDA Forest Service, *Interim Update of 2000 RPA Assessment, 2007,* p. 83.

Figure 3: Carbon Pools on Forest Land



Source: Figure 57 in 2007 Update of 2000 RPA, p. 83

However, even though forests in the U.S. have acted as carbon sinks, the 2007 RPA reports that the size of annual additions to the sink (sequestration) appears to be declining. (2007 RPA, p. 6)

The Environmental Protection Agency lists the following forestry practices that can sequester or preserve carbon storage (See also Table 47):

1) Afforestation (Tree planting on lands previously not in forestry)
2) Reforestation (Tree plantings where trees would not regenerate without intervention)
3) Avoided Logging
4) Longer harvest-regeneration cycles

Table 47: Key Forestry Practices to Increase Carbon Storage and Sequestration[64]

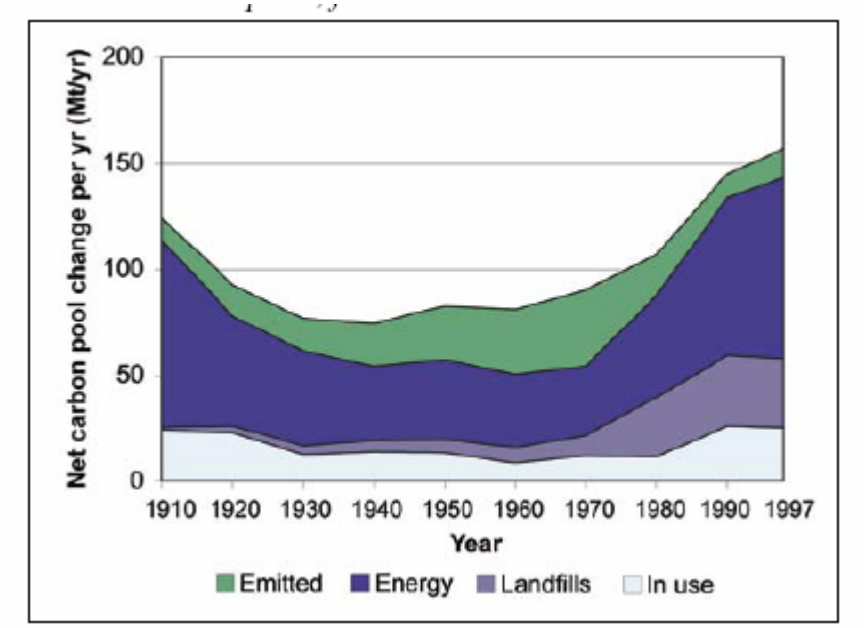
Key Forestry Practices	Typical definition and some examples	Effect on greenhouse gases
Afforestation	Tree planting on lands previously not in forestry (e.g., conversion of marginal cropland to trees).	Increases carbon storage through sequestration.
Reforestation	Tree planting on lands that in the more recent past were in forestry, excluding the planting of trees immediately after harvest (e.g., restoring trees on severely burned lands that will demonstrably not regenerate without intervention).	Increases carbon storage through sequestration.
Forest preservation or avoided deforestation	Protection of forests that are threatened by logging or clearing.	Avoids CO_2 emissions via conservation of existing carbon stocks.
Forest management	Modification to forestry practices that produce wood products to enhance sequestration over time (e.g., lengthening the harvest-regeneration cycle, adopting low-impact logging).	Increases carbon storage by sequestration and may also avoid CO_2 emissions by altering management. May generate some N_2O emissions due to fertilization practices.

[64] U.S. Environmental Protection Agency, Carbon Sequestration in Agriculture and Forestry: Forestry Practices that Sequester or Preserve Carbon. http://www.epa.gov/sequestration/forestry.html , last updated on Thursday, October 19th, 2006.

Not all carbon is immediately released by logging. Decomposition takes some time, but carbon release may be sped up by burning of logging debris.

Some of the wood is made into products. The table below shows estimates of how much carbon is stored in products, how much is added to landfills, how much is emitted and how much is burnt for energy.

Figure 4: Net Changes in Carbon in Harvested Wood Products



Source: Figure 58 from 2007 Update of 2000 RPA, p. 84

According to the 2007 Interim Update of 2000 RPA, the "half-life of carbon in products varies from 1 year for paper (except free-sheet used in books) to 100 years for wood used in new single-family homes…. In 1990, some 18 percent of the carbon consumed was added to products in use and 23 percent was added to landfills. About one-half was burned for energy…." If wood is used for fuel, it can offset carbon dioxide emissions from fossil fuels, if fuel use goes along with an equivalent amount of re-growth. [65]

The loss of carbon to the atmosphere from logging is also related to the loss of organic matter from the soil. Logging may reduce soil productivity through compaction, disturbance, erosion, and removal of organic matter. This decreased soil productivity could therefore reduce tree growth and the capacity for carbon sequestration by re-growing trees.

Carbon is sequestered when forests regrow after they are logged. However, the carbon sequestered by young trees may be much less than the carbon that could have been sequestered if older trees had been left standing. In the article entitled "Are old forests underestimated as global carbon sinks?**"** the authors state that: "Old forests are important carbon pools, but are thought to

[65] USDA Forest Service, *Interim Update of 2000 RPA*, 2007, p. 84.

be insignificant as current atmospheric carbon sinks. This perception is based on the assumption that changes in productivity with age in complex, multi-aged, multispecies natural forests can be modelled simply as scaled-up versions of individual trees or even-aged stands. This assumption was tested by measuring the net primary productivity (NPP) of natural subalpine forests in the Northern Rocky Mountains, where NPP is from 50 percent to 100 percent higher than predicted by a model of an even-age forest composed of a single species. If process-based terrestrial carbon models underestimate NPP by 50 percent in just one quarter of the temperate coniferous forests throughout the world, then global NPP is being underestimated by 145 Tg of carbon annually. This is equivalent to 4.3–7.6 percent of the missing atmospheric carbon sink. These results emphasize the need to account for multiple-aged, species-diverse, mature forests in models of terrestrial carbon dynamics to approximate the global carbon budget." [66]

Another article, "Carbon storage and fluxes in ponderosa pine forests at different developmental stages," finds that old (>250 years) Ponderosa Pine forests sequester twice as much carbon as recently clearcut forests.[67]

What these global climate change scientists are telling us is that it does make a difference whether the trees are old or young. However, the Forest Service neglected to even mention these or other studies in the WNF FEIS, and didn't compare and contrast the costs to climate change from logging versus not logging, a requirement of the Global Climate Change Prevention Act of 1990 (7 U.S.C. 6701).

Forest Service Can Improve
FOREST CARBON STORAGE AND SEQUESTRATION

By

- **Afforestation** (Tree planting on lands previously not in forestry)
- **Reforestation** (Tree plantings where trees would not regenerate without intervention)
- **Avoided Logging**
- **Longer Harvest-Regeneration Cycles**

Climate Change and WNF Plan

The 2006 WNF Land Resource Management Plan, Record of Decision, and Final Environmental Impact Statement contain no reference to Climate Change at all. These documents neither address possible impacts of Climate Change on the forest, nor do they discuss ways in which forest management could contribute to a reduction in greenhouse gases.

[66] Carey,Eileen V., Anna Sala, Robert Keane, and Ragan M. Callaway, Are old forests underestimated as global carbon sinks? *Global Change Biology*, Volume 7, Number 4, April 2001, p. 339-344.
[67] Law, B.E., P.E. Thornton, J. Irvine, P.M. Anthoni, and S. Van Tuyl, Carbon storage and fluxes in ponderosa pine forests at different developmental stages, *Global Change Biology*, Volume 7, Number 4, April 2001, p. 339-344.

Even through the Forest Plan does not address climate change directly, or, carbon storage and carbon sequestration specifically, there are several conclusions that can be drawn from the information that the WNF Plan does make available regarding forestry practices that can sequester or preserve carbon storage:

- **Afforestation** (Tree planting on lands previously not in forestry): The 2006 WNF Plan asks for land consolidation, and some non-forested land may be purchased and forest may regrow. The Plan authorizes land acquisitions of up to 40,000 acres.

- **Reforestation** (Tree plantings where trees would not regenerate without intervention): WNF FEIS Table 2-4 states that reforestation will happen on 500 acres.

- **Avoided Logging**: The 2006 WNF Plan does not avoid logging.

- The WNF Plan projects the following activities over ten years that affect the capacity of the forest to store and sequester carbon: (Table 2-4, FEIS p. 2-19):
    - **Prescribed burns** for oak regeneration on **46,215 acres.**
    - **Prescribed burns** for hazardous fuel reduction on **21, 508 acres**.
    - **Timber Harvest** on **16,481 acres** of the forest (even-and uneven aged harvest).
    - **Commercial thinning** on **1,460 acres.**
    - **Development of new forest openings** on **500 acres.**

  Only a small part of the WNF (about 11 percent) is allowed to go into a process of natural succession (Future Old Forest).

- **Other WNF activities that remove vegetation are shown in Table 48:**

Table 48: Potential Acreage Affected by Forest Service Ground Disturbing Activities Within Cumulative Effects Analysis Area.

	A	B	C	D	E	E Modified	F
Trail Construction	303.5	303.5	265	302	265	265	225
Recreation Facility Construction	60	60	60	60	60	60	60
Road Construction or Reconstruction	315	421	540	537	530	538	495
Skid Trails and Landings	198	441	747	739	718	740	634
AML Restoration	522	522	522	522	522	522	522
Energy Minerals Development	1,371	1,371	1,371	1,371	1,371	1,371	1,371
Utility Line Construction	50	50	50	50	50	50	50
Fireline Construction	15	15	14	14	14	14	14
Total Acres Affected	2,834.5	3,183.5	3,569	3,595	3,530	3,560	3,371
Percentage of Cumulative Effects Analysis Area	0.11	0.12	0.14	0.14	0.14	0.14	0.13

Source: WNF FEIS Table 3-6

According to Table 3-17, FEIS p. 3-83, **mature forest habitat** will **increase between 255 and 324 percent after 100 years** with all alternatives, mature meaning older than 80 years for hardwoods forests and older than 60 years for pines.

This could indicate that there might be **net sequestration of carbon on the WNF in the next 10** years in spite of burning and logging activities and other disturbances. However, the following need to be considered:

1) All **logging and burning is in addition to natural disturbances**, which could affect large areas. For example, in 2003 about 71,000 acres were damaged on the Ironton Ranger District by an ice storm. (FEIS, p. 3-124) Natural disturbances like droughts, storms, and increases in damage from insects and diseases, would likely increase with increases in global temperatures, and release carbon into the atmosphere in addition to what will be logged and burnt by the Forest Service over the next 100 years.

2) The fact that some net sequestration may occur is good, but **how much more could have been sequestered if the forests had not been logged?** What are called "mature" trees at age 80 by the Forest service, are trees that could potentially live several hundreds of years. If they were not cut, how much more carbon could be stored and sequestered, especially considering that older trees may be capable of sequestering a lot more carbon than younger trees (see information above)? Given the urgency of slowing down carbon dioxide build-up in the atmosphere, what could have been the contribution of the WNF to this goal?

Valuation

According to information provided above, carbon sequestration and storage were included in ecosystem valuation studies for New Jersey, with the values per acre/per year presented in the table below. We will not attempt to use these numbers to assess the lost value of those services for the WNF from logging and burning, but encourage others who are more knowledgeable about the effects of these and other disturbances on the storage and sequestration of carbon to pick up where we had to leave off. For example, one difficulty is that carbon is stored above and below ground, in trees and other forest vegetation, both live and dead, and is released over different lengths of time depending on where it is stored at the time of logging and burning. There also seems to be misinformation about the carbon sequestration potential of older vs. younger forests.

We will however, try to estimate the **damage** to **carbon sequestration services** from permanent changes to the landscape.

Table 49: Per-Acre Values for Climate Related Ecosystem Services

Ecosystem Service ***2004 $ PER ACRE PER YEAR***	Minimum	Middle*	Maximum
Carbon storage	$16	$30	$43
Carbon sequestration	**$83**	**$155**	**$222**

Source: New Jersey State Parks and Forests – Study (Table 12, p. 42)

Just adding up the activities from Table 48 that **remove carbon sequestration capability completely** at least for the next ten years (trail and road construction, recreation facility construction, energy minerals development, and utility line construction) adds up to **2,284 acres** of vegetation removal over ten years, or **228 acres per year**.

Using the same method as we did above for calculating water and air-related ecosystem service damage, we assume that the disturbance is spread out evenly over ten years. That means an area of 228 acres is added every year that cannot deliver carbon sequestration services because it is devoid of vegetation. From year to year, the number of acres that cannot deliver this ecosystem service increases, and adding them up, we arrive at **12,540 cumulative acres over 10 years.** Multiplied with the per acre/per year values from Table 49 for carbon sequestration, we arrive at a loss of carbon sequestration value that is between **$1,040,820** and **$2,783,880** for about 2,280 acres of permanent removal of vegetation.

Table 50: Loss of Carbon Sequestration Value from Permanent Removal of Vegetation

Ecosystem Service Value	**Minimum**	**Middle**	**Maximum**
Carbon Sequestration (2004 $ per acre per year)	$83	$155	$222
Acres of Reduced Carbon Sequestration Capacity over 10 Years	12,540	12,540	12,540
Value of Damage to Ecosystem Service from WNF ground disturbing activities on 2280 acres over ten years (FEIS Table 3-6)	**$1,040,820**	**$1,943,700**	**$2,783,880**

Net Public Benefit Analysis

The Forest Supervisor stated in the ROD, p. 3: "The Forest Plan outlines environmentally sound management to achieve desired conditions … in a way that maximizes long-term net public benefits."

Does this apply with regard to storage and sequestration of carbon as an ecosystem service provided by the WNF?

Public Costs from WNF Plan Regarding Carbon Storage and Sequestration

Negative impacts on carbon storage and sequestration come from:

- Prescribed burns for oak regeneration on 46,215 acres.
- Prescribed burns for hazardous fuel reduction on 21, 508 acres.
- Timber Harvest on 18,441 acres of the forest.
- Other ground disturbing activities (for example road and trail building, mining) on 3,560 acres (out of those, we calculated a loss between $1,040,820 and $2,783,880 for about 2,280 acres of permanent removal of vegetation).

Greenhouse gases are generated from the use of **fossil fuels** for logging, mining, trail building, trail use (ORV).

Public Benefits from WNF Plan Regarding Carbon Storage and Sequestration

Positive impacts on carbon storage and sequestration:

- Land acquisition of up to 40,000 acres (LRMP Appendix D-12), if that land is reforested.
- Net forest growth from standing forest (after considering natural disturbances and Forest Service activities).
- Sequestration from young trees that re-grow after logging.

Net Public Benefit or Loss from WNF Plan Regarding Carbon Storage and Sequestration?

The WNF Plan may or may not create a net public benefit with regard to carbon sequestration and storage. We cannot tell from the information provided in the plan whether the damage done to that ecosystem service may be outweighed by additional growth in areas of the forest that are left undisturbed or by reforestation on land that will be added to the forest.

What is clear, however, is that **net public benefits are not maximized** when it comes to this aspect of ecosystem services, since clearly it would have been possible to not log and burn and thereby achieve much higher carbon storage and sequestration.

Table 51: Public Benefits and Costs from Improving Climate Related Ecosystem Services on the WNF

Ecosystem Service: **Climate Regulation**	
Public Costs Created by 2006 WNF Plan	**Public Benefits Created by 2006 WNF Plan**
Negative impacts on carbon storage and sequestration: • **Prescribed burns** for oak regeneration on **46,215 acres.** • **Prescribed burns** for hazardous fuel reduction on **21, 508 acres**. • **Timber Harvest** on **18,441 acres** of the forest. • **Other ground disturbing activities** (for example road and trail building, mining) on **3,560 acres.** • **Use of fossil fuels for logging, trails, mining.**	**Positive impacts on carbon storage and sequestration:** • **Land consolidation on up to 40,000 acres** (if agricultural land is turned back into forest land). • **Net increase of average age of forest left standing.** • **Sequestration from young trees that regrow after logging.**
Net Public Benefit?	**Net Public Loss?**

D. Does WNF Plan Preserve and Enhance Biodiversity?

Introduction—What is Biodiversity?

Biological Diversity:
In the Appendix to the LRMP (A-2), the **Forest Service** defines biological diversity as:

> **"The variety of life in an area, including the variety of genes, species, plant and animal communities and ecosystems, and the interaction of these elements.** The term is often abbreviated to biodiversity."

Importance of Unseen Organisms:
Alverson, et. al. point out that **ecosystem functions depend mostly on organisms that are unseen**, and that we are **ignorant of many of the components of biodiversity** that are relevant to forest management.[68]

The authors explain that there are **many populations of poorly known species** that are **central to nutrient cycling, long-term site productivity, and responses of other ecosystem components to pathogens and exotics**. These species interact in ways as yet poorly understood to **provide benefits and stability to familiar elements of the ecosystem**, producing healthy trees, fertile soil, good forage for deer, and so on:[69]

- There is an incredible diversity of invertebrates and fungi of forest litter and soils.
- Underground threads of hundreds of species of mycorrhizal fungi weave complex networks among decaying litter, wood, and other organic materials, shunting some of these nutrients to the roots of trees.
- Individual trees often depend on scores of mycorrhizal species, each with different ecological characteristics and responses to stress.
- We have only begun to study the complex interactions of soil arthropods and fungi and their long-term consequences.
- We do not understand how traditional methods of forest management, such as wildlife openings, clearcuts, winter selective cutting, and the reduction of acreage of old growth, will affect these hidden elements of forest ecosystems.
- Management for wildlife in the narrow sense (all those with a backbone) affects wildlife in the broad sense, whether intended or not.

Biodiversity as Ecosystem Service:
This was explained above, and we are repeating this explanation here:
Biodiversity and Genetic Treasures. A forest ecosystem is composed of a rich diversity of plants, animals, insects, fungi and bacteria. We have very incomplete understanding about what role each of these different elements plays within the forest ecosystem, or how a forest ecosystem interacts with other natural and human-influenced systems. We rely on natural

[68] Alverson, William S., W. Kuhlmann , and D. M. Waller, *Wild Forests: Conservation Biology and Public Policy.* Covelo, CA, USA: Island Press, 1994, p. 24.
[69] Alverson, et. al., *Wild Forests*, p. 26.

functions and interactions that we do not now understand, and we need to have available to us the rich genetic treasures that may help us adapt to changing environments. Maintaining the diversity also keeps open the potential of discovering new medicines and food products.

Biodiversity Assessment of the WNF Eco-Region

What can be said about biodiversity on the WNF? To explore that question, we consulted a source available online.[70] This text was originally published in the book, *Terrestrial Ecoregions of North America: A Conservation Assessment*.[71] The assessment offers an in-depth analysis of the biodiversity and conservation status of North America's ecoregions. **The following are excerpts from this assessment (emphasis added):**

- **Appalachian Mixed Mesophytic Forest:** The WNF is located in a region of temperate broadleaf and mixed forests called "**Appalachian Mixed Mesophytic Forests."** The Mixed Mesophytic Forests ecoregion was based on an **aggregation of several of Omernik's level III ecoregions**. The **northern part** of the **Appalachian Mixed Mesophytic Forests** region includes eastern Kentucky, western North Carolina, most of West Virginia, **southeastern Ohio** and southwestern Pennsylvania.
- **Biological Distinctiveness:** "The Mixed Mesophytic Forest ecoregion represents **one of the most biologically diverse temperate regions of the world.** The ecoregion harbors **some of the richest and most endemic land snail, amphibian, and herbaceous plant biotas in the U.S. and Canada.** The ecoregion's **freshwater communities are the richest temperate freshwater ecosystems in the world**, with globally high richness and endemism in mussels, fish, crayfish, and other invertebrates."
- **Habitat Loss:** "Over **95 percent of this habitat**, perhaps more, has been **converted or degraded at some point in the last 200 years**.
    - Only a **few very small and scattered fragments of undisturbed or old-growth forests still remain**, most less than a few hectares in size.
    - Forests were converted for agriculture, coal mining, logging for charcoal, dams, and road building.
    - Most of the agricultural lands have subsequently failed and are being abandoned, with an increase in the growth of **secondary, or pioneer, forests.** These **regrowing forests lack many of the features and much of the diversity of undisturbed, or old-growth forests,** namely large trees, variable age classes of trees, structural complexity such as multiple canopy layers, and diverse and abundant wildflowers, salamanders, fungi, land snails, and other invertebrate taxa.
    - Because of the intensity and broad extent of clearing of forests over the last two centuries, many **forest-specialist species appear to have been extirpated over large portions of the landscape**, or extirpated entirely, as has the carrier pigeon.

[70] World Wildlife Fund, Appalachian mixed mesophytic forests (NA0402). http://www.worldwildlife.org/wildworld/profiles/terrestrial/na/na0402_full.html#con_stat

[71] Ricketts, Taylor H. et. al., *Terrestrial Ecoregions of North America: A Conservation Assessment* (World Wildlife Fund Ecoregion Assessments), Island Press 1999.

- If **source populations in undisturbed forest fragments** are not imbedded in or adjacent to regrowing tracts, large areas of secondary forests may remain depauperate into the future.

- **Secondary Forest Biodiversity Potential:**
  - Secondary forests have the capacity to conserve a great deal of biodiversity and represent, in combination with the last fragments of undisturbed forest, the best opportunity to conserve the region's biodiversity over the long-term.
  - **Larger, unroaded blocks of forest can also act as source pools for breeding migratory songbirds that are experiencing negative reproductive rates** due to cowbird parasitism and nest predation by meso-predators in the mosaic of smaller forest fragments across the landscape.

- **Logging Interest in Secondary Forest:** Trees within secondary forests are beginning to attain sizes that are attractive to logging interests. **A landscape-scale conservation strategy for conserving large, interconnected blocks of mature forests urgently needs to be developed and implemented.**

- **Remaining Blocks of Intact Habitat:** The larger **habitat blocks** that do exist are **found primarily on public lands.** Some of the larger extant blocks of relatively intact habitat can be found within, among others, the **WNF** in southern Ohio.

- **Degree of Fragmentation:**

  - Much of the existing forest, whether old growth or regrowth forests, is still distributed in a **highly fragmented mosaic throughout the region**, broken by agriculture, roads, power lines, towns, and other forms of development.
  - **Fragmentation is highest in the northern part of the ecoregion, primarily in southwestern Pennsylvania and Ohio.**

- **Degree of Protection:**
  Most larger blocks of forest presently occur in federal and state forests, wilderness areas, and state natural areas. However, the **management plans for federal forest lands do not strictly protect the forests,** but reflect the multi-use management policy of the Forest Service. Present federal and state policies dictate intensive harvest of timber from National Forests, usually accompanied by road building, fire suppression, thinning, application of herbicides and pesticides, and other ecologically damaging management practices.

  Several **landscape-level conservation systems** have been proposed for this ecoregion and the adjacent Appalachian ecoregion, consisting of a **network of core protected areas, corridors and linkage zones, and buffer zones**.

- **Types and Severity of Threats:**
  - A primary threat is the **increasing conversion and fragmentation of forests through logging and development.** Hardwood forests are increasingly being exploited throughout the region as maturing forests become attractive to timber exploiters and production in West Coast forests declines.
  - The globally outstanding freshwater biodiversity of the ecoregion is highly imperiled from **toxic pollution, acid runoff from mines, pesticides and herbicides, sedimentation, eutrophication from excess nutrient runoff**, dams, dredging, channelization, and introduced species such as the zebra mussel.
  - **Acid rain deposition,** from industrial and urban sources, continues to be a major problem in many sensitive ecosystems, particularly in higher elevation forest communities.
  - Numerous **proposed highways, roads, and power lines** cut across many of the larger blocks of forest in the ecoregion.
  - **Off-road vehicle use and road building** have severely degraded riparian communities and rare bogs and glades in many areas.
  - **Abundant populations of deer,** resulting from the eradication of large predators and poorly managed hunting programs, have been implicated in the extirpation and reduction of many understory plant species and the alteration of community structure.
  - **Many wild herbs and other plants are harvested for commercial purposes**, and some, like wild ginseng, are threatened with extirpation over large areas of their range because of unregulated and illegal poaching.
  - **Large numbers of black bears are poached** for their gall bladders for the Asian medicinal trade.
  - **Freshwater mussels are legally and illegally harvested** for their shells to be used as nuclei for cultured pearls in Asia.
  - **A number of endangered species**, including the Indiana bat and many plants and freshwater mussels and fish, occur within the ecoregion.

- **Priority Activities to Enhance Biodiversity Conservation:**
  - **Identification and protection of large core areas of forest, linkage zones, and buffer zones,** building upon existing protected sites.
  - **Protection and expansion of existing large blocks and restoration of additional blocks** distributed across the landscape is a **top priority conservation activity**.
  - **Plans to conserve larger blocks of forest for songbird conservation need to be implemented immediately before logging interests obtain concessions throughout the region as regrowing forests becomes more lucrative.**
  - Increase in **heritage inventories of the ecoregion** to identify additional areas and species populations in need of protection and conservation action.
  - **Reintroduction of cougars and gray wolves**, and better management of existing populations of black bear and mustellids, would help reestablish ecological interactions that were sustainable and less damaging to the ecosystem than existing conditions.

Forest Service Can Best Enhance
BIODIVERSITY

By

- **Protecting habitat that is the scarcest—large blocks of continuous interior forest—from logging, mining, road, and trail building.**
- **Linking large forest blocks** (establish wildlife corridors).
- **Expanding existing large blocks** (consolidation of forest ownership; conservation easements; avoiding logging; mining, road and trail construction).
- **Restoring additional blocks of currently fragmented forest** (consolidation of forest ownership; conservation easements; avoiding logging; mining, road and trail construction).
- **Not disturbing endangered species habitat** (no burning, logging, mining, road and trail construction).
- **Restoration of disturbed areas** (wetland and stream bank restoration, mine reclamation).
- **Allowing forest to grow into multi-layered old growth forest**

WNF Plan Approach to Biological Diversity

The following paragraphs summarize the Forest Service approach to conservation of biodiversity (emphasis added):

- "… maintaining components of the **oak hickory forest** and some native pine communities, and **providing all successional stages of forest across the landscape** are necessary in order to conserve plants and animals in the planning area." (FEIS p. 37)

- "The **long-term maintenance of oak hickory and native pine on the landscape is necessary to conserve biodiversity.** Each supports plant and animal species native to the WNF, and therefore each has been termed a management indicator habitat."(FEIS p. 37)

- "The **degree to which oak and native pine are maintained** on the landscape in the planning area over time will be **based on the amount and type of timber harvesting and, to a degree, prescribed burning** that is projected to occur in each alternative." (FEIS p. 37)

In other words, according to the FEIS, the **Forest Service intends to conserve biodiversity by applying timber harvests and prescribed burns.**

The intent is two-fold:

1) To maintain and restore a mixed oak ecosystem
2) To create more early successional habitat

Maintain and Restore a Mixed Oak Ecosystem

The mixed oak ecosystem, according to the FEIS, is under threat to be taken over by more shade-tolerant and fire-intolerant species, like red maples and tulip poplars. While currently oak hickory is still the dominant species, shade tolerant species are becoming more prevalent in the understory, giving those species an advantage over oaks whenever there is an opening in the forest. (FEIS, p. 3-40/41)

To make sure that oak will be the dominant species after clearcuts or selective cutting, the FEIS suggests (sometimes repeated) prescribed fires that are claimed to eliminate competing, less fire-tolerant species in the understory, like maples. If fire isn't enough to eliminate the competition, there will also be herbicide treatments (3-47). The LRMP, especially Appendix E: "Vegetation Management for Oak Ecosystem Maintenance," states that clear-cuts (even-aged management) combined with burns are probably the most effective in regenerating oaks, while selective cuts (group selection) are less likely to lead to a strong regeneration of oaks, unless accompanied not only by prescribed burns, but also by herbicide spraying. Other silvicultural treatments like pre-commercial and commercial thinning, grapevine control and site preparation are to be used as well to make sure oak is favored over other species.

A key factor in the projected decline of oaks, according to the Forest Service, is the virtual elimination of fire from the forest since the 1920s. (FEIS p. 1-17) The ROD (p. 11) states: "Research indicates that oak hickory forests have dominated what is now southeast Ohio for thousands of years, largely because of frequent use of fire by Native Americans." (FEIS, p. 3-184)

The FEIS explains, **"Forest managers now recognize that a natural fire regime, a general definition of the role fire would play across a landscape in the absence of modern human mechanical intervention, would include an influence similar to Native American burning."** (FEIS, p. 3-184)

In other words, the frequent fires used by Native Americans to modify the forest landscape in presettlement times, are defined by the Forest Service as a "natural" fire regime.

The Appendix D of the FEIS (p. D-1—D-2), explains that oak hickory cover in the area of the WNF was not just promoted by the influence of Native Americans, but also through the Europeans who settled the area. Here are some direct quotes from those pages (emphasis added):

- Traveling west from Pittsburgh, Pennsylvania, David McClure in 1772 noted that "the woods were clear from underbrush, the oaks and black walnut do not grow very compact, and there is scarcely anything to incommode a traveler in riding, almost in any direction, in the woods of the Ohio. **The Indians have been in the practice of burning over the ground, that they may have the advantage in seeing game at a distance among the trees**.

- **In southeast Ohio, frequent burning is believed to have favored the more fire-resistant oaks and eliminated understories of mesic species such as American beech and sugar maple.**

- Beginning at the time of European settlement in the early 1800s, the **general level of disturbance was higher** because land was cleared for agricultural crops. **Fire was used to clear the land, and it sometimes escaped to the woods, so that the level of fire disturbance remained similar to the conditions before the settlement of Europeans**.

- In southeast Ohio, timber harvesting on the uplands was limited until the mid-1800s when the **charcoal iron industry** became prominent in the region. The charcoal industry (ca. 1830 – 1890) was the primary cause of the clearcutting of many forest stands in southeast Ohio. In 1875 there were 69 iron furnaces in the Hanging Rock region of southeast Ohio and northeast Kentucky. **To supply charcoal for a typical furnace, 200 to 600 acres of forest were harvested annually, and the forest was harvested again at 20 to 30 year intervals.** These cuts were essentially coppice harvests, whereby regeneration was of sprout-origin. **This cutting regime ultimately fostered oak regeneration and reinforced its dominance**.

- In southern Ohio, the fire-return intervals during the period of the mid-1800s to 1925 were in the range of 3 to 7 years (Abrams and Nowacki, 1992). Fire scar data analyzed in Vinton County, Ohio show that the fire return interval averaged 3.6 years for low-intensity fires, and 7.5 years for major fires. **The fires were probably ignited by people and occurred mostly in the dormant season or early spring,** and only a few (6%) occurred during the summer. **There is little indication that climate patterns caused the fire events since they were human-caused.** The fires appeared to have burned until either weather extinguished them or they encountered barriers. **As shown in Figure D - 1, the acreage of land that experienced fire dropped dramatically after the late 1920s and early 1930s when fire control laws were passed and the general protection of the forest ecosystem began**.

In other words, according to the FEIS, all fire occurrences and frequencies, and of course the logging, before 1925 are the consequences of heavy human intervention, whether by Indians, early settlers or the charcoal industry.

According to the Forest Service, there is now a need for the oak hickory forest to be restored and maintained through even-aged and uneven-aged logging, prescribed burns, herbicide treatments and other silvicultural treatments.

With this, the Forest Service basically states that the historic, heavy-handed human intervention that resulted in frequent forest fires and the development of a fire-adapted tree cover is a desirable condition. According to the WNF Plan, 46,215 acres will be burnt, and 16,481 acres logged (WNF FEIS Table 2-4) to achieve this historic "ideal" oak cover.

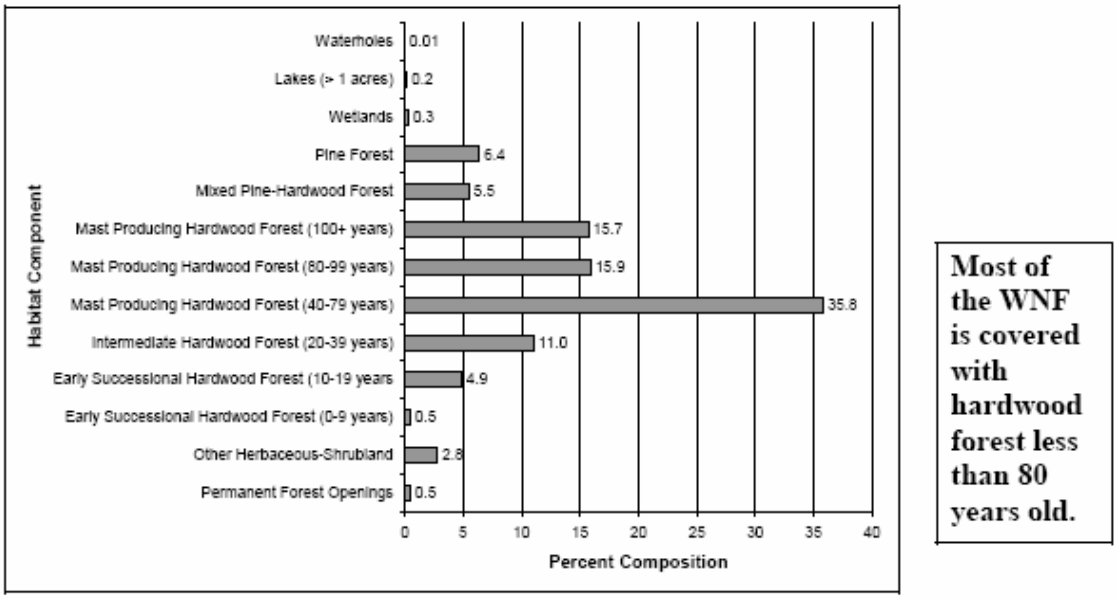
Create More Early Successional Habitat

According to the ROD, p. 10, "Under the 2006 Forest Plan 77% of the Forest will be managed to provide mature forest habitats (big trees, 100-120 yrs old or older, some with openings in the canopy and some with a closed canopy). **The remaining 23% of the Forest will be managed to provide habitat for species that require early successional and grassland habitats.** This is a

change from the 1988 Plan as amended, which had no provisions for providing early successional habitat."

ROD, p.10/11: "The FEIS analysis shows that a variety of habitats will be required to contribute toward viability of species at risk: mature hardwood forest, mid-successional hardwood forest, early successional habitat, pine forest, grasslands, and healthy aquatic and riparian habitats. Large intact forest communities within this ecoregion are limited."

Figure 5: Habitat Composition on WNF



Source: WNF FEIS Figure 3-8

- "Early successional forest habitat is needed to conserve certain animal species in the planning area, however our analyses showed that this habitat has declined on NFS land since the 1988 Forest Plan was implemented." (FEIS, p. 3-37)

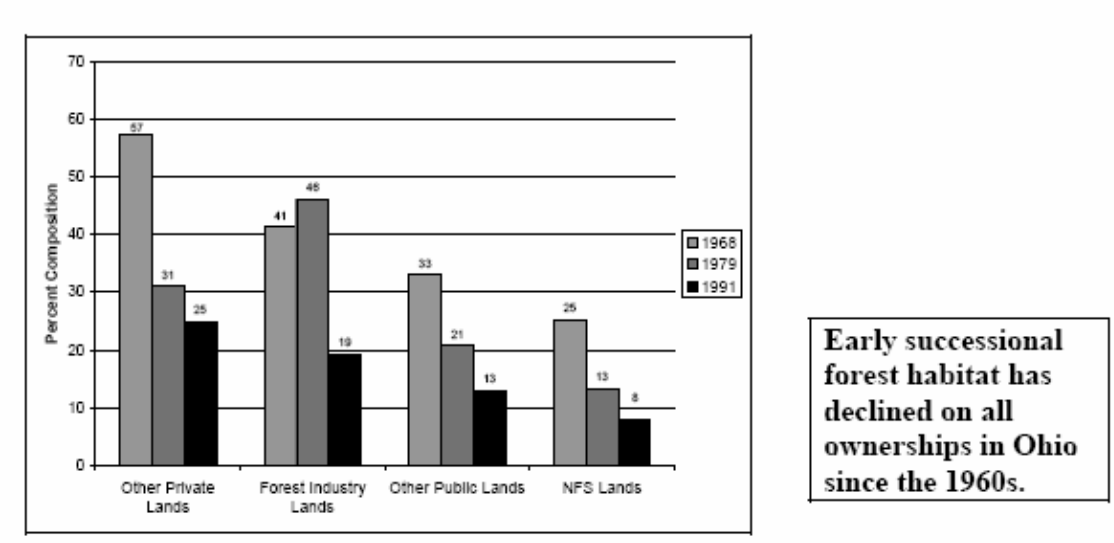
- "Approximately 35 percent of the terrestrial vertebrate species that are known to occur on the Wayne use early successional forest habitat during their life cycle." (FEIS, p. 3-59)

- "Repeated disturbances are required to maintain early successional forest habitat. Natural disturbances created by tornadoes, ice storms, floods, windthrow, insect and disease outbreaks, and natural death, vary in size from small gaps to large-scale clearings. Timber harvesting is a tool that can create early successional forest habitat in the landscape, and the size and habitat quality of the resulting disturbance can vary, as it does with natural disturbances." (FEIS. p. 3-59)

- "A declining trend in early successional forest habitat and the subsequent decline in population trends for some species that rely upon it, is not only a concern on the WNF, but has emerged as an issue across the eastern United States. Forest Inventory and Assessment data show that early successional forest habitat has been declining on all

lands in Ohio since the late-1960s. This decline is in part due to maturation of forests, but also to a decline in farm abandonment." (FEIS, p. 3-59)

Figure 6: Percent Composition of Early Successional Forest Habitat in Ohio Managed by Four Ownerships 1968-1991



Source: WNF FEIS, Figure 3-20

- "In 1968, 25 percent of NFS land was comprised of early successional forest habitat, whereas only 5.4 percent is covered by early successional forest today."(FEIS, p. 3-60)

- "This habitat type occurs in various-sized patches and is randomly scattered across the planning area (WNF Vegetation Database)." (FEIS, p.3-62)

- "If current management continued (i.e., only uneven-aged management and thinning), **early successional habitat would continue to decline until the only early successional habitat available would likely be in utility corridors that are selectively maintained or on newly acquired lands that were recently cutover.**"(FEIS, p. 3-61) (emphasis added)

- The Forest Service points out that under existing conditions, early successional habitat **consists of small patches distributed haphazardly across** the landscape. This is not appropriate for **some early successional species** that **need larger patches of that habitat.** (FEIS p. 3-66)

- To ensure that the habitat was optimal and species were well distributed, the taxonomic experts indicated that **at least one large block of contiguous NFS land managed under this rotational scheme should occur on each administrative unit.** (FEIS, p. 3-67)

- "**Even-aged management methods that retain trees in the harvest unit** (e.g., clearcut with reserves, shelterwood, and two-age) can provide habitat for both early successional species, as well as some species typically associated with mature forest." (FEIS, p. 3-178)

Evaluation Criteria for Analyzing WNF Plan Approach to Biological Diversity

In evaluating the 2006 WNF Plan's approach to biological diversity, we will assess:

- Whether this plan addresses issues that have **been identified as primary concerns or important threats related to biodiversity** in the:
    - 2007 Interim Update of the 2000 Renewable Resources Planning Act Assessment;
    - USDA Forest Service Strategic Plans for FY 2007–2012 and FY 2004-2008; and
    - "Terrestrial Ecoregions of North America: A Conservation Assessment."

- Whether the habitat goals set by the 2006 WNF Plan are a reflection of the relative scarcity of those habitats on the WNF, in the region, or for the U.S.

- Whether the 2006 WNF Plan enhances prospects for Federally listed endangered species.

This evaluation is centered on the question of whether the 2006 WNF Plan maximizes net public benefits. For a maximization of net public benefits,

- Public benefits have to outweigh public costs (otherwise there would be a loss), and
- No other use of Forest Service resources should be expected to be able to raise net public benefit above what has been achieved through the Plan.

What is of the highest benefit to society changes over time, and the Forest Service itself assesses from time to time what are the most pressing issues to be addressed by forest managers, and where priorities should be placed.

Above, we analyzed in great detail how the 2006 WNF Plan addresses the threats of fragmentation and invasive species, and we will therefore only briefly summarize the results here.

The 2006 WNF Plan increases disturbances throughout the forest through **logging, prescribed burns, and mining, as well as through the building of more roads and ORV trails.** These disturbances will:

- Provide more and larger sized patches of early successional habitat for area-sensitive species that are dependent on those habitats.

- Increase the danger of NNIS spreading throughout the forest, with NNIS being one of the biggest threats to biodiversity (see chapter on NNIS above).

- Increase fragmentation of continuous, interior, mature patches of forest on at least **63 percent of the Wayne National** of the forest, therefore decreasing beneficial habitat for

any species that depend on large continuous patches of forest at various stages of their life cycle (see chapter on Fragmentation above).

Analysis of Early Successional Habitat Goal

Both the 2007 Interim Update of the 2000 Renewable Resources Planning Act (RPA) Assessment and the "Terrestrial Ecoregions of North America: A Conservation Assessment" put into question the urgency of providing more early successional habitat.

The 2007 Update of the 2000 RPA points out that in the East, 23 percent of all timberland is between 0-20 years old. The RPA also states that this age class is getting smaller, but then explains that this is what should be expected to occur when the forest matures after it has been heavily logged. In other words, the large expanses of early successional habitat earlier in the 20th century were solely the result of heavy logging pressure.

From the 2007 RPA Update: "Extent of Area by Forest Type and Age Class or Successional Stage" (p. 44/45):

- "In the East, about 58 percent of all timber land is classed as having an average stand age of more than 40 years, 19 percent is between 20 and 40 years in average stand age, and 23 percent has an average stand age of less than 20 years (fig. 25). In the West, the average stand age is older (80 percent of the area has timber aged 40 years or more) than for the East, reflecting the fact that more areas in the West have never been harvested."

  "The Nation's forests are getting older in many areas of the country, **but age is a relative term. Compared to the early 20th century, eastern forests are older, but they are only a fraction of the average age of forests at the time of pre-European settlement.** From an **ecosystem diversity perspective, this maturation will lead to increased diversity of forest structure** but a decreased diversity of forest types because later successional stages will continue to increase at the expense of earlier successional stages." (emphasis added)

Table 52: Timberland Area by Stand-Age Class in the East

0-19 years	23%
20-39	19%
40-59	23%
60-79	17%
80-99	8%
100-199	4%
200+	**0%**
Uneven aged	6%

Source: 2007 Interim Update of 2000 RPA

The **"Terrestrial Ecoregions of North America:** A Conservation Assessment," extensively quoted above, gave the following assessment:

- "A landscape-scale **conservation strategy for conserving large, interconnected blocks of mature forests urgently needs to be developed and implemented."**
- **"Fragmentation is highest** in the northern part of the ecoregion, primarily in southwestern Pennsylvania and **Ohio."**
- "The **WNF** contains **some rare patches of almost extinct natural forest** that could be protected and connected throughout the region…."

Even the FEIS graph included above (Figure 6), showing the decline since 1968 of early successional habitat on NFS land, other public land, private forests, and timber industry land, also shows that **on all lands besides NSF land**, the percentage of **early successional habitat is still between 12 and 25 percent**. Private lands, therefore, are providing a lot of this habitat.

This is **not true for the provision of large, interior tracts of mature forests**. Those are not currently available on private lands and cannot be expected to be provided by private landowners. Public land owners like the U.S. Forest Service are the only ones in a position to respond to this need for large, continuous interior tracts of mature forest.

In pushing the provision of early successional habitat through logging, the Forest Service also disregards and discounts that natural disturbances will provide this habitat type naturally, and for free. The FEIS mentions natural disturbances created by **tornadoes, ice storms, floods, windthrow, insect and disease outbreaks, and natural death**, and states that they can vary in size from small gaps to large-scale clearings. The FEIS (p. 3-124) mentions that in the year 2003, about 71,000 acres on the Ironton Ranger District were damaged by an ice storm.

However, when it comes to projecting acres of early successional habitat under different alternatives, Alternative A shows ZERO acres of early successional habitat. (FEIS Table 3-20, p. 3-100) Alternative A is the no-action alternative, meaning that it would continue the direction of the 1988 plan as amended, which did not prescribe clearcuts to create early successional habitat. In other words, the FEIS completely ignores and therefore discounts that **natural disturbances** will, without any human having to lift a finger, lead on an ongoing basis to the death of some trees in the forest, creating openings of various sizes that can be occupied by trees and other vegetation in early successional stages.

The Table below shows that after 100 years there will be grassland habitat of 2,134 acres (under E_{mod}) compared to 973 acres under the 1988 amended Plan, and early successional habitat of 12,820 acres compared to 0 acres.

While both these habitat types will increase in size compared to 1988 Plan direction (as amended), there will be mature forest habitat of 192,645 acres (under E_{mod}), compared to 238,053 acres under the 1988 amended plan. The difference is 45,408 acres.

Table 53: WNF Habitat Indicators

Issue Indicator	Amount or Trend* Estimate (after 100 years)	A	B	C	D	E	E Modified	F
NFS land allocated to management areas that allow timber harvesting	Amount (acres)	210,939	210,939	205,760	210,462	205,759	202,777	174,858
NFS land allocated to management areas that allow prescribed fire	Amount (acres)	210,939	210,939	205,760	210,462	205,759	202,777	174,858
Oak-hickory Forest	Amount (acres)	18,088	41,082	40,201	49,040	62,118	60,169	57,823
	Trend	↓↓↓	↓↓	↓↓	↓↓	↓	↓	↓
Pine Forest: Pine Warbler	Amount (acres)	**	13,299	11,977	11,805	10,680	10,461	7,876
	Habitat and Population Trends	↓↓↓	↓	↓	↓	↓	↓	↓↓
Early successional forest: Yellow-breasted Chat Ruffed Grouse	Habitat Amount (acres)	0	13,308	11,224	13,434	13,520	12,820	9,664
	Habitat and Population Trends	↓↓↓	– or ↑	↓	– or ↑	– or ↑	– or ↑	↓↓
Mature Forest Habitat: Cerulean Warbler Worm-eating Warbler Pileated Woodpecker	Habitat Amount (acres)	238,053	186,896	196,305	195,110	192,645	193,358	206,776
	Population Trend	– or ↑	– or ↓	– or ↑	– or ↑	– or ↑	– or ↑	– or ↑
Mature Riparian Forest Habitat: Louisiana Waterthrush	Habitat amount (acres)	29,623	29,623	29,623	29,623	29,623	29,623	29,623
	Population Trend	– or ↑	– or ↓	– or ↑	– or ↑	– or ↑	– or ↑	– or ↑
Grassland Habitat: Henslow's Sparrow	Habitat Amount (acres)	973	973	2,134	2,134	2,134	2,134	2,134
	Trend in population	– or↓	– or↓	– or↑	– or↑	– or↑	– or↑	– or↑

* Estimates of population trends for management indicator species are based on habitat trends on the WNF, and do not take into account how environmental conditions or factors related to wintering habitat could affect their population trends.

**No even-aged management prescribed; therefore pine would disappear over time on WNF.

↓ Slight decline from present levels; ↓↓ Moderate decline from present levels; ↓↓↓ Major decline from present levels

– Stable or no change from present levels

↑ Slight increase from present levels; ↑↑ Moderate increase from present levels; ↑↑↑ Major increase from present levels

Source: FEIS Table 3-20

Why does the Forest Service expend all this energy and money to push beyond what nature would do on its own?

By not responding to the need for larger patches of interior forest habitat, and actually moving into the opposite direction and providing more of a habitat that is much less scarce, at the expense of the habitat that is scarcer, the Forest Service cannot claim to have maximized public benefits with regard to biodiversity.

Analysis of Oak Hickory Restoration Goal

Similarly, the other center piece of the 2006 WNF Plan, the establishment and maintenance of an oak hickory ecosystem, **does not seem to be guided by a concern for the maximization of public benefits.**

While undoubtedly some species will benefit from the pursuit of this goal (as some species will benefit from the availability of more early successional habitat), the FEIS does not make it clear why it is in the public interest to re-create a forest type that dominated the landscape at some time in the past only as the result of heavy human disturbance.

The **restoration and maintenance of that forest type will require ongoing interventions through logging, burning, herbicide spraying,** and other silvicultural methods as long as this forest type is seen as a desirable goal. There will never be a point where the Forest Service could sit back and let natural processes take over to do the job, because as soon as the Forest Service stops intervening, the forest will probably start to revert to a more natural state, where oak

hickory will play a much smaller role and will move towards just occupying its ecological niche on drier ridge tops.

Logging continuously is exactly what the Forest Service is planning to do on the WNF. The Allowable Sale Quantity (ASQ), which is 83 million board feet in the first decade, will go up to 88 million board feet during the second decade, and to 148 million board feet in the third, and then stays at that level. This is an increase of 78% compared to the first decade (Table B-2, LRMP Appendix B). The WNF plan declares 161,752 acres on the WNF as suitable for timber, and these acres will all be logged at intervals of 60-80 years, the time needed for trees to "mature" after they have been logged.

What the Forest Service is proposing here with regard to oak hickory forests **falls neither under passive**, **nor active management** as described in "A Citizen's Call for Ecological Forest Restoration: Forest Restoration Principles and Criteria."[72]

According to "A Citizen's Call," effective forest restoration should have as its primary objective the **reestablishment** of **fully functioning ecosystems**. Ecological integrity can be thought of as the "ability of an ecosystem to support and maintain a balanced, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of natural habitats within a region."

This can be achieved either by passive or by active restoration, with **priority being given to passive restoration.**

Passive Restoration means halting activities that cause degradation or prevent ecosystem or species recovery. This is considered the first and most critical step in restoration of ecological integrity.

Passive restoration should take precedence "where it is vital to eliminate or reduce the root causes of ecosystem degradation, including stopping destructive logging, road building, livestock grazing, mining, building of dams and water diversions, off-road vehicle use, and alteration of fire regimes." [73]

Certainly the **Forest Service is not practicing passive restoration by restoring oak hickory forests through logging and burning.** To the contrary, the Forest Service proposes not to stop, but to **re-introduce heavy-handed practices that prevent the forest from recovering** from the massive human interventions that took place over hundreds of years, enacted by native Americans (so the Forest Service tells us) and European settlers alike. The goal of the Forest Service clearly is <u>not</u> to move the forest as close as possible to what could be considered a natural habitat.

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[72] DellaSala, Dominick A., Anne Martin, Randi Spivak, Todd Schulke, Bryan Bird, Marnie Criley, Chris van Daalen, Jake Kreilick, Rick Brown, and Greg Aplet, A Citizen's Call for Ecological Forest Restoration: Forest Restoration Principles and Criteria, *Ecological Restoration*, Vol. 21, No. 1, 2003.
http://www.wildwestinstitute.org/pdf/Restoration%20Principles.pdf

[73] DellaSala, et. al., A Citizen's Call for Ecological Forest Restoration, p. 17-18.

Active Restoration means**: "**Reintroduce natural processes or species through direct intervention. Direct human intervention is needed in cases where it is necessary to reintroduce (or secure) natural processes, at-risk species, or regionally extirpated species, and in cases where ecosystem composition, structure, and function are degraded or hindered by factors such as compacted soils, channelized streams, invasive species, or fire suppression."

"Active restoration methods include, but are not limited to, planting, prescribed burning, road obliteration, removal of barriers to fish passage and water diversions, invasive species control, fuel treatment, and riparian restoration." [74]

The Forest Service cannot claim to be practicing active restoration when it comes to oak hickory forests, since active restoration has the same goal as does passive restoration: to restore the forest's ecological integrity and move it towards a state where it can heal and maintain itself.

Active restoration is aimed at supporting the forest in resuming natural processes that have been so damaged by human intervention that it is unlikely that the forest will heal itself without some obstacles being removed.

The Forest Service is practicing active restoration on the Wayne, for example, through mine reclamation.

But intervening **to "restore" a land cover type that only came about because of massive human disturbances** in the first place has **nothing to do with active restoration,** i.e. helping the forest to achieve ecological integrity, defined above as the "ability of an ecosystem to support and maintain a balanced, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of natural habitats within a region."

To add to the irony of the situation, not only does the Forest Service claim that it wants to maintain and restore a forest type that would not occur naturally, but then, instead of preserving the oaks that are already there in abundance, providing mast for wildlife and supporting a certain suite of plant and animal species adapted to the oak hickory forest, the Forest Service goes ahead and cuts those precious, desired oaks for timber.

Without Forest Service logging most of the oaks that are now present and are dominating the landscape of the WNF, they would continue to be there for hundreds of years, busily producing mast for wildlife that depends on them and providing habitat for species adapted to them, regardless of maples in the undergrowth. Oaks can get to be 300 years old, and most of the WNF has now reached 40-90 years old, according to the FEIS Figure 3-29 (p. 3-71). Natural disturbances would bring some of those oaks down before they reached their full age (but that will also happen in addition to the logging done by the Forest Service).

Contrary to the general certainty with which the FEIS promotes the idea that maples will replace the oaks unless the Forest Service intervenes, in one place the FEIS actually admits that many scientists do not know the influence of the influx of maples on forest structure. (FEIS, p. 3-74)

[74] DellaSala, et. al., A Citizen's Call for Ecological Forest Restoration, p. 18.

Only because the Forest Service is planning on harvesting oaks does the whole issue of "regeneration" even come up. It is the Forest Service, by cutting oaks, that is making the oaks disappear over the next 100 years, not the competition of the maples and poplars in the understory. In other words, **all the efforts that go into maintaining, restoring or "regenerating" oaks are only necessary because the oaks are cut in the first place!** After the oaks are cut, the Forest Service unleashes its arsenal of interventions to attempt to make them grow back, with silvicultural treatments like herbicide spraying, thinning, crop tree release, grape vine control, and prescribed burns. All this is the direct result of the Forest Service logging oaks, and wanting to create a continuous supply of oaks in the future for private logging companies.

In addition to that, the logging of the oaks and all the other silvicultural treatments do create slash that will add fuel to the forest floor, much more than could be expected to occur naturally. That, in turn, gives the Forest Service more "justification" for prescribed burns.

While prescribed burns are mentioned as one possible tool of active restoration in "A Citizens Call," it is unlikely that this would be an appropriate tool to be used on the WNF.

Given the history of human-induced fires on what is now the WNF, the policy of fire suppression that started in the 1920s may have been more geared towards suppression of human-induced fires than of naturally occurring fires. And the reason for prescribed burns given by the Forest Service is clearly to "restore" this historic human fire regime to the forest. As the FEIS states in Appendix D about forest fires before the 1920s, **"The fires were probably ignited by people and occurred mostly in the dormant season or early spring,** and only a few (6 percent) occurred during the summer. **There is little indication that climate patterns caused the fire events since they were human-caused**." (Emphasis added)

Unlike the active restoration, as defined by "A Citizens Call," which would be applied to restore the capacity of the forest to then regulate itself, the Forest Service plans to maintain an artificial state that requires ongoing intervention through both logging and burning.

If the goal of the Forest Service is to restore the WNF to a more natural state, and that state involves fires that happen naturally on a larger scale than they do today, then the first step towards that goal is not to conduct prescribed burns but to make room for naturally occurring fires to run their course on at least some parts of the forest. This would be considered passive restoration.

By setting a goal of **"restoring" oak hickory**, a goal that has **no obvious connection to any pressing public need**, and by committing forest resources, including taxpayer money, to that goal, the Forest Service neglects any number of other, really pressing issues that could be addressed in the Forest Plan. These include, for example, mine reclamation, wetland restoration, the creation of large, continuous interior patches of forest, the control of NNIS, and the control of illegal OHV trails. Dealing with those issues would make a significant contribution to the protection of biodiversity on the WNF by restoring and protecting habitat for the most vulnerable and endangered species.
"Because **resources are always limited**, conservationists and foresters charged with conserving diversity should **clearly concentrate their efforts** regarding diversity on maintaining those

particular elements **most in danger** of being lost or of having their ecological relationships with other elements disrupted. In addition, rare community types, rare species within communities, and species sensitive to human disturbance obviously deserve more protection than common, pervasive, or weedy species."[75]

The Forest Service may argue that by providing a continuous supply of oaks, it makes an important contribution to the local economies of WNF counties. Our macroeconomic analysis below will address this issue in greater detail. But we can say this much here: The contribution of WNF logging does not make any significant contribution to employment and income in WNF counties.

In "managing" the forest for oak hickory forest cover, the Forest service is pursuing a goal that doesn't address any obvious public need. Therefore, there is not much of a benefit from all that logging, burning, herbicide spraying that is part of that "management."

The public costs, on the other hand, are formidable. By logging and burning, the Forest Service does damage to the capacity of the forest to provide ecosystem services related to water and air purification, carbon sequestration, and recreation. Pollution of water and air, and threats to endangered species increase. The Forest Service increases fragmentation of interior, mature forests, and thus reduces one of the scarcest habitat types in the nation. On the other hand, the Forest Service provides more of a habitat that is in comparatively plentiful supply: early successional habitat. This increased disturbance and fragmentation of the forest from logging and burning invites more NNIS, one of the major threats to biodiversity.

Furthermore, the Forest Service could have reduced expenditures, fragmentation, pollution and threat of NNIS, and could have increased the availability of interior, mature forest habitat by basically leaving the forest to itself, and letting it grow, and by taking a fraction of the money that was spent to log and burn, to actively support the recovery of the forest by decommissioning roads (reduce fragmentation), removing NNIS, reclaiming mines, repairing riverbanks, every once in a while removing a tree that may be a hazard to visitors, maintaining hiking trails, buying land for forest consolidation, and building attractive campgrounds.

While larger **continuous patches of grassland and early successional habitat** may also be relatively scarce, and there may be some justification to provide less fragmented habitats of those types as well, this does not require ongoing logging, and especially clear-cutting across the whole forest. The **goal of providing these habitats could be achieved without actually reducing the availability of the habitat that is most scarce, the mature continuous interior forest habitat.** There are a number of options how that could be done, including conservation easements on private land, or purchasing larger patches of agricultural land on the edge of the forest that are then either kept in grassland or in a state of early succession on a permanent basis, or are only added to interior forest blocks as new additional agricultural land is acquired.

[75] Alverson, et.al., *Wild Forests,* p. 42.

Analysis of Endangered Species Impacts

Summarizing the findings so far, the WNF Plan pushes early successional habitat, even though this habitat type exists in relative abundance on private lands and would naturally occur on the WNF without any intervention by the Forest Service.

Meanwhile, the very practices that the Forest Service claims to employ as tools to enhance biodiversity, especially logging and burning, have been identified as posing severe threats to biodiversity, because they further the fragmentation of interior forests and create new pathways and suitable habitat for NNIS.

Whatever habitats the Forest Service provides or maintains on the WNF—some species will thrive as a result, while others may decline or not see much improvement. For example, even-aged management (clearcuts), road building and mining create more edge habitat, and some species will thrive in that habitat. (FEIS, p. 3-80)

"There are over 300 aquatic and terrestrial vertebrate species, in addition to countless invertebrates and over 2,000 plant species known to inhabit the WNF sometime during their life cycle. Species viability evaluations conducted as part of the 2006 Forest Plan revision demonstrated that habitat diversity is the key to the conservation of these plants and animals." (FEIS, p. 3-34)

The WNF Plan heralds a "mosaic" of habitat types, where patches that are at different stages of succession are distributed throughout the forest. (FEIS, p. 3-239)

However, given limited resources, including a limited amount of land, efforts to maintain or improve habitat for all species currently present is neither economically wise nor ecologically justified. As Alverson, et. al. stated above, "rare community types, rare species within communities, and species sensitive to human disturbance obviously deserve more protection than common, pervasive, or weedy species."

Among those most rare and deserving of protection are species that are Federally listed as threatened or endangered.

How is the 2006 WNF Plan doing with regard to Federally Listed Species?

According to the FEIS (p. 3-109), The U.S. Fish and Wildlife Service identified nine Federally listed plant and animal species that occur within or near the WNF. Only three of them are known to occur within the WNF proclamation boundary.

As far as federally listed species are concerned that are **not currently found** on the WNF, the FEIS indirectly admits that there are potentially adverse effects from "management" activities (for example logging) for four of these species, by stating that adverse effects will be minimized by standards and guidelines that apply to those activities (FEIS, p. 109-112). In one case, the Forest Service claims that adverse effects are temporary and will result in improved habitat for a particular species in the future. (FEIS, p. 3-110) This argument is used repeatedly to justify

disturbances to the forest but does not hold much water, since the disturbances that are necessary to "regenerate" oak hickory and to maintain artificially high levels of early successional habitat have to be continued for an indefinite time, as long as the Forest Service holds on to the goal of perpetuating a forest cover and structure that can only be maintained by ongoing disturbances. In other words, the short-term disturbance is not-short term, and adverse effects on certain species will continue.

About federally listed species that can be found on the WNF, the FEIS has the following information:

- **Running Buffalo Clover:**
  "Non-native invasive species, including white clover, Japanese stilt grass, garlic mustard, Japanese honeysuckle, amur honeysuckle, wintercreeper, and periwinkle pose risks to this species and its habitat." (FEIS, p. 3-113)

  As was shown in great detail above in this report, the management activities proposed in the 2006 WNF Plan are likely to open up more opportunities for the establishment and dispersal of NNIS.

  The FEIS also states: "Cumulatively, the Forest Service could implement about 74,000 acres of projects that could adversely affect the species or its habitat (i.e., prescribed fire, road and trail construction, even-aged management). These disturbances would be distributed across the WNF and over the decade. The actual disturbance would be less since many activities would occur on the same acreage of land, however that would be analyzed in detail at the project-level." (FEIS, p. 3-115)

  Again, there is an admission that management activities are expected to have a negative impact on this species.

  On the other hand, the Forest Service claims that its use of uneven-aged management (group selection cuts) on 108,008 acres of the forest could benefit the species. (FEIS p. 3-114) Underlying this is an assumption that it is up to the Forest Service to provide ideal conditions for this species, and that logging and burning are the ways to do this. With this, the Forest Service disregards natural disturbances that can create "filtered or dappled sunlight conditions" favorable to the species without the necessity to build logging roads or to administer large scale prescribed burns that have negative impacts on that same species.

  "Prescribed fire accounts for the largest acreage; it may result in short-term adverse effects that can be mitigated, but can offer long-term benefits to the species. Prescribed fire is a tool that can be used to create open understories, much like that which was present historically." (FEIS, p. 3-114/115)

  What the Forest Service is not saying is that its habitat modification program (establishing oak hickory) is not limited to a short time but would have to be continued indefinitely as long as establishing oak hickory is considered a goal.

That means that new short-term impacts would continually be created for a long time to come.

A **Likely to Adversely Affect** determination is made for the running buffalo clover. (FEIS, p. 3-116)

- **Bald Eagle:**
  "Eagles select areas with low human disturbance…" (FEIS, p. 3-117)

  According to the FEIS, habitat degradation resulting from the removal of supercanopy trees along larger streams and lakes has been identified as a threat to this species, as has contamination of aquatic ecosystems from point source and non-point sources of pollution. (FEIS, p. 3-117)

  A **Not Likely to Adversely Affect** determination is made for the bald eagle across all alternatives. However, it is also stated that loss of habitat (i.e., removal of suitable nesting or roosting trees) or disturbance could occur as a result of timber harvesting activities, prescribed fire, development of oil and gas wells, surface mining activities, road construction and maintenance, road reconstruction, trail construction and maintenance, or construction of facilities. "However, conservation measures integrated into the alternatives would not only protect occupied roosts or nesting sites if they were discovered …, they would ensure potentially suitable habitat would be available on NFS land in the future." (FEIS, p. 3-119)

  Again, it is clear from the above statements that Bald Eagle Habitat can be negatively impacted by projected management activities, even though measures are supposedly taken to minimize effects. The River Corridor Management Area that is most relevant to the bald eagle allows selective cutting as well as clearcuts (LRMP, p. 3-35), in other words, human disturbances.

- **Indiana Bat**

  The FEIS follows a familiar pattern, stating that management practices are employed to improve bat habitat in the long run but that there may be adverse effects in the short run, which will be mitigated by standards and guidelines.

  "Uneven-aged timber harvesting opens gaps in the canopy, which may directly benefit the Indiana bat." (FEIS, p. 3-121)

  "The vegetation management and prescribed fire projected to occur during the first decade would contribute to the long-term goal of retaining or developing Indiana bat roosting and foraging habitat. However, implementing such activities may alter roosting or foraging habitat for a short time. Other activities, not associated with Indiana bat conservation, may also occur during the first decade and could temporarily alter potentially suitable Indiana bat habitat for a period of time." (FEIS, p. 3-122)

Again, with regard to the bat, as with other species, the Forest Service claims to provide ideal habitat conditions through logging and burning. In its appeal of the WNF plan, Heartwood has questioned this proposition, and the arguments presented in the appeal will not be repeated here.[76]

In claiming that short-term negative impacts on the Indiana bat will lead to improved habitat conditions sometime in the future, again the Forest Service ignores that its habitat modification program (establishing oak hickory) involving logging and burning is not limited to a decade, but would have to be continued indefinitely as long as maintaining oak hickory forests is considered a desirable goal. That would mean that new short-term impacts on the bat would be continually created for a long time to come.

That this is indeed what the Forest Service is planning on doing can be concluded from Table B-2 (LRMP Appendix B), which shows that the ASQ will increase from currently 83 MMBF in the first decade to 148 MMBF in the third decade and then stay at that level.

The tables below show the acres affected by management activities that could lead to potentially adverse effects in the "short run," as well as activities that lead to permanent changes.

Table 54: Projected Management Activities that Could Result in the Alteration of Potentially Suitable Indiana Bat Habitat

	A	B	C	D	E	E Modified	F
Timber Harvest	5,000	11,160	18,890	18,680	18,150	17,941	16,040
Crop Tree Release	1,150	3,250	3,239	2,786	2,142	2,113	1,719
Prescribed Fire	69,819	69,819	69,819	69,819	69,819	69,819	69,819
Temporary Roads, Skid Trails and Log Landings	316	571	893	885	863	886	774
Hazardous Fuels Reduction – Mechanical Methods	10,181	10,181	10,181	10,181	10,181	10,181	10,181
Development of Permanent Openings	500	500	500	500	500	500	500
Utility Corridor Development	50	50	50	50	50	50	50
Closure of mine features	232	232	232	232	232	232	232
AMD Treatments	270	270	270	270	270	270	270
Total (Acres)	**87,518**	**96,033**	**104,074**	**103,403**	**102,207**	**101,992**	**99,585**
Percent NFS land Affected	**36.7**	**40.3**	**43.7**	**43.4**	**42.9**	**42.8**	**41.8**
Percent Cumulative Effects Analysis Area Affected	**7.9**	**8.7**	**9.4**	**9.3**	**9.2**	**9.2**	**9.0**
Hazard Tree Removal	2,550	2,550	2,550	2,550	2,550	2,550	2,550
Hickory Tree Removal	320	692	1,160	1,148	1,115	1,142	987

Source: WNF FEIS Table 2-24

[76] Heartwood and Buckeye Forest Counsel, *Notice of Appeal.*

Table 55: Projected Management Activities that Could Result in the Permanent Loss or Alteration of Potentially Suitable Indiana Bat Habitat

	A	B	C	D	E	E Modified	F
Permanent Road Construct. and Reconstruct. (acres)	197	291	394	391	385	392	355
Recreation Trails (acres)	303.5	303.5	265	302	265	265	225
Recreation Facility & Parking Lot Construct. (acres)	60	60	60	60	60	60	60
Surface Mining (acres)	1,250	1,250	1,250	1,250	1,250	1,250	1,250
Oil & Gas Well Development (acres)	121	121	121	121	121	121	121
Total (acres)	**1,931.5**	**2,025.5**	**2,090**	**2,124**	**2,081**	**2,088**	**2,011**
Percent of NFS land	**0.81**	**0.85**	**0.88**	**0.89**	**0.87**	**0.87**	**0.84**
Percent of Cumulative Effects Analysis Area	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**

Source: WNF FEIS Table 3-25

In addition, there will be negative effects on bats from the logging around the construction of the Nelsonville Bypass, begun in 2007. (FEIS, p. 3-128)

A **Likely to Adversely Affect** determination is made for the Indiana bat across all alternatives.

For most of the federally listed species, the Forest Service claims, as we have shown above, that its management approach will benefit species in the long run, with the unspoken assumption that interventions are necessary to achieve that goal. But is that true? The FEIS itself projects what would happen to forest stands that are left to develop naturally (emphasis added):

"For purposes of this analysis, forest stands that are in areas projected to undergo natural succession will be assumed to have older forest characteristics within 100 years. They would possess forest trees of great age (typically 150-200 years old in southeast Ohio), **diversity of canopy layers, gaps in the canopy, large woody debris on the forest floor, and a component of standing dead and dying trees.** … The difference between a managed uneven-aged forest and one undergoing natural succession is that **trees within the natural succession prescriptions will continue to grow older until they die, and then will become snags and finally coarse woody debris on the forest floor.** Trees in **uneven-aged management prescriptions will likely be harvested and removed from the stand at some point in their life cycle,** with the exception of hickory trees and those trees identified for retention to ensure long-term Indiana bat roosting habitat."

So the difference is not in the outcome (openings in the canopy), the difference is in whether trees can be harvested or not!

Timber Industry Rationale Behind Forest Service Goals

The reader may be wondering by now why in the world the Forest Service is so keen on maintaining oak hickory forests and creating early successional habitat.

There are two inter-related answers to this question:

First, the Forest Service, as a public agency, responds to financial incentives that are provided by Congress. To maintain its existence and continue to employ people, the Forest Service has to do those things for which funding is provided by Congress. And funds happen to be available to the Forest Service for hazardous fuel reduction and for timber operations. We will explore this issue of incentives in more depth further below (Chapter: Follow the Money).

Second, because of the financial incentives to allow logging on National Forests, and because of a long tradition of industrial forestry professionals being in charge of the Forest Service, land use planning on the National Forest basically follows the imperatives of industrial forestry.

Since there has been growing opposition to subjecting the National Forests to practices of industrial forestry, the Forest Service has learned to sell these practices under the label of "ecosystem management." As a result, under what the Forest Service calls ecosystem management, goals and objectives related to managing habitat are inevitably achieved by applying logging "treatments" (and more recently, by prescribed burns). And these logging treatments follow some familiar patterns. Where logging treatments are actually harmful to certain species, the Forest Service justifies logging activities by saying that even though there may be negative impacts in the short run, these species will benefit in the long run.

Forestry industry experts know that it is most economical to cut trees after they have reached a certain optimal age that varies for different species. Leaving trees that have reached that optimal age in the forest is, according to timber industry logic, a waste. This is why 80 year-old trees are called mature and are considered ready for harvest. Trees that get older than their optimal harvesting age are called "overmature," even though some, like oaks, are known to be able to live another 200 years after they are labelled overmature. The words "mature" and "overmature" imply that those trees are becoming useless unless they are logged, like apples that start to rot when they are not eaten.

But those mature and overmature trees, if left standing, could be living productive lives for many years to come, providing habitat and mast and valuable ecosystem services (for example air purification and carbon sequestration). Even after trees finally die, they do not stop playing a role in the forest ecosystem, becoming snags that provide habitat for bats, birds, lichen, and insects.

What are the imperatives of the timber industry? It is to provide a continuous supply of timber, and therefore it makes sense to plant and cut trees in such a way that every decade, there is a cohort of trees ready to be harvested. That way, at all times, there are about the same number of trees in each age class, growing towards being harvested after they have reached the optimal age. If the optimal age for cutting was 100 years, then about 1/10 of the forest would have trees in the 90-100 year age class, and 1/10 would be found in the 0-10 age range.

But is this age-class distribution something that would naturally occur in a multi-layered, highly differentiated old-growth forest? In an old-growth forest, only natural disturbances like storms, droughts, diseases and old age kill trees. When a tree falls, it creates an opening in which early

successional species can thrive for a while, until the gap closes again. Because of these dynamics, old-growth forests have a fine–grained structure of different age classes and therefore provide habitat in all different successional stages.

It is obvious that if most trees in a forest live out their natural life span of possibly hundreds of years instead of being logged after they reach 80 or 100 years of age, the percentage of trees in the 0-10 and 10-20 age classes will be much smaller than in a forest where about 1/10 of the forest is logged every decade.

When the Forest Service laments the lack of early successional habitat, the standard against which the forest is judged is not the amount of early successional habitat that would occur naturally in old-growth forests. Rather, the forest is judged by the timber industry standard, which requires about 1/10 of a forest or more of a suitable timber area to be cut every decade to keep a continuous supply of timber over time.

Since timber operations are less costly when a large area of trees can be cut at once (rather than cutting a single tree here and there throughout the forest), industrial forestry is also known to favor clearcuts, which have been renamed as “even-aged management.” Clearcuts, in turn, lead to stands of trees that are all about the same age, very different from the fine-grained diversity of successional stages to be expected in an old-growth forest.

It is the timber industry rationale that calls for a certain percentage of forest to be in the early successional state, and not the “decline” of certain wildlife species that have become dependent on that disturbance. It is the timber industry rationale that calls for large continuous blocks of early successional habitat (= clear cuts, or even-aged management) instead of large continuous blocks of old-growth forest.

The tell-tale signs of the timber industry rationale are all over the 2006 WNF Plan, with the re-introduction of clearcuts, the restriction of the “Future Old Forest” Management Area (the only one where natural succession will be allowed to take place) to areas that are not suitable for timber management (FEIS, p.3-121), the pursuit of early successional habitat goals (and especially the creation of continuous, unfragmented blocks of that habitat), at the cost of increased fragmentation of highly scarce, old-growth forest, and insistence that all negative side effects from logging can be minimized by following certain guidelines and standards and that what is unavoidable can be justified by promoting the goals of ecosystem management, in this case, maintaining oak hickory.

“Natural succession would also be allowed to occur on lands that are defined as unsuitable for vegetation management. As an example, such lands may include land-locked tracts or steep areas, or may occur in management areas that are not suitable for timber production.” (FEIS, p. 3-74)

Net Public Benefit Analysis

The Forest Supervisor stated in the ROD, p. 3: "The Forest Plan outlines environmentally sound management to achieve desired conditions … in a way that maximizes long-term net public benefits."

Can the Forest Supervisor claim that net public benefits have been maximized with regard to preserving and enhancing biodiversity?

Public Costs from WNF Plan Regarding Biodiversity

Costs Associated with "Habitat Modification:"

- **Budget Expenditures for Logging and Burning** are integral to the Forest Service's stated habitat modification goals (but it would be more correct to consider them the costs of the timber program). The projected costs are not included in the FEIS. However, we obtained some budget information regarding burning and timber programs through a FOIA request; this information is presented in the chapter below entitled Follow the Money.

- **Budget Expenditures** related to guidelines and standards to reduce logging and burning impacts that harm endangered species.

- There are other activities like mining and building recreational trails that also have a negative impact on biodiversity. The budget costs of those are not included here, except for the costs of any mitigation measures and negative impacts on biodiversity.

- **Budget Costs related to mine reclamation**, **wetland restoration, and reclaiming of other disturbed lands** may benefit rare and endangered species by helping to restore habitat suitable to them.

Threats to Biodiversity from WNF Plan Implementation:

- Reduced availability of unfragmented interior forest habitat (on at least 63 percent of the Forest). Public cost is large because private lands don't provide this habitat type.

- Negative impacts on federally listed species and other wildlife from burning, logging, OHV, mining road and trail building, which pollute air and water and create noise.

- Reduced stream quality (from logging and burning, especially on river corridor) reduces aquatic habitat quality. Aquatic habitat is extremely disturbed by mining waste and destruction of wetlands.

- Increased NNIS Risks.

Public Benefits from WNF Plan Regarding Biodiversity

- **Maintaining Oak Hickory Does Not Address an Urgent Public Need.** The Forest Service uses the supposed benefits from its habitat modification program to justify negative side effect from logging and burning.

  Theoretically, all negative side effects on air and water quality, the financial losses of the timber sale program, and damage to ecosystem services could be justified if the Forest Service could show that the benefit from creating early successional habitats and from maintaining oak hickory will outweigh all these negatives.

  But this is not possible when the habitat modification program itself does not address an urgent public need and therefore cannot contribute enough (or anything) to offset the negatives it creates, including the financial loss of the timber sale program.

  As a result, foregone benefits from the misuse of resources loom large. If there is no obvious benefit, the resources used up in pursuing the "benefit" could instead have been used for something of higher value, like reclamation of mine land and of illegal OHV trails.

- Some species will benefit from increased availability of early successional habitat, but since this habitat is not as scarce as continuous interior forest habitat, these benefits are more than outweighed by the loss of the continuous interior forest habitat.

- Pollution damage and damage to ecosystem services and to sensitive species from logging and burning may be reduced because of measures prescribed in standards and guidelines.

- Habitat improvements and reduced pollution may result from special restoration and protection measures (mine reclamation, soil stabilization, gating for Indiana bats, decommissioning of roads, etc).

- Timber revenue is generated.

Net Public Benefit or Loss from WNF Plan Regarding Biodiversity?

As shown above, the value of ecosystem goods is only a small fraction of the value of ecosystem services. Therefore, any program that —overtly or covertly—favors timber and other ecosystem goods over ecosystem services is not maximizing net public benefit. In other words, pulling out resources from timber management and instead using these resources to increase the capacity of the forest to provide ecosystem services would yield a higher net public benefit than what the WNF Plan proposes. Plus, in all likelihood, the timber program does not even pay for itself (just considering budget revenues and expenditures related to the program; for more see Chapter below, Follow the Money):

- The Forest Service can probably rightly claim that its management for oak hickory and early successional habitat will benefit some species by providing for their habitat needs. The crucial question with regard to net public benefit, however, is not whether there are some benefits, but whether the benefits outweigh the cost, and whether net benefit is maximized. The Forest Service is not making a convincing case that maintaining oak hickory forests is connected to any public need, or why this forest type, that can only be maintained through ongoing logging and burning, should be preferred instead of allowing natural processes to re-establish themselves. Large, continuous blocks of interior old growth forest are the scarcest type of forest. To maintain and expand this type of forest and to help connect small remnants of original mesophytic forest with other areas is **of much greater value than what is pursued by the Forest Service.**

- With regard to some species, especially the endangered Indiana bat and several other federally listed species, the Forest Service claims that they will benefit from the 2006 WNF Plan. This is a highly questionable proposition for a number of reasons, including the fact that the FEIS itself states that these species are likely to be negatively affected by the logging and burning. The Forest Service claims that the short term negative effects will be offset by long-term benefits to these species, but this statement is belied by the fact that the habitat modification program envisioned by the Forest Service will have to go on as long as the Forest Service upholds maintaining oak hickory as a goal (or, put differently, as long as there is an ASQ of 83 MMBF and rising). That means that short term impacts on these species will be repeated over and over.

- Considering the environmental costs, the damage to ecosystem services, the impacts on endangered species, and the favoring of low value over high value benefits, we conclude that the Forest Service **is creating a net public loss with regard to biodiversity**.

Table 56: Public Benefits and Costs from Preserving and Enhancing Biodiversity on WNF

Ecosystem Service: Improving Biodiversity?	
Public Costs Created by 2006 WNF Plan	Public Benefits Created by 2006 WNF Plan
1. **Unknown Budget Costs for habitat modification** (logging and burning, herbicides, other silvicultural methods) (supposedly undertaken to improve habitat.) Supposed Goal: Early successional habitat and oak hickory forests. **2. Unknown Budget Costs related to enforcing standards and guidelines** aimed at reducing negative impacts on rare and endangered species that are negatively impacted. **3. Unknown Budget Costs for actively increasing habitat** for running buffalo clover. **4. Threats to Biodiversity from WNF Plan Implementation:** • Reduced availability of unfragmented interior forest habitat (on at least 653 percent of the Forest). Public Opportunity Costs are large because private lands don't provide this habitat type. • Negative impacts on federally listed species. • Reduced stream quality (logging, ORV, burning, especially in river corridor) reduces aquatic habitat quality. • Disturbance of wildlife through mining activities, logging, ORV, burning. • Increased NNIS risks. 5. Opportunity Costs (lost opportunities of expanding or restoring the most scarce—and therefore most valuable—habitats.	**1. Timber Revenue**: Positive side effect from creating more early successional habitat and restoring oak hickory. (It can offset some of the timber-related costs, but in the past has not offset all of them.) **2. Increase in early successional habitat** compared to natural disturbance. Public benefit from creating more (continuous) grassland or early successional habitat is comparatively small. It is not as scarce as unfragmented mature interior forest, therefore not as valuable. **3. Some species will benefit** from the interventions by the Forest Service, but not the ones that need the most help. . **NET PUBLIC LOSS**

E. Does WNF Plan Maximize Net Public Benefits Regarding Recreation?

Framework of Analysis

WNF managers are attempting to provide not only "multiple uses" of the Forest, including logging, mining, biodiversity, and recreation; they are also offering multiple recreation activities. Opportunities for outdoor recreation on the WNF currently include camping, picnicking, swimming, boating/canoeing, fishing, hunting, driving for pleasure, off-highway (OHV) vehicle riding, horseback riding, mountain biking, hiking, wildlife viewing, nature study, gathering forest products, natural, and cultural, and historic education and interpretation.

Mining, logging and burning (the latter being part of the Forest Service's version of "ecosystem management") are in conflict with managing the forest for providing ecosystem services.

They may also create conflicts with the use of the forest for recreation. The conflicts can come from noise pollution, smoke, and visual degradation associated with logging, burning and mining. In addition, different forms of recreation can conflict with one another. For example, OHV usage may disrupt other, less intrusive forms of recreation, like hiking and wildlife viewing. But all forms of recreation may have more or less severe environmental impacts.

"A fixed land base with a growing population and increasing demands for recreation has many management implications, including a smaller and more fragmented rural land base and less 'connectiveness' between people and the land. Perhaps the most important implication is greater conflicts and competition for access to land. For example, the public puts clean water, protection for future generations, wildlife habitat, and naturalness at the top of their list of most highly valued purposes for public forests (Tarrent et al. 2003). These uses are often at odds with motorized and resource extraction uses."[77]

There is some evidence that the WNF planning team does not have good relationships with some stakeholders due to conflicts among recreation users. According to the Recreation Feasibility Study authors, "… there was a Trail Master Plan (TMP) developed by a WNF collaborative planning committee in 1994 to address issues associated with trail system development. However, this TMP was not considered nor approved as an amendment to the Land and Resource Management Plan; therefore, went unheeded except in the minds of stakeholders. It is a prime example of the animosity and lack of credibility that has intensified about WNF outdoor recreation operations the last few years."[78]

Each recreation activity also has a different cost to the public and to the Forest Service, in the form of tax dollars or appropriations used to provide the service.

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[77] USDA Forest Service, *Interim Update of 2000 RPA, 2007*, p. 100.

[78] Strategic Research Group, *Wayne National Forest Recreation Feasibility Study*, p. 45. http://www.fs.fed.us/r9/wayne/recreation_sites/feasibility_study/recreation_feasibility_report.pdf

In this chapter, we will try to assess which forms of recreation might create the highest net public benefits to society.

The forms of recreation that will provide the highest net benefit to society are the ones with the **lowest costs** and the **highest benefits.**

Costs can be measured in terms of budget expenditures and in terms of environmental costs or damage to ecosystem services.

Benefits can be measured in terms of number of users that are attracted to an activity and how much of a consumer surplus is created by an activity.

Valuing Recreation Benefits

The Renewable Resources Planning Act of 1974 and Government Performance and Results Act [GPRA] of 1993 require an assessment of the supply of and demand for renewable resources on the nation's forests and rangelands and an analysis of the costs and benefits associated with the USDA Forest Service's programs, including outdoor recreational programs on national forests.

1. Recreation Values from Loomis Study

Randall S. Rosenberger and John B. Loomis did a landmark study estimating the benefits of outdoor recreation, based on a literature review of economic studies from 1967 to 1998 in the U.S. and Canada. This work was supported by the Strategic Planning and Resource Assessment (SPRS) staff (formerly RPA staff).

In the 2005 update of that study, Loomis reports the following **consumer surplus values** for the northeast region of the United States, which includes Ohio. [79]

[79] USDA Forest Service, *Updated Outdoor Recreation Use Values on National Forests and Other Public Lands*, by John Loomis, October 2005, p. 8. http://www.fs.fed.us/pnw/pubs/pnw_gtr658.pdf

Table 57: Detailed Descriptive Statistics on Average Consumer Surplus Values Per Person Per Day By Activity and Region, 1967-2003, Continued

Area and activity	N	Mean	Standard error	Minimum	Maximum
			2004 dollars		
Northeast area:					
Birdwatching	3	34.86	22.20	5.80	78.46
Camping	10	33.11	6.32	6.73	66.44
Cross-country skiing	3	34.60	2.82	29.70	39.49
Fishing	69	32.60	5.46	2.08	253.13
Floatboating/rafting/canoeing	6	88.32	22.93	20.08	143.50
General recreation	5	16.87	8.08	1.97	46.69
Going to the beach	22	42.60	7.03	3.78	117.82
Hiking	3	75.18	12.83	49.80	91.10
Hunting	87	47.45	4.03	4.16	250.90
Motorboating	3	29.68	25.21	3.78	80.10
Mountain biking	1	40.93		40.93	40.93
Picnicking	2	56.45	47.51	8.94	103.96
Pleasure driving	1	21.35		21.35	21.35
Rock climbing	1	102.89		102.89	102.89
Scuba diving	14	17.92	3.43	2.81	45.00
Sightseeing	2	121.43	88.36	33.07	209.77
Swimming	7	22.21	6.14	2.20	50.10
Visiting environmental education centers	1	6.01		6.01	6.01
Waterskiing	1	15.13		15.13	15.13
Wildlife viewing	65	31.30	2.18	2.40	96.30

Source: USDA Forest Service, Updated Outdoor Recreation Use Values on National Forests and Other Public Lands, by John Loomis, October 2005, p. 8

The table shows that the activities with the highest consumer surplus (mean) are rock climbing and sightseeing, followed by floatboating/rafting/canoeing, and hiking.

2. Recreation According to the 2007 RPA Interim Update

Outdoor recreation activities (not broken down into regions) that have grown the fastest between 1960 and 2000–01 are bicycling, camping, canoeing/kayaking, and swimming.

Viewing or photographing birds was the activity growing fastest in this country from the early 1980s up to the early 2000s. There were more than 50 million more birding participants in 2001 than in the early 1980s. Since the 1982–83 national survey, the growth rate in birding participation has exceeded 231 percent. Following birding have been day hiking and backpacking at 194 and 182 percent growth, respectively. Snowmobiling grew 125 percent in those almost 20 years between surveys. A second motorized activity within the list of fastest growing activities was driving motorized vehicles off road, including all-terrain and other four-wheel-drive vehicles.[80]

[80] USDA Forest Service, *Interim Update of 2000 RPA, 2007,* p. 96-97.

Table 58: Participation percentages and number of participants in the United States by the 20 Fastest Growing Activities From 1994-95 to 2000-01

Activity	Percent participating 1994–95	Millions of participants 1994–95	Percent participating 2000–01	Millions of participants 2000–01	Percent increase 1994–2001
Kayaking	1.3	2.6	3.5	7.4	185.7
Snowboarding	2.3	4.4	4.9	10.4	134.8
Jet skiing	4.7	9.3	9.5	20.3	119.3
Viewing or photographing fish	13.7	26.8	24.8	52.8	96.8
Playing soccer outdoors	4.7	9.3	8.1	17.3	87.2
Snowmobiling	3.6	7.0	5.6	11.8	70.2
Ice fishing	2.0	3.9	2.9	6.2	59.5
Sledding	10.2	20.0	14.7	31.2	56.2
Viewing wildlife	31.2	61.1	44.7	95.2	55.8
Backpacking	7.6	14.8	10.7	22.8	53.8
Day hiking	23.8	46.7	33.3	70.9	51.8
Canoeing	7.0	13.8	9.7	20.7	50.7
Bicycling	28.7	56.1	39.5	84.2	50.0
Horseback riding	7.1	13.9	9.7	20.6	48.0
Mountain climbing	4.5	8.8	6.0	12.9	46.5
Running or jogging	26.2	51.3	34.5	73.6	43.5
Coldwater fishing	10.4	20.3	13.6	28.9	42.8
Ice skating outdoors	5.2	10.3	6.9	14.6	42.7
Surfing	1.3	2.6	1.7	3.6	40.4
Camping developed	20.7	40.5	26.4	56.2	38.7

Sources: NSRE 1994–95 data (1995 number of participants based on estimate of 195.8 million, civilian, noninstitutionalized population 16 years and older); NSRE 2000-2001, Versions 1-9 (2000–01 number based on estimate of 213.1 million, civilian, noninstitutionalized people 16 years and older).

Source: 2007 Interim Update RPA, Table 11

Table 58 shows that wildlife viewing, bicycling, running or jogging, and day hiking had the highest number of participants of any activity in the United States between 2000 and 2001. Kayaking, snow boarding, jet skiing and viewing or photographing fish had the highest percent increase from 1994-2001.

This table shows recreational activities regardless of the type of land or its ownership. Thus, there are no direct measurements in the RPA of recreation and tourism that occur on national forest land or rangeland.

A survey of privately owned forest land shows that the “proportion of privately owned forest land open to the public and free of charge declined steadily from 29 percent in 1979 to 23 percent in 1989, 15 percent in 1996, and 11 percent in 2001. Access to the remaining privately owned forest land is at the discretion of the owner and can vary from no access to free access. Recreational activities most likely to occur on private lands by the general public are hunting and other activities that require large open areas. Thus, national forests in many areas serve a unique

role in providing recreational opportunities. For example, roaded areas in natural settings increasingly are to be found only on public lands."[81]

3. Recreation Studies on the WNF

On the WNF, nature viewing, hiking sightseeing and picnicking are the most popular outdoor recreation activities. This is in line with what is most in demand in the region and the rest of the nation. [82]

Table 59: Local, State, Area, and National Outdoor Recreational activities by Percentage of Population Participating

Activity	Area Recreation Users (2000)	Midwest (NSRF 1994/95)	National NSRE 2000
Nature Viewing/Sightseeing	79	NA	NA
Hike/ Nature Walk	70	68.2	33.2/ 83.1
Picnic	64	52.2	54.7
Swim/ Beach	59	53.4	60.7
Historical Site	53	43.9	46.3
Lodge	36	NA	NA
Boat	35	31.8	36.4
Fish	33	31.5	34.2
Tent Camping	27	21.7[a]	26.2
Tour Bike	24	31.4	39.7
Off-Road Vehicle	18	12.6	17.5
Recreational Vehicle	14	NA	NA
Mountain Bike	13	NA	21.5
Hunt/Trap	12	11.3	11.4
Shooting	12	NA	NA
Horseback Riding	10	6.8	9.8
Backpack	9	5.4	10.7

Source: Recreational Feasibility Study, page 17.

[81] USDA Forest Service, *Interim Update of 2000 RPA, 2007,* p. 96.
[82] Strategic Research Group, *Recreation Feasibility Study*, p. 17.

Table 60: WNF Activity Participation and Primary Activity

Activity	% Participating	% as Primary Activity
Developed Camping	4.8	1.2
Primitive Camping	5.7	0.3
Backpacking	3.7	2.9
Resort Use	0.2	0
Picnicking	14.4	6.0
Viewing Natural Features	68.0	0.4
Visiting Historic Sites	3.8	0
Nature Center Activities	3.3	0.1
Nature Study	6.5	0
Relaxing	62.3	5.0
Fishing	21.7	18.5
Hunting	5.2	4.7
OHV Use	54.9	50.9
Driving for Pleasure	14.4	3.8
Snowmobiling	0	0
Motorized Water Activities	0.1	0.1
Other Motorized Activity	0.2	0
Hiking / Walking	20.4	5.1
Horseback Riding	1.2	1.0
Bicycling	1.2	0.8
Non-motorized Water	0.4	0
Downhill Skiing	0	0
Cross-country Skiing	0	0
Other Non-motorized	1.9	0.7
Gathering Forest Products	2.9	0
Viewing Wildlife	68.2	<.1

Source: WNF National Visitor Use Monitoring Report, 2003

Note: The "Primary Activity" column totals more than 100% because some visitors chose more than one primary activity.

Table 60 shows the top three activities on the WNF to be viewing wildlife, viewing natural features, and relaxing.

According to the WNF FEIS, demand for dispersed forms of recreation on the Forest is equivalent to or higher than that of developed recreation, depending on the activity. Dispersed recreation is expected to receive a 10 percent increase in visitor growth by the next decade.

According to the latest national, regional, and local recreation studies, demand for such activities as wildlife/nature viewing, hiking, OHV riding, horseback riding, mountain bike riding, primitive camping, visiting historic and other interpretive sites, and driving for pleasure will continue to increase. No areas on the WNF can be classified as ROS Primitive as it is currently defined. Based upon comments received from public scoping and local recreation surveys, the FEIS states that, "demand for additional miles of non-motorized trails was clearly evident. The 1988 Forest Plan projections for new equestrian and hiking trails have not been met." (FEIS page 3-209) The FEIS also states that there is a "lack of adequate miles of ATV/OHM trails."

The **top five activities across all populations surveyed in the area around the WNF** usually revolve around being **low-impact, relaxing, and pleasurable, as well as having a nice scenic quality to them.** In general, nature viewing, hiking, picnicking, beach activities, and visiting

historic sites are reported most often as the outdoor activities people do. Nature viewing includes bird watching, wildlife viewing, and visiting nature centers. Hiking and picnicking can also include nature viewing.

4. Summary of Recreation Trends

In conclusion, the experts that the Forest Service hired to study recreation trends nationally and locally, and the agency researchers themselves are in agreement that **low impact dispersed recreation has the highest number of people participating in them and the highest increase in the percentage of participants.**

Due to their low impact on the environment, these activities have lower financial, economic and environmental costs.

The low impact recreational activities also tend to have a higher consumer surplus.

If there is indeed a conflict between high and low impact activities, i.e., nature-based tourism and OHV usage, as the Forest Service states, then it would make sense to resolve the conflict in favor of the activities with the highest participations rates, or consumer surplus.

Recreation Opportunities Available on WNF and in the Region

1. WNF and Other Outdoor Recreation Sites in the Region

Regionally, the economic impact of national forest-based recreation depends to some extent on the proximity of population centers as well as on the unique characteristics of a region's forest resources. It also depends on the availability of national forests for recreation as compared to what is available on private land, state parks, or national parks, as well as the driving distances for both local and visitors from outside the region.

The WNF is within a day's driving distance of millions of people in Columbus, Cleveland, and Cincinnati, Ohio; Pittsburgh, Pennsylvania; Louisville and Lexington, Kentucky; and Charleston and Huntington, West Virginia.

The area surrounding the WNF has a large number of outdoor recreation sites managed by the Ohio Department of Natural Resources (ODNR) and by county and local parks. Additionally, four privately owned sites are in the area: Bob Evans Farms, American Electric Power's Recreation Lands (AEP), the Mead/Westvaco Paper Company, and The Wilds.

But despite the four major commercial sites, available outdoor recreational opportunities are concentrated on public lands. Current publicly held lands in close proximity to WNF consist of almost 283,000 acres held by Ohio State Parks, Ohio Division of Wildlife, and Ohio State Forests. In comparison, WNF manages 233,422 acres.

2. Campsites

The Ohio State Parks system has many campsites in the area, with a range between thirty and one hundred campsites per park. Several parks also have bridle camps, but this type is limited. Although there are several camping areas on the WNF, the actual number of sites for camping is small. The Athens Unit has the fewest number of camping sites, with approximately twenty-nine, while the Ironton Unit has the most, with around seventy-three. There are at least twenty-seven private campgrounds near the Athens Unit, and fewer than ten near the other two units.

Table 61: Camping Facilities Offered at State Land Management Agencies and WNF

System	Number of Campgrounds	Number of Sites	Electric Sites	Group Sites	Flush Toilets	Showers
State Agencies	21	2,162	1,194	13	5	11
WNF	13	155	64	4	5	3
SE Ohio Totals	34	2,317	1,258	17	10	14
Percentage	38%	7%	5%	24%	50%	21%

Source: Strategic Research Group, Recreation Feasibility Study, Page 7

This table indicates that the WNF isn't doing as much as the State in meeting the demand for developed recreation.

Table 62: Summary of Developed Recreation Sites on the WNF

Ranger Districts	Total # of Tent Camp Units	# Group Camp Units	# RV Camp Units	# of Single Picnic sites	# of Family Picnic sites	Picnic Shelters	Swim Sites	Boat Launch	Canoe Launch	Observation Sites	Interpretive Sites
Athens	74	3	45	6	4	5	0	2	3	0	2
Ironton	81	1	46	3	3	3	1	2	0	1	1
Totals	**155**	**4**	**91**	**9**	**7**	**8**	**1**	**4**	**3**	**1**	**3**

Source: WNF District Offices and Infra Database

3. Dispersed Recreation Regionally and on the WNF

The WNF offers “dispersed recreation” opportunities, including driving for pleasure, OHV riding, horseback riding, hiking, wildlife viewing, nature study, gathering forest products, hunting, canoeing, fishing, etc. Dispersed recreation sites contribute approximately 295,778 or 30 percent of the Forest’s total Persons at one Time (PAOTs). This value, however, does not include the number of visitors that may participate in such activities as hunting, fishing,

gathering forest products, wildlife viewing, pleasure driving, or other dispersed recreation activities, just the actual number of visitors coming to the recreation sites themselves. According to another source, the WNF had approximately 450,000 total visitors to the Forest in 2006.[83]

There are six off-road vehicle trail systems in southeast Ohio, three of which are on WNF lands. The State Agencies have concentrated on providing more backpacking, mountain biking and hiking opportunities than the Forest Service. Some local residents have stated that the State Agencies provide more low impact, high value recreation than the Forest Service because they have made themselves more accessible to the public and therefore to the public's concerns (David Maywhoor, personal communication, May 2008).

Table 63: Trail Systems (in miles) Offered at State Land Management Agencies and WNF

System	Hiking	Bridle	Mountain Bike	ORV	Backpack
State Agencies	426.5	331.5	364.2	38	83
WNF	362.6	88.2	213.3	116	16
SE Ohio Totals	789.1	419.7	577/5	154	99
WNF %	46%	21%	37%	75%	16%

Source: Recreation Feasibility Study, page 5

Table 64: Miles of WNF Trails by Administrative Units

Units	Hiking	Equestrian	Mountain Bike	ATV/OHM	Total Miles
Athens Totals	129.4[1]	19.4	70.0[2]	70.0	129.4[1]
Marietta Totals	90.7[1]	12.3	90.7[3]	0	90.7[1]
Ironton Totals	129.0[1]	42.7	46.0[2]	46.0	129.0[1]
Forest Totals	**349.1**	**74.4**	**206.7**	**116.0**	**349.1**

[1] Trail miles may be shared with mountain biking, ATV/OHM, and/or equestrian use.

[2] Trail miles shared with ATV/OHM use.

[3] Trail miles shared with hiking.

Source: WNF District Offices and Infra Database

Source: FEIS Table 3—45

[83] The NVUM Round 1 Output Forest-Level Visitation and Confidence Intervals.

Table 65 from the FEIS shows the miles of trails in each WNF unit by use. This shows that the hiking trails must be shared with mountain bikers, ATV/OHM and/or horseback riders. However, information from a 2005 flyer obtained from the WNF shows 78.5 miles of trails, or 22 percent as designated hiking trails.

Table 65: Trails in the WNF by Activity

	MILES	**PERCENT**
Trail length just for hikers (designated hiking trails)	78.5	22%
Trails shared with bikes (designated for hiking)	80.4	23%
Trails shared with horses(designated horse trails)	67	19%
Trails shared with horses and bikes (designated horse trails)	16	5%
Trails shared with ORV and bikes (designated for ORV's)	112	32%
TOTAL	**353.9**	**100%**
Miles for Hiking	78.5	
Miles of Potential Conflict	275.4	

Source: WNF Flyer Revised 7/2005

Mountain bike and horseback riding accounted for less than five percent of trail use on the Wayne between 1998 and 2003. Trail use information related to hiking is unknown because the Forest does not charge fees for this activity. However, based upon the 2002 WNF Recreation Feasibility Study, the need for additional equestrian trails (19.4%), hiking trails (17.3%), and mountain biking trails (13.3%) were among the top six requests from local and statewide users.

While the Ohio State Parks have concentrated on developed camping, the WNF has the most extensive available area for wildlife viewing, hunting, and fishing, i.e., the activities with the highest values, but with few designated sites. In contrast, Ohio Department of Wildlife has designated twenty-eight formal viewing sites, and promotes another hundred on a more informal basis.

According to ODNR’s record of annual license sales, the demand for fishing and hunting licenses has gradually declined over the last decade. For the 12 counties surrounding the Wayne, fishing license sales experienced a drop of 23 percent, while hunting license sales dropped 5.8 percent between 1988 and 2000.

Plans for Recreation on the WNF

1. Heritage/Cultural Sites and OHV?

The FEIS states that the WNF is best positioned to provide interpretation of heritage/cultural sites, and OHV trail riding. There is no explanation of why the WNF is best positioned to supply these "opportunities" to the public (FEIS: 3-195).

In the WNF DEIS, the Forest Service planned for 21 to 124 miles of potential new OHV trail construction; in the WNF FEIS the range has been changed to 50 to 124 miles of potential new OHV trail construction, at a cost of $3.2 million (FEIS, p.3-228).

Table 66: Miles of New and Existing OHV Trails on the WNF

Management Activity	Alt. E Modified
New OHV Trail Construction (Density Range - miles/sq.mi)	2.4 to 3.5
New OHV Trail Construction (mileage range)	50 to 124
Total OHV Mileage Range (existing + planned)	137 to 240
OHV Cross-country Use	Prohibited

Source: Adapted from FEIS Table3—55

Yet the plans for more OHV trails and mining are in conflict with the push for more heritage tourism, and there are no concrete plans to address this conflict, nor plans for the development of the market for heritage tourism.

In fact, later on in the FEIS, the Forest Service states:

"Cultural features such as historic barns, log structures, iron furnaces, covered bridges, and mineral developments also contribute to the landscape character. These contrast with areas of significant environmental abuse, such as abandoned mines, acid seeps, roadside trash dumps, and the effects of illegal motor vehicle use" (FEIS: 3-232).

In other words, the Forest Service is telling the public that the WNF is well positioned to provide both recreational opportunities, while at the same time stating that the one activity, OHV usage, is in conflict with the other.

According to the nonprofit National Trust for Historic Preservation report, "The National Forest System: Cultural Resources at Risk," more than 2 million sites of cultural and historical significance may be on Forest Service land. At-risk treasures include American Indian pueblos

and sacred sites, petroglyphs, Revolutionary and Civil War battlegrounds, trails used by the Lewis and Clark expedition, and Forest Service lookout towers.

About 80 percent of the 193 million acres the agency manages in 44 states and Puerto Rico haven't been surveyed for such sites. This is because unlike other federal land-management agencies, the Forest Service has no statute that specifically mandates historic or archaeological preservation as part of its mission.

The report names other threats to sites of cultural and historical significance, such as off-road vehicle use; oil and gas development; livestock grazing; logging; and a resurgence in uranium, gold and other hard-rock mining. The report also states that the federal government's push to mine for minerals and drill for oil and gas on millions of acres of land, overseen by the Bureau of Land Management (BLM), is leaving natural and cultural resources in peril. Less than 1 percent of the Forest Service's $4.4 billion budget goes to heritage resource programs.

If the Forest Service is serious about developing heritage/cultural sites on the WNF as their "niche," the public will need to see what type of funding they are willing to commit to this activity, and understand that it would result in the elimination of OHV usage on the WNF.

2. Other Trails

We know that for many outdoor recreation and tourism activities, the availability of facilities determines its use. What does the Forest Service plan for recreation over the next ten years?

Table 67: New Non-Motorized Trail Density, New Construction Miles, and Cross-Country Travel by Alternatives

Management Activity	Alt. E Modified
New Hiking Trail Construction (mileage range)	5 to 30
New Non-motorized Trail Constr. (Density Range - miles/sq.mi)	Up to 2.5
New Equestrian Trail Constr. (mileage range)	5 to 50
New Mtn. Bike Trail Constr. (mileage range)	15 to 30
Equestrian Cross-country Use	Prohibited
Mtn. Bike Cross-country Use	Prohibited
Hiking Cross-country Use	Allowed

Source: FEIS Table 3—52

The Forest Service states that demand is high for additional OHV, horse, hiking, and mountain bike trails.

Compared to motorized trails, noticeably fewer miles of new trail would be constructed for equestrian, hiking, and mountain bike use due to "current and historic use from these activities." (We are not sure what this last statement means). The proposed range of new trail construction for each trail activity would be: Equestrian (5 to 50 miles), Mountain biking (5 to 30 miles), and Hiking (5 to 30 miles). Also, we agree with the Forest Service that there is currently unmet demand for mountain biking, hiking and equestrian trail riding opportunities on the WNF. Yet, there is no real explanation as to why the Forest Service is not striving to meet the high demand for these activities (FEIS: 3-214,215), considering that hiking and wildlife viewing are the activities with the highest value and highest level of participants.

As was just stated, the FEIS is only promising to develop between 5 and 30 miles of hiking trails. Hikers may or may not have the trails to themselves, and may have to share them all with other users, including OHV's, horses and mountain bikers (tables in the FEIS and trail maps from the WNF differ as to whether or not the hiking trails are dedicated). Hikers would benefit from appropriate recreational infrastructure, including low impact, quiet, designated trails, campsites, signage, maps, etc. However, no plans are developed in the FEIS to provide for these.

3. Wildlife Viewing and Wilderness Areas

There are no plans for developing wildlife viewing activities on the WNF. Also, the WNF currently has no inventoried roadless areas, no Congressionally designated Wilderness, no congressionally designated wild, scenic or recreation rivers and no rivers that are potentially eligible for this designation. The 2006 Forest Plan recommends no areas for wilderness designation, and recommends no river segments for Wild or Scenic River designation, nor are there plans to develop these areas in the future. And, the Forest Service has plans to increase, rather than decrease, forest fragmentation, which works against the establishment of large areas that could be designated as roadless and/or wilderness areas. From the FEIS:

> "No roadless areas were identified in the Roadless Area Review and Evaluation process (RARE or RARE II) completed as part of the 1988 Forest Plan. Since 1988, the WNF has acquired over 50,000 acres of land. An inventory of the current National Forest ownership completed in March 2003 found that there are still no areas on the Forest that meet roadless area criteria."
> (FEIS p. 1-26)

Also in 2004, the WNF evaluated its land to determine if any area met the national criteria for Roadless/Wilderness areas. (See Appendix C for a complete discussion of the Forest's Roadless/Wilderness evaluation and results) (FEIS, p. 3-198).

The United States Congress designated the West Sister Island Wilderness of Ohio in 1975 and it now has a total of 77 acres. Located in Northern Ohio on an island in Lake Erie, this is the only wilderness area in Ohio and it is managed by the Fish & Wildlife.[84]

Our research of the 1964 Wilderness Act and 1975 Eastern Wilderness Act shows that the Forest Service, with the help of Congress, has broad latitude when naming areas of national forests for Wilderness designation. There are currently no steadfast rules on the size of a Wilderness Area, nor any rules on the shape or setting. Also, the Forest Service has a great deal of latitude in the decommissioning of roads in order to help an area meet Wilderness criteria. There are guidelines for all of these factors, but the Forest Service has a lot of discretion. The Forest Service has created arbitrary criteria and uses them to limit Wilderness designation in many national forests in the region, even though there is no basis in current law for them doing so. [85]

For example, in the Mark Twain National Forest, the Forest Service has created a criterion of a 2,500-acre "core of solitude" 1/4 mile from any roads or structures. Even if an area meets this arbitrary criterion, they then exclude areas due to the lack of an "amoeba-like" shape.[86]

The Forest Service is failing to consider the context or relative values of the Forest by not designating Wilderness Areas on the WNF. The WNF is close to populations of millions of people who place a very high value on living close to Wilderness Areas.

We have recommended that the Forest Service put together a task force that includes low impact recreation groups, wilderness advocate organizations and other interested parties to do a serious survey of areas on the WNF FEIS that might be designated Wilderness.

The WNF is one of the few large public land bases in Ohio that visitors may visit to experience solitude, closeness to nature, and semi-primitive settings. Even though the Forest Service acknowledges the fact that only they can provide opportunities for these high value, low impact activities, there is no evidence that they are going to seriously pursue developing them.

"The private lands surrounding the Wayne are gradually losing their preferred settings and access for nature-based recreation. This trend can be traced to agricultural, mineral, and urban/suburban development. Furthermore, as more private lands are posted to prevent public access or are leased to hunting clubs, public lands may be among the few remaining areas where recreationists can pursue certain kinds of outdoor activity" (FEIS 3:215).

4. Highly Developed Recreation:

Based on the 2002 WNF Recreation Feasibility Study, camping received the third highest number of responses in a survey asking participants to name what activities they would like the

[84] The National Wilderness Preservation System -Wilderness.net. http://www.wilderness.net/index.cfm?fuse=NWPS&sec=stateView&state=oh&map=inoh&CFID=15143979&CFTOKEN=61582805
[85] Sheff, Jim, May 2008, Personal Communication.
[86] Sheff, Jim, May 2008, Personal Communication.

Forest Service to expand. Not only are campers demanding more campsites, those using developed campgrounds are demanding campsite amenities, such as improved RV pads, electricity, and sewer hookups (NOI Comment Analysis 2002 and SRG 2002). Users have also expressed the need for more parking areas, interpretative facilities, and informative brochures, maps, and signs (SRG 2002). Historically, camping facilities located near large bodies of water or scenic vistas are favored over any other sites. Visitors participating in developed recreation activities generally prefer developed facilities in natural settings. Lake Vesuvius and Leith Run recreation areas were developed to be all inclusive recreation destinations. These highly accessible recreation areas typically receive the highest concentrated recreation use on the Forest, especially during the summer recreation season. Both recreation areas are predominantly operated by concessionaires. Developed recreation is expected to receive a 16 percent increase in visitor growth by the next decade (FEIS, p.3-205-209).

The WNF DEIS calls for 4,078 acres of land to be allocated for Developed Recreation Development. The Forest Service also estimates they will construct between 1-5 new Recreation Facilities (i.e. Campgrounds). The FEIS states the "Emphasis would also be placed on reducing the Forest's deferred maintenance backlog, upgrading existing facilities, and altering or decommissioning less valued sites before considering new development. Generally, improvements are made for site and resource protection, however, visitor comfort and convenience would also be considered. Each alternative proposes only a moderate increase in new facility development due to the reality of limited budgets." (FEIS:3-208,209).

However, no budget information is given as to how much would be allocated to developed recreation, and no concrete plans for the construction of new facilities are presented.

5. Rock Climbing, Charismatic Species, Wildlife Viewing:

There are no discussions regarding rock climbing, and charismatic species for wildlife viewing or hunting. In other words, the benefits of the highest recreation values, as stated in the Loomis study above—rock climbing and sightseeing, followed by floatboating/rafting/canoeing, and hiking—are either not being considered in the WNF or are mentioned but not given serious consideration for expansion. The Loomis study noticeably excludes any mention of OHV usage from its table of recreation activities with high consumer surplus.

What promotes recreation with the highest benefits on the WNF? For rock climbing and hiking and other like activities it would most certainly include cliffs, rocks, and scenic landscapes. The FEIS does not give any information on these activities nor habitat availability for these activities.

According to the FEIS, very limited non-motorized trails are planned over the life of the new Forest Plan. The WNF has no plans to change any opportunities for other dispersed recreation such as fishing, canoeing/boating, camping, backpacking, viewing wildlife, and visiting historic sites. No opportunities are mentioned to accommodate more hunters, except to say that management activities would expand hunting habitat. This lack of non-motorized trails is in contrast to the 50-124 miles of new OHV Trail construction planned in the WNF FEIS.

Environmental Impacts of Recreational Activities and Impacts on Other Users

There is no systematic analysis in the WNF FEIS that summarizes and compares the environmental costs of the different recreation activities that occur in the Forest even though the Plan does provide some partial information.

The WNF offers **dispersed recreation, including OHV usage, horseback riding, mountain biking, backpacking, hiking, and wildlife viewing.**

1. OHV Usage

The FEIS contains information about some of the environmental costs of OHV usage on the Wayne, and hints that it is in fact a national issue for the Forest Service:

"….the OHV use is likely to continue increasing. Thus, managing OHV use will continue to be an issue and a challenge for the WNF, just as it has become a national issue for the Forest Service. Unmanaged recreation, especially the undesirable impacts from unmanaged OHV use, has been identified by the Chief of the Forest Service as one of the key threats facing the national forests and grasslands. Concerns have been expressed over the amount of unplanned roads and trails, erosion, lack of quality OHV recreation opportunities, degradation of water quality, and destruction of habitat from unmanaged OHV activity."

"A principal effect of OHV usage is the displacement of some non-motorized users seeking solitude such as hikers, mountain bikers, backpackers, primitive campers, bird watchers, and even some hunters. This is generally attributed to factors as loud noise, exhaust emissions, and the high rate of speed from these recreational motor vehicles (FEIS 3:219)."

Many citizens have expressed concern about the environmental costs of OHV usage:

"In the Strategic Plan, the Chief of the Forest Service has named unmanaged off-road vehicle use as one of the four greatest threats to the long-term health of our National Forests. This threat includes impacts to the land, air and water quality, wildlife and habitat, and the experiences of millions of Americans who visit National Forests to hike, backpack, paddle, climb, birdwatch, horseback ride, cross-country ski, snowshoe, and mountain bike.

It is well-established that the proliferation of OHVs places soil, vegetation, air and water quality, and wildlife at risk through pollution, erosion, dust, sedimentation of streams, habitat fragmentation and disturbance, and other adverse impacts to resources. These impacts cause severe and lasting damage to the natural environment on which human-powered and equestrian recreation depends and alter the remote and wild character of the backcountry. Motorized recreation monopolizes forest areas by denying other users the quiet, pristine, backcountry experience they seek. It also presents safety and health threats to other recreationists."[87]

[87] Letter to Dale Bosworth. http://www.naturaltrails.org/pressroom/releases/2004/bos-rec-final.pdf

The noise from OHV usage has been shown to have a negative effect on breeding birds within about 100 meters.[88]

The Forest Service points out that, "accelerated motorized recreation use could strain the Forest's limited law enforcement program. Heavily used areas require more routine patrol, and create an uneven distribution of law enforcement officers (LEO) across the Forest. Less used recreation areas would lack law enforcement" (FEIS 2:223).

Here we see that because of the heavy costs of patrolling OHV users, precious resources are used up that would otherwise be spent on creating opportunities for other higher value, lower cost recreation like hiking, biking, and wildlife viewing.

The FEIS continues, "To help absorb displaced non-motorized users, the Wayne limited motorized trail use to a few management areas that cover approximately 19 percent of the Forest. The remaining 81 percent is open to nonmotorized recreation use"(FEIS 3:223).

We have pointed out earlier that the Forest Service knows they have a problem with OHV riders going off trails. They claim they will fix this by adding more trails. However, others have pointed out that most of the illegal activity is not because of lack of trails, but in the desire for OHV users to have an off-trail experience...and creating more trails will increase off trail use and in fact, create vectors for more activity into more remote areas.[89]

From the FEIS:

"Though many user-developed routes may be found on the Forest, they are not condoned. However, some user-developed trails could be considered for system trail designation if they are well located and could be easily incorporated into the existing designated trail system. Many user-developed trails are causing adverse effects to natural resources and pose a risk to rider safety. When user-developed trails are identified and cannot be reasonably incorporated into the existing designated trail system, they will be closed and rehabilitated. Certainly, the miles of user-developed trails the Forest could incorporate or rehabilitate/close in a given year is dependent on its budgetary and personnel capabilities" FEIS 3:224).

In other words, there are no concrete plans to determine how many miles of illegal OHV trails exist in the WNF, and no explicit allocation or resources to deal with the problem.

The effects of OHV usage on ecosystem services are also explored in other parts of the Ecosystem Services section of this report.

2. Other Dispersed Recreation—Horseback Riding, Mountain Biking, and Hiking and Wildlife Viewing:

The FEIS contains very little to no information about the environmental costs of other dispersed

[88] USDA Forest Service, *Interim Update of 2000 RPA, 2007,* p. 101.
[89] Ernie Reed, May 2008, personal communication.

recreation activity. Only hiking is briefly referred to:

"Due to the relatively low impact of hiking on the natural resources, this activity is permitted in most areas of the Forest, except where signs are posted stating 'closed to foot travel.' This would apply to all alternatives, including the 'no action' alternative" (FEIS 3:210).

There is no information on the effects of horseback riding, mountain biking, hiking and wildlife viewing on the Forest, or about the conflicts that these activities may have with each other, nor the conflict between mining and logging and these activities.

Very little research has been in done in an attempt to answer the question of whether mountain biking causes more harm to the environmental than horseback riding or hiking. According to one meta analysis, "empirical studies that have been conducted do not support the notion that bikes cause more natural-resource impact. What studies do demonstrate is that all forms of outdoor recreation—including bicycling, hiking, running, horseback riding, fishing, hunting, bird watching, and off-highway-vehicle travel—cause impacts to the environment."[90]

The authors also found, "no statistically significant difference between measured bicycling and hiking effects. They did find that horses caused the most erosion of the trails, and that motorcycles travelling up wetted trails caused significant impact. They also concluded, "Horses and hikers (hooves and feet) make more sediment available than wheels (motorcycles and off-road bicycles) on prewet trails, and that horses make more sediment available on dry plots as well."

Hikers, mountain bikers, backpackers and horseback riders may cause harm to the environment by going off trails or leaving behind debris. The FEIS does not explore this.

3. Sense of Place

There seems to be an implicit assumption in the WNF FEIS that visitors to the national forest can easily trade one area of the forest for another. There is a sense in the FEIS that if one area of the WNF gets logged, mined, or destroyed by OHV usage, people who used to visit that area for spiritual enrichment, wildlife viewing, heritage tourism, etc., can easily shift to visiting another area, and make this trade off without any problem. It turns out that this is typically not the case, and is a very important consideration that the Forest Service has omitted.

It turns out that people—individuals and communities—create a sense of place, and a sense of themselves as belonging to a particular place. When this shift occurs, people become protective of what they consider "their" place.

There are numerous studies that go into detail about how public lands can become a place to which people feel such connections; and how public lands are increasingly the only landscapes

[90] Sprung, Gary, *Natural Resource Impacts of Mountain Biking: A summary of scientific studies that compare mountain biking to other forms of trail travel*, International Mountain Bicycling Association. http://www.imba.com/resources/science/impact_summary.html

remaining to which we can form such connections. When this occurs there is less need for agencies to enforce regulations. The users become protective of the place and less tolerant of OHV damage, littering, and other environmentally destructive practices. This allows the agency to operate with less expense and people to feel increasingly empowered, which increases the connection to the specific place.

Cultural geographers make much of the qualitative difference between a mere location and a "place." Places are imbued with socially constructed meanings accumulated over many generations.

It is possible that the management directions the Forest Service has developed actually erode any potential for those kinds of connection to the landscape as a "place" of emotional engagement. The Forest Service is transforming public lands into a commodity--a collection of fungible products.

In a time of universal consumerism, the special places in our national forests become even more valuable. The recent move by the Forest Service toward viewing visitors to the national forest as "customers," and recreation activities as "products" may in fact preclude the public land being a true commons.[91]

4. Developed Recreation

There is no information in the FEIS about the effects of developed recreation on the WNF. Parking for developed recreation and the actual developed recreation itself seems to be concentrated in specific areas of the WNF and not spread out like OHV usage.

It would be safe to say that wildlife viewing, hiking, horseback riding, backpacking and developed recreation all have less impact on the environment than OHV usage. But a lot of the effects of these activities depend on how people behave in the forest and on monitoring by the Forest Service and other citizens.

Recreation: What Are the Costs?

OHV

According to the FEIS, ORV trails will cost taxpayers $2.7 million to build and $434,000 to maintain over the next ten years (FEIS 3:228). This does not include the cost of patrolling the WNF for illegal ORV usage, or the cost of remediating the damage done to the Forest when ORVs go off trail and cause damage. The Forest Service admits that there is no established trail patrol program to educate/inform riders of Forest OHV policies. They also admit that they do not routinely monitor or patrol trails, and there is a lack of adequate signing or marking of existing designated trails. According to the FEIS, **there are no plans to remedy this.**

[91] Nickells, David L., May 2008, personal communication.

The way Congress set up the Recreation Fee Demo Project allows the Forest Service to keep receipts from activities they charge fees for. In the case of the WNF, 90 percent of the fees that the agency keeps come from ORVs, and three percent come from horseback riding and mountain biking fees combined. The WNF FEIS does not tell the public where the other seven percent comes from, but perhaps we can assume it comes from developed campsites.

The Forest Service does raise approximately $250,000 in user fees from OHV usage, a large percentage of the $500,000 in appropriations earmarked for recreation is most likely spent on OHV usage. We do know that much of the Forest's 116-mile OHV trail system that was constructed in the early 1990s was funded from appropriations specially earmarked by Congress. Since then, a majority of the Forest's trail appropriations ($250,000) were designated for trail maintenance (FEIS 3:228). Also, another $250,000 is spent yearly on "Unit Recreation Enhancement," but the Forest Service revealed no explanation on what that means.

Campgrounds

The WNF contains 11 campgrounds—seven of which are under REA and five are free use camps. Two group picnic shelters are also operated under REA (Fee Demo Project's new name, Recreation Enhancement Act). Fees for pay sites run from $10 to $50 per day.[92] There is no information in the FEIS on how much it costs to operate these sites, nor the total amount in fees that are collected, nor where the money goes (concessionaires, Forest Service, etc?) However, we were able to find this on the WNF website:

Operation/Maintenance Costs of Developed Recreation on the WNF

* It requires just over $1 million to properly operate and maintain the WNF's developed recreation areas. This total also includes deferred maintenance and capital improvement (CIP) costs.

* Of the $1 million total, campground operation and maintenance cost approx. $580,000. Day-use facilities (i.e. picnic areas, beach, boat-launches, etc.) make-up the remaining costs.

In 2005, the Wayne received approx. $550,000 in appropriation and $50,000 in user fees to operate and maintain all of its recreation areas (including campgrounds).

Campground fees have not been updated since 1996. Facilities are in much need of updating to meet public demand (i.e. install electrical hook-ups, new water and sewer systems, etc.)[93]

It is not clear how if the cost of operating and maintaining the WNF's developed recreation areas is over $1 million, and the WNF received only $600,000 to operate and maintain them, where the additional money comes from to balance the deficit.

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[92] USDA Forest Service, Recreational Fee Program FY 07 Program Summary, p. 1. www.fs.fed.us/r9/wayne/recreation_sites/trail_permits/2007_stats.pdf

[93] USDA Forest Service, Wayne National Forest, Background Information on Campground Fees. http://www.fs.fed.us/r9/wayne/recreation_sites/trail_permits/campgrounds.html

Water Related Recreation
Water related recreation is not mentioned in the FEIS. We do know from other documents that the WNF has 447 water acres available, three boat ramps, one boating amenity (fuel sales, dock or slip rentals, and boat rentals), one swimming area, ten canoe areas, and one beach area.[94] No information is available in the FEIS on how much it costs to operate these sites, nor the total amount in fees that are collected, nor where the money goes (concessionaires, Forest Service, etc?).

There is evidence that this lack of a clear explanation and understanding of the funding and budgetary process has become a major source of animosity toward the Forest Service from some WNF area residents.[95]

Net Public Benefit Analysis

The Forest Supervisor stated in the ROD, p.3: "The Forest Plan outlines environmentally sound management to achieve desired conditions … in a way that **maximizes long-term net public benefits."**

Does this apply with regard to recreation?

Public Costs from WNF Plan Regarding Recreation

1. Forest Services Expenditures
Expenditures that could be related to improving recreation in the long run:

- Measures designed to reduce soil erosion and compaction from OHV usage, mountain biking, horseback riding and hiking (improving visual quality)
- Expenditures related to decommissioning illegal OHV and other trails and roads and re-integrating that land into the forest.
- Costs of monitoring, patrolling and enforcement related to different facilities are not revealed in FEIS.

2. Costs of New Facilities and of Maintenance: For the most part costs of constructing and maintaining recreational facilities (campsites, water-related recreation, trails, cultural/historic sites) are not revealed in the FEIS, except partially for OHV.

2. Environmental Costs from Recreation

- Environmental Costs are high from OHV (with regard to water, soil and air, as shown in other sections of the ecosystem analysis).

- All recreational uses have some environmental impact, which is partly related to lack of enforcement of regulations (and to lack of sense of place).

[94] Strategic Research Group, *Recreation Feasibility Study*, p. 8.
[95] Strategic Research Group, *Recreation Feasibility Study*, p. 26.

- Logging practices that disregard the fact that people develop a sense of place backfire when people then feel less responsible for "their " forest. If people's sense of place is not disrupted by having their "places" destroyed by logging, mining and burning, they will take responsibility for that place, and not trash it or damage it as easily. That may reduce the environmental costs from recreation (as well as financial costs).

3. Opportunity Costs

- High conflicts exist between OHV, horses, mountain bikes and hikers that have not been resolved. High value recreation activities and activities with a potentially large number of visitors may therefore be sacrificed for lower value activities that are enjoyed by fewer people. Missed opportunities may be wildlife viewing and rock climbing, and hiking. Cultural sites are mentioned as a niche, but no plan is set forth that would show how the Forest Service plans on developing this recreational activity.

Public Benefits from WNF Plan Regarding Recreation

Some user groups will benefit more than others. Much emphasis is put on OHV trails. Other trails will be expanded as well, but not to the same degree.

It is not apparent from the FEIS that the Forest Service plans to put high priority on supporting the activities with the highest numbers/consumer surplus.

Recreation benefits are reduced because of negative impacts on the recreation experience from **logging, burning and mining.**

Therefore, the benefits overall are likely to be much smaller than they could be.

Net Public Benefit or Loss from WNF Plan Regarding Recreation?

A net public benefit regarding recreation is unlikely to arise over the next ten years.

The benefits from recreation are probably much lower than they could be. To increase those benefit, the Forest Service would have to focus on meeting the demands of larger numbers of potential visitors for high-value activities (for example hiking, sightseeing, wildlife watching). There is no evidence that the Plan is going in that direction.

At the same time, the costs of providing for high-impact recreation, with the associated need for repair, rehabilitation, patrolling, and enforcement create very high costs.

If the Forest Service would focus on the highest values (largest numbers of people served according to their most preferred/most highly valued activities), that would not only lead to a significant increase in net public benefit, it would also lower costs considerably (especially if OHV were banned from the forest).

On the other hand, there may be facilities that are expensive to provide, like developed campsites, but that do not have the same negative externalities on the environment and on other users, an therefore are likely to generate a net benefit rather than a net loss.

Table 68: Ecosystem Service: Recreation

Public Costs Created by 2006 WNF Plan	Public Benefits Created by 2006 WNF Plan
1. Forest Services Expenditures Unknown For: • Measures designed to reduce soil erosion and compaction from OHV usage, mountain biking, horseback riding and hiking (improving visual quality). • Decommissioning illegal OHV and other trails. • Costs of monitoring, patrolling and enforcement. **2. Costs of New Facilities and of their Maintenance almost completely unknown.** **3. Environmental Costs from Recreation** High from OHV, but all recreational uses have some environmental impact. **4. Opportunity Costs** Missed opportunities for high value recreation may be wildlife viewing and rock climbing, and hiking. Cultural sites are mentioned as a niche, but no plan is set forth that would show how the Forest Service plans on developing this recreational activity.	1. **Some user groups (OHV users) will benefit more than others.** 2. It is not apparent from the FEIS that the Forest Service plans to put high priority on supporting the activities with the highest numbers/consumer surplus. This makes overall benefit lower than it could be. 3. **Recreation benefits are reduced** because of negative impacts on the recreation experience from **logging, burning and mining.** **NET PUBLIC LOSS**

VI. Follow the Money- Incentives for Logging, Burning, Mining and ORV's

A. Introduction

Why in the world is the Forest Service so keen on maintaining oak hickory forests and creating early successional habitat on the WNF? And why is the Forest Service allowing mining and highly destructive forms of recreation, given all the negative impacts these activities have? These are questions begging for an answer, not just for the WNF.

Throughout its history, the Forest Service has put forward an image of protector of the national forests' resources. But, this image is often at odds with the reality of the Forest Service's management regime. Many citizens have been surprised to hear that the Forest Service sells trees off of national forests to private logging companies, and oil and gas leases to private energy companies, and allows high impact recreation, like OHVs, on national forests.

What is even more surprising is that the Forest Service not only sells public resources to private companies, but that they do so at huge financial, economic and environmental costs to the taxpayers.

One possible answer is that providing timber is part of the Forest Services' mission established by law. However, the laws that mention timber do not require the Forest Service to supply timber at all cost. The laws in place now would give the Forest Service the flexibility to reduce or eliminate timber operations if they are in the way of achieving greater benefits through other uses of a forest. For example, in establishing what areas of a forest are suitable or unsuitable for timber production, the Forest Service can exclude riparian areas, wildlife habitat, threatened and endangered species habitat, and recreation areas from being logged. Areas where timber production is not cost-effective can also be excluded. (FEIS, Appendix B-34)

Therefore, taking recourse to the law doesn't provide a satisfying explanation for the presence of extractive programs on national forests.

This section deals with the financial costs of the extractive programs carried out on the WNF, and explains what financial incentives Forest Service managers face to continue with those programs even in the face of widespread public opposition, and obvious losses of long term net public benefit.

B. Budget Data

The Forest Service receives funding from Congress through appropriations every year. Appropriations approved by the Congress and signed by the President give authority to an agency to expend a given amount of funds to carry out federal programs.

The WNF FEIS does not provide any specific information on the Forest Service's budget for carrying out activities on the WNF. There is one line in the entire document, in Table 2-4, that says, "Forest Service Expenditures," with no further explanation.

Heartwood filed a Freedom of Information Act (FOIA) to obtain budget data from the Forest Service for the WNF for the years 2004-2007. The budget is broken down into line items for general budget categories such as "Forest Products," "Minerals and Geology," etc., which is listed in Table 69. When we asked for more specific explanations on how the money was being spent within each line item, the Forest Service responded in a few different ways: First we were told that it was impossible to say exactly how much was spent on what activity within each category; then we were told that we had to ask individual managers within each department for that information; and finally we were sent a certified letter that told us all further questions would be answered by the Regional Office in Wisconsin. To date, we have still not been given any further explanation.

Table 69 has some line items that are left blank. This is because, we were told, the money in the missing line items has been taken out of the control of the WNF and is now being managed by the Regional Office in Milwaukee, Wisconsin. The explanation we were given for this change is that the new system will allow the Forest Service to distribute the money more efficiently to those programs that need it the most. While we cannot comment on whether or not we agree with this statement, we can point out that this change has skewed the budget data to make it look like the 2007 budget has decreased considerably, when the reality is just that the management of some of the money has been shifted to a different location, making it impossible for us to track.

Table 69: WNF Expenditures from Appropriations 2004-2007

WNF EXPENDITURES FROM APPROPRIATIONS (in thousands of dollars)	2007	% of Total Budget	2006	% of Total Budget	2005	% of Total Budget	2004	% of Total Budget
Cost Pool General Management					$400	3%	$407	3%
Cost Pool Legis and Public Communication					$339	3%	$222	2%
Cost Pool Ongoing Business Services					$545	5%	$846	7%
Cost Pool Common Services					$510	4%	$463	4%
Facilities	$217	3%	$139	1%	$297	3%	$214	2%
Fire Facilities Construction Additional							$25	0%
Roads-Capital Improvements	$174	2%	$278	3%	$154	1%	$142	1%
Infra Improvements			$8	0%	$416	4%	$317	3%
Trails-Capital Improvements	$246	3%	$500	5%	$260	2%	$238	2%
CMEX							$161	1%
Construction-Non federal external reimbursement	$422	5%	$259	2%	$409	4%		
Facilities Assessment	$138	2%	$111	1%				
Coop Work-non agreement based	$5	0%						
Coop Work Other	$8	0%	$43	0%	$17	0%	$492	4%
K-V Regional Projects	$87	1%	$61	1%				
Cooperative Work - K-V	$20	0%	$2	0%	$	0%		
Acquisition of land to complete changes					$54	0%	$45	0%
Regional Recreation Enhancement	$10	0%	$55	1%	$52	0%		

Recreational Enhancement-Cost of Collection/Indirect	$30	0%					$52	0%
Unit Recreation Enhancement	$232	3%	$252	2%	$237	2%	$271	2%
Gifts, Donations, Bequests	$1	0%						
Federal Highway Administration Expense	$22	0%	$48	0%	$15	0%		
Federal Highway Aquatic Passage	$14	0%						
Federal Highway Emergency Relief	$28	0%	$633	6%	$65	1%		
National Scenic Byways Transportation Planning	$4	0%						
Land Acquisition	$1,091	14%	$698	6%	$419	4%	$421	4%
Disaster Fund Supplemental					$19	0%		
Administrative Maps	$6	0%						
NFS Federal External Reimbursement	$12	0%	$14	0%				
NFS Non Federal External Reimbursement	$138	2%	$13	0%				
SJOB PP- Prop								
Inventory and Management			$293	3%	$291	3%	$277	2%
Landownership Management	$293	4%	$350	3%	$254	2%	$359	3%
Minerals and Geology	$1,115	14%	$2,342	22%	$284	2%	$325	3%
Land Management Planning	$144	2%	$157	1%	$432	4%	$613	5%
Grazing	$5	0%	$4	0%	$12	0%	$3	0%
Recreation, Heritage, and Wilderness	$520	7%	$645	6%	$379	3%	$528	4%
Forest Products	$301	4%	$441	4%	$361	3%	$315	3%
Vegetative and Watershed Management	$508	6%	$266	2%	$958	8%	$1,341	11%

Vegetative Treatment to Improve Conditions							$21	0%
Wildlife and Fisheries Habitat Management			$273	3%	$205	2%	$213	2%
SCSEP (fund elderly corps)	$9	0%	$134	1%	$131	1%	$120	1%
O & M of quarters	$	0%						
Computer Services							$96	1%
Reforestation Trust	$9	0%	$15	0%	$	0%		
Botanical Products	$2	0%	$1	0%				
Timber Pipeline Sale Preparation	$87	1%	$161	2%	$241	2%	$196	2%
10% Roads and Trails Funds for States	$67	1%	$84	1%	$358	3%	$108	1%
Fleet and Equipment Rental	$255	3%	$399	4%	$277	2%	$509	4%
WF NonFed External								
Suppression	$350	4%	$1,075	10%	$528	5%	$92	1%
Hazardous Fuels Reduction	$744	9%	$442	4%	$569	5%	$801	7%
Preparedness	$528	7%	$551	5%	$521	4%	$413	3%
FIRE TOTAL	$1,622	21%	$2,068	19%	$1,618	14%	$1,306	11%
Total	$7,843	100%	$10,749	100%	$11,625	100%	$11,950	100%

Source: Forest Service, WNF, FOIA

C. Logging

The timber sale programs on the national forests, in general, have never been profitable—the programs cost the taxpayers much more to administer than the revenues that come in from the logging companies. Most years, nearly every national forest loses money on timber programs, and collectively the national forest timber sale program loses hundreds of millions of dollars per year. The WNF has been one of the money losers for the years that have been documented.[96]

Starting in the late1980s and up until the late 1990s, the Forest Service released to the public the Timber Sale Information Reporting System (TSPIRS) that helped citizens document how much

[96] Documented, for example by Thoreau Institute, Public Land Research and Analyses Reports. http://www.ti.org/publiclands.htm

money the timber sale program was losing. This report was ordered by Congress due to intensive lobbying efforts from citizens.

Before TSPIRS, the Forest Service told the public outright that their mission was to supply trees to private logging companies to help supply wood products to the nation's building frenzy. At the same time, they denied that the timber sale program was a money loser. However, citizens began to "follow the money" and to investigate Forest Service accounts and found that not only had taxpayers been subsidizing the logging companies and the agency itself, but also that the Forest Service was hiding this fact through creative accounting techniques.

TSPIRS uncovered, for example, that the agency took over 50 percent of the costs of timber roads and never counted them as expenses related to timber sales. Instead, these costs—attributable to the cost of creating the roadbed—were written off completely as "capital improvements" to the forest. In other words, building roads into roadless areas for the sole purpose of taking out timber was deemed a capital improvement that benefited the forest in general, not the timber purchaser. Other creative accounting techniques included reforestation costs amortized over hundreds of years, instead of being shown as a current cost of the timber program, and road maintenance costs and failed reforestation costs not mentioned at all as costs of the timber program. In addition, expenses for restoring watersheds were not treated as costs of timber sales, even though they may involve taking out the very road beds previously constructed for timber sales and accounted for as capital improvements to the forests.

Eventually, the Forest Service had to admit that their system of accounting lacked integrity. In the mid 90s, the agency began to publicly admit the program lost money, even if the amounts they admitted to were far below what the General Accounting Office and citizens were discovering and publishing at the time.

Over the years, the Forest Service has changed publicity tactics. Today, the Forest Service tells citizens that giving away public trees to private logging companies is not a matter of business, but a matter of "ecosystem management." In other words, the extraction of the trees is just a means to an end, the end being more biodiversity, cleaner water, etc., anything that the agency knows the public wants, and therefore might not question the Forest Service about the means to achieve those goals. The Forest Service also asserts that the agency is not about making money, and that program expenses do not have to cover costs as long as the programs are achieving the goals of ecosystem management.

To make matters worse, the Forest Service has not issued a TSPIRS report since 1997. They have instead gone to a more "modern" Foundation Financial Information System (FFIS), which has eliminated any timber sale program reporting. In fact, it is now impossible to get specific budget data from the Forest Service, even with the use of a Freedom of Information Act (FOIA) request, due to this "streamlining." Today, entire program budgets are condensed into one line items, making it impossible to see where the money within the logging program has been spent (for example, on roads, timber sale planning, timber sale improvement, reforestation, etc.).

Since budget information on national forests is not publicly available, Heartwood filed a FOIA request to obtain information on Forest Service revenues and expenditures for the WNF.

According to the information provided to Heartwood, the Forest Service received $8,500 in timber receipts for the WNF in 2004, $65,052 in 2005, $27,748 in 2006 and $252,894 in 2007.

Since it is now impossible to calculate how much the agency is spending on different aspects of the timber sale program, and the Forest Service refused to give us an explanation of what each line item means, we have had to use our best estimate to give an idea of revenues compared to expenditures for the timber program on the WNF.

According to the Congressional Research Service, the line items "Forest Products" and "Timber Pipeline Sale Preparation" are both costs of the timber sale program. In addition, money spent from the K-V Fund is going towards the costs of the timber sale program. The Knutson-Vandenberg or K-V Fund, created under the Knutson-Vandenberg Act of 1930, receives some money from timber sales, which, instead of going back into the General Fund of the Treasury, can be used by the Forest Service to pay for the costs of the timber program, or for special projects in the area of the timber sale. Total costs from all these line items were $494,697 in 2007, $666,285 in 2006, $602,256 in 2005, and $510,247 in 2004.

Subtracting costs from revenues shows the agency lost at least $241,803 in 2007, $638,537 in 2006, $537,204 in 2005, and $501,737 in 2004. At least six percent of the WNF budget was spent on the timber sale program.

Table 70: Losses from the Timber Sale Program on the WNF

	2007	**2006**	**2005**	**2004**
Revenues				
Timber Receipts	**$ 252,894**	**$ 27,748**	**$ 65,052**	**$ 8,510**
Costs				
Forest Products	$ 301,057	$ 441,203	$ 361,185	$ 314,514
Timber Pipeline Sale Preparation	$ 86,585	$ 161,440	$ 241,071	$ 195,733
K-V Regional Projects	$ 87,137	$ 61,143		
Cooperative Work K-V	$ 19,918	$ 2,499		
Total Costs	**$ 494,697**	**$ 666,285**	**$ 602,256**	**$ 510,247**
Losses	**$(241,803)**	**$(638,537)**	**$(537,204)**	**$(501,737)**

Source: Forest Service, WNF, FOIA

Other line items that the Forest Service might be spending on the timber sale program include cost pools (overhead), vegetative and watershed management, land management planning, and

wildlife and fisheries habitat management. Even without adding any of these line items to the cost of the timber sale program, one can see that the program loses money.

Mainly, funding for timber-related budget line items (forest products and timber pipeline sale preparation) comes from Congress through appropriations.

In addition, millions of dollars from timber receipts automatically go back into the Forest Service budget through the K-V fund that was established through the Knutson-Vandenberg Act of 1930. The Forest Service treats all but $0.50 per thousand board feet (mbf) of timber sale receipts as available for K-V expenditure. The K-V Fund gives Forest Service managers a financial incentive to push logging over other uses of the national forest, since this results in money they can rely on coming in automatically as long as timber receipts are flowing.

This incentive, added to an institutional culture that rewards and promotes managers that "get out the cut" has resulted in the nonsensical WNF Plan we see today.

In addition to timber revenues that are available to the Forest Service through the K-V fund, the Forest Service can put money from salvage sales into a special Salvage Sale Fund. The Forest Service can keep 100 percent of these receipts from salvage timber.

Salvage sales are timber sales that the Forest Service justifies on the grounds of "dead or dying trees" from disease, windstorms, snowstorms, or fire. For the WNF these sales do not contribute to the Allowable Sale Quantity (ASQ). In other words, the amount of logging that can take place under the WNF Plan can end up being much larger than what the Forest Service is accounting for with the ASQ. In fact, every management area listed below can be logged under the guise of salvage without any limitations.

The Forest Service has stated in the WNF FEIS that:

"The Allowable Sale Quantity (ASQ) varies among the alternatives (Table 3 - 98). This variation is a result of land allocation to different management areas as well as variations in the standards and guidelines for each management area. These affect the quantity of land available for treatment (author's comment: i.e. logging) plus the intensity of the treatments. The Allowable Sale Quantity (ASQ) is the maximum timber volume capability of an alternative given its management area (MA) assignments. Suited lands lie within the following management areas: Diverse Continuous Forest, Diverse Continuous Forest with OHV, Forest and Shrubland Mosaic, Forest and Shrubland Mosaic with OHV, Grassland and Forest, Historic Forest, Historic Forest with OHV, and River Corridor. **Timber affected by natural mortality events such as fire, windstorms, or insect infestations may be harvested under salvage sales. Any harvest in these management areas would be to meet other objectives and would not contribute to ASQ**. (FEIS, p. 3:319)."

Money collected by the Forest Service and put into the Salvage Sale Fund may be spent on:

- Timber inventory (silvicultural examination) costs;
- Timber resource planning costs;
- Timber support costs;

- Sale preparation costs;
- Harvest administration costs;
- Appeals & litigation costs;
- The costs of reworking plans after appeals & litigation;
- Timber road costs, primarily engineering and design;
- Sale overhead (general administration and program management) costs;
- Ecosystem management costs;
- Lands activities (probably land line location) costs;
- Facilities costs;
- Law enforcement costs; and,
- Ecosystem management overhead costs.[97]

Congress created the Salvage Sale Fund in 1976 with a one-time appropriation of $6 million for the purpose of removing dead and damaged national forest trees.

One of the fundamental problems with this fund is that forest managers can deposit all revenues from timber salvage sales back into the Salvage Sale Fund rather than returning the money to the U.S. Treasury. This has created an incentive among forest managers to classify healthy, green trees as part of a salvage sale in order to make the sale more appealing to timber purchasers, thereby generating more revenue. As a result, this fund has ballooned from a mere $25 million in 1987 to more than $150 million today. Now the Salvage Sale Fund is responsible for almost 1/3 of the timber sales on Forest Service lands. On the Hoosier National Forest, almost 100 percent of all timber sales in the past decade have been salvage sales.[98]

Additionally, forest managers have been diverting a portion of these funds to pay for agency overhead like computers, salaries, and rent. According to a General Accounting Office report, in 1997 more than 27 percent of Salvage Sale Funds were spent on items or projects that could not be directly linked to the sale of dead or damaged timber.

The Forest Service is authorized to make expenditures from the Salvage Fund without an annual appropriations request, giving Congress little ability to monitor and control this spending. Presently, the Salvage Fund is financing approximately one third of the logging on national forests completely free from congressional oversight. Many of these sales fail to cover significant portions of their costs.[99]

As long as Congress is willing to fund timber operations through appropriations or through the K-V and Salvage Sale Funds, the Forest Service will continue to apply timber industry practices on national forests, even if these practices increase pollution and damage the capacity of the forest to deliver ecosystem services, which have a much higher value than ecosystem goods like timber.

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[97] See Thoreau Institute, Public Land Research and Analyses Reports.
[98] Mahler, Andy, May 2008, Personal Communication.
[99] Green Scissors, Freeze the Slush, U.S. Forest Service Salvage Fund $79.9 million. http://www.greenscissors.org/publiclands/salvagefund.htm

The Forest Service, as a public agency, responds to the financial incentives provided by Congress. To maintain its existence and continue to employ people, the Forest Service can only do those things for which funding is provided by Congress. And Congress, fuelled by their own incentives resulting from campaign contributions from the timber industry, provides funding to the Forest Service for the timber sale program.

The institutional culture of the Forest Service also drives the emphasis on the timber sale program. This culture is sustained by political appointees who have either been timber industry lobbyists or "proven themselves" in the agency by pushing the timber sale agenda.

For example, the overseer of the Forest Service, the Assistant Secretary of the USDA, Mark Rey, is a veteran timber industry lobbyist, and Abigail Kimbell, the newly appointed Chief of the Forest Service (2007) authored President George Bush's controversial "Healthy Forest Initiative." According to Public Employees for Environmental Responsibility (PEER), she was responsible for the largest reprisal action ever undertaken against agency whistleblowers.

In all, Kimbell purged 44 whistleblowers while she was Supervisor of the Bighorn National Forest in Wyoming. Of those 44, eight ultimately won a $200,000 settlement with the agency in 2003, while Ms. Kimbell was promoted to Regional Forester. The concerns raised by the whistleblowers in the late 1990's where about the Bighorn National Forest and included accusations of illegal timber sales and sweetheart concessions to favored timber companies, failure to meet reforestation commitments to restore habitat, violation of wilderness protections, and road construction through Native American sacred sites.[100]

The Forest Service has an interest in making sure that logging on the National Forests is acceptable to Congress. The efforts of the Forest Service to reframe logging as a tool of ecosystem management is therefore not just an attempt to reduce public opposition, it is also helpful in convincing Congress to keep the timber appropriations going, and to give Congress a reason to continue this program even though it generates a loss. Of course, lobbying by logging interests may also be a factor here, because they benefit from below cost timber sales.

Ultimately, however, responsibility to make sure that Forest Service operations generate more public benefits than costs lies with Congress.

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[100] Public Employees for Environmental Responsibility (PEER), New Forest Service Chief has Checkered Past — Responsible for Largest Whistleblower Retaliation Case in Agency History, Press Release from February 1, 2007. http://www.peer.org/news/news_id.php?row_id=817

D. Mining

The WNF Plan alternative chosen by the Forest Service (E_{mod}), allows for opening up almost 90 percent of the entire surface of the WNF to mineral extraction activities (FEIS, p. 3-250, Table 3-62).

There are three scenarios that occur on the WNF with regards to minerals or oil and gas deposits. One, the Forest Service and the BLM manage and the taxpayers own the forests above the deposit, as well as the deposit and drilling rights. Two, the Forest Service manages the forest above the deposit and a private company owns the deposit and drilling rights below, or three, a private company owns an inholding within the WNF proclamation boundary and the deposit or drilling rights below. (FEIS, p. 3-250, Table 3-62)

This mixed ownership pattern is a legacy from the time before the Federal Government became owner of what is now national forest land, mostly in the East. In some cases, the person who the Forest Service purchased the land from retained the drilling rights below the surface. In other cases, a third party that had purchased the rights from the private owner still retains the drilling rights after the sale of the land to the Forest Service.

The BLM administers the leasing program for federally owned oil and gas on the National Forests, and the Minerals Management Service (MMS) collects the money. The BLM does not administer oil and gas leases that are privately held underneath federally owned surfaces. The BLM only deals with leases where the surface and the drilling rights are owned by the federal government.

Based on information from the MMS, in 2004, the total sales value for all mining on all public land in Ohio was $4.7 million. The value in 2005, 2006, and 2007 was $5.6 million, $7.6 million and $7.1 million respectively. Most of this money goes to the private mining companies that acquire the leases from the BLM. Eleven and one half percent of the sales value goes to what is called “royalties,” and 5.7 percent goes to “disbursements.”

According to the MMS, 87 percent of the disbursements from mining on public lands in Ohio come off of Corps of Engineers Flood Plain lands. This is land that the Corps of Engineers purchased from private individuals in order to protect other areas from flooding. The other 13 percent of disbursements come off of the WNF. A percentage of the royalties from mining on the WNF goes to the Federal Treasury. The MMS estimates this is three times the dollar amount being disbursed to the State of Ohio.

In 2007, the MMS collected approximately $208,399 from both royalties and disbursements from oil and gas leases on the WNF. Royalties of $156,299 went into the Federal Treasury’s “Forest Service Fund.” A total of $52,100 was given to the State of Ohio, who then disbursed this money to WNF counties. The royalties and disbursements for 2006, 2005 and 2004 were approximately $210,000, $168,000, and $18,000, respectively. Table 73 lists the figures for the number of leases and amounts of oil and gas from the public land of Ohio for years 2004-2007.

Table 71: Total Producing and Non-Producing Oil and Gas Leases and Volumes in the State of Ohio 2004-2007

	2007		2006		2005		2004	
	Leases	Acreage	Lease	Acreage	Lease	Acreage	Lease	Acreage
Producing	214	36,724	211	36,498	210	36,419	206	36,018
Non-Producing	19	29,591	29	32,278	33	32,850	20	29,609
Total	233	66,315	240	68,776	243	69,269	226	65,627
	2007		2006		2005		2004	
Sales Volume								
Oil (bbl)	27,799		35,422		33,644		34,061	
Processed (Residue) Gas (mcf)	4,533		6,677		8,951			
Unprocessed (Wet) Gas (mcf)	1,268,317		627,036		616,839		663,975 (both gases)	

Source: Minerals Management Service: http://www.mrm.mms.gov/

After the money goes into the Forest Service Fund, it can then be appropriated back to the Forest Service through the Congressional appropriations process. Or, the funds can go to WNF county schools, through the Secure Rural Schools Act. Where the money goes is up to Congress and varies from year to year.

For the WNF the Minerals and Geology budget line item is associated with money spent administering oil and gas leases. In 2007, the WNF spent $1,114,504 or 13 percent of their entire budget on administering oil and gas leases. In 2006, they spent $2.3 million or 23 percent, in 2005, $284,000 or two percent, and in 2004, $326,000 or three percent. There was a very dramatic rise in this line item between 2004 and 2005. This budget information was obtained by Heartwood through a FOIA request.

What exactly the money is spent on is not revealed in the budget information.

Subtracting WNF costs from the royalties and disbursements generated by federal leases on WNF land (collected by the MMS), the Treasury lost $906,105 in 2007, $2,131,625 in 2006, $115,447 in 2005, and $307,454 in 2004 on the WNF mining program.

Table 72: Mineral Revenues from Federal Lands in Ohio 2004-2007 (in thousands of dollars)												
Sources: Minerals Management Service and USDA Forest Service												
	2007			2006			2005			2004		
Mineral Revenues	Sales Value	Royalties	Disbure-ments	Sales Value	Royalties	Disburse-ments	Sales Value	Royalties	Disburse-ments	Sales Value	Royaltie s	Disburse-ments
Oil	$1,650	$ 184		$ 2,128	$ 195	$ -	$ 1,407	$ 103.7		$ 1,000	$ 78.0	$ 29.0
Other Royalties		$ 1.3	$ 0.3		$ 24.3	$ 18					$ 0.8	$ 0.6
Processed Residue Gas	$ 30	$ 3.7	$ 2.9	$ 62	$ 7.8	$ 6	$ 54.8	$ 6.9	$ 8.1			
Unprocessed Wet Gas	$5,383	$ 618	$ 396	$ 5,410	$ 608	$ 378	$ 4,126	$ 477	$ 310.0	$ 3,668	$ 425.0	
Other Revenues (Oil & Gas Rents)		$ 6.0	$ 1.3		$ 7.2	$ 3	$ 20.6		$ 5.0			$ 9.0
Total Mineral Revenues from Federal Lands in Ohio	$7,063	$ 813	$ 401	$ 7,600	$ 842	$ 404	$ 5,608	$ 588	$ 323.1	$ 4,668	$ 504	$ 39
Minerals Program Losses		2007			2006			2005			2004	
Budget Allocation		1,115			2,341			284			325	
Minerals and Geology Losses		$ (907)			$ (2,131)			$ (116)			$ (308)	

Table 73: Distribution of Royalties and Disbursements from Public Land in Ohio to the Federal Treasury and State of Ohio

	2007			2006			2005			2004		
	To the Federal Treasury Forest Service Fund	To the State of Ohio	Total Mineral Revenues from the WNF	To the Federal Treasury Forest Service Fund	To the State of Ohio	Total Mineral Revenues from the WNF	To the Federal Treasury Forest Service Fund	To the State of Ohio	Total Mineral Revenues from the WNF	To the Federal Treasury Forest Service Fund	To the State of Ohio	Total Mineral Revenues from the WNF
From Corps of Engineers Flood Plain Land		$ 348			$ 352			$281			$ 34	
From the WNF	$ 156	$ 52	$ 208	$ 158	$ 53	$ 210	$ 126	$ 42	$ 168	$ 13	$ 4	$ 17

Source: Minerals Management Service

There are many other financial costs associated with oil and gas leases on the WNF that are not shown in this report. These include, for example, costs generated by the BLM and MMS for administering the oil and gas leases and collecting the royalties and disbursements, money spent by the Office of Surface Mining for Reclamation of abandoned mines, and money spent on the Fish and Wildlife Service for consulting on the presence of endangered species.

The Forest Service has the power to decide whether mining will be allowed on the WNF. In an amendment to the 1988 Forest Plan that was adopted in 1992, the Forest Service made all federally owned minerals on the WNF available for leasing. (FEIS, p. 2-33) The Forest Service also controls the conditions under which these leases are made available, by designating some surfaces as "No Surface Occupancy" (NSO). Minerals underlying a NSO can still be extracted by directional drilling, but, basically, the NSO designation on the WNF has the same effect as that of a "no leasing" designation (FEIS, p. 2-33).

Why does the Forest Service allow mining operations on the WNF, even though the damage from past mining is so obvious, and to this day mars the landscape and pollutes many waterways in the Forest?

Again, the answer lies in the incentives and opportunities provided by congressional appropriations. With world market prices for oil increasing, Congress has been more willing to support domestic drilling, and the Forest Service gladly goes along, because increased funding means more jobs and more income for the Forest Service.

E. Fire

The Forest Service purportedly uses prescribed burns in order to "reestablish oak hickory" forests on the WNF and to reduce hazardous fuel buildup. We have already questioned the validity of these programs earlier.

The National Fire Program is a very controversial program, especially in the Midwestern region, due to high financial costs, dangerous health effects, and environmental impacts. It is costing taxpayers increasingly large amounts of money.

After the fires (mostly in the Western United States) of 2000, Congress increased the Forest Service's budget by nearly 40 percent, from $3.6 to $5.1 billion a year. Three-fourths of this increase was related to fire. As Table 74 shows, fire budgets for the Forest Service and federal land agencies in the Department of the Interior have hextupled in the last decade and nearly doubled in just one year to nearly $3 billion per year.

Table 74: Forest Service and Department of the Interior Fire Budgets (millions)

	1991	2000	2001
Forest Service	298	1,035	1,913
USDI	168	491	977
Total	466	1,526	2,890

Fuel treatment and presuppression costs are based on 1991-1993 and 2001-2003, with 2003 based on the president's proposed budget. Suppression is based on 1990–1992 and 2000–2002 with 2002 estimated based on costs to date this year.

Source: (www.ti.org)

The change in funding to the Forest Service from 1980 to 2002 also shows the dramatic increase in the fire budget versus other programs. The fire program grew 253 percent during those years, while the entire national forest management budget decreased by 32 percent.

Table 75: Forest Service (for the entire agency) Change in Funding from 1980 to 2002 (after adjusting for inflation)

Research	24%
State & Private Forestry	102%
Fire	253%
National Forest System	-37%
Construction	10%
Permanent Funds	-31%
Trust Funds	-60%
Total National Forest Management	-32%
Land Acquisition	197%
Payments to States	-30%
Total Forest Service	17%

Source: www.ti.org

In 1991, the Forest Service spent 13 percent of its total budget on wildland fire management. In 2006, 45 percent of the agency's budget went to fighting fire.[101]

[101] Gorte, Ross, Personal Communication, April 2008.

Table 76: WNF Fire Program Budget 2004-2007

	2007		2006		2005		2004	
Suppression	$ 350,077	4%	$ 1,074,607	10%	527,686	5%	91,958	1%
Hazardous Fuels Reduction	$ 744,092	9%	$ 442,469	4%	$ 569,160	5%	$ 801,018	7%
Preparedness	$ 528,164	6%	$ 551,034	5%	$ 521,074	5%	$ 412,767	4%
FIRE TOTAL	$ 1,622,333	20%	$ 2,068,110	20%	$ 1,617,920	14%	$ 1,305,743	11%
Total	$ 7,843,000	100%	$ 10,749,000	100%	$ 11,625,000	100%	$ 11,950,000	100%

Source: Forest Service, WNF, FOIA

In 2007, the WNF spent $1,622,333 on fire or 20 percent of their total budget, $2,068,110 in 2006 or 20 percent, $1,617,920 or 14 percent in 2005, and $1,305,743 or 11 percent in 2004.

The way funds are appropriated for the National Fire Program provides a very strong incentive for Forest Service managers to burn whether or not the program is effective, and regardless of environmental or health concerns. According to information obtained from the Congressional Research Service and the Thoreau Institute, Congress has basically given the agency a blank check to do prescribed burns. The agency can transfer funds from other programs, especially K-V Funds and land acquisition funds, to be used for prescribed burns. When they do this, Congress often reimburses the Forest Service, providing an incentive to the agency to waste tax dollars. After all, what Congressperson wants to be responsible for hazardous fuel buildup? The National Fire Program has given the Forest Service a new mission after the decline of the booming commercial timber sale program of the 90s.

Because the Forest Service allegedly uses prescribed burns to “reestablish oak hickory forests” that the timber industry wants for commercial extraction, the costs of the Fire Program can be considered a subsidy to the timber sale program.

Why is the Forest Service suddenly so eager to burn tens of thousands of acres on the WNF?

Again, the answer lies in the incentives and opportunities provided by congressional appropriations. The Forest Service gladly goes along, because increased funding means more jobs and more income for the Forest Service.

F. Recreation

The WNF administers a recreation program that includes hunting, fishing, hiking, horseback riding, mountain biking, wildlife viewing, and off-highway vehicle (OHV) usage, including all-terrain vehicle (ATV) and off-highway motorcycle (OHM).

The FEIS states on p. 1-20 that: "The demand for recreation opportunities on the Wayne has increased since the1988 Forest Plan was developed. National recreation trends are reflected locally, including an aging population and increased demand for mountain biking opportunities. Demand for non-consumptive nature-based recreation (bird watching, photography, sight-seeing) is increasing faster than demand for more traditional consumptive activities such as hunting and fishing. Those activities remain popular on the Wayne, however. Interest in heritage resources, especially pertaining to the Underground Railroad which ran through the WNF, is increasing."

In 1996 Congress passed the 1996 Omnibus Rescissions and Appropriations Act which approved the Fee Demonstration (Fee Demo) project. This law authorizes the Forest Service as well as other federal land management agencies to charge fees and keep 80 percent of the funds for reinvestment in designated recreation areas. The Act introduced user fees to a system that includes 232 million acres managed by the Forest Service, 264 million acres by the Bureau of Land Management, 93 million by the Fish and Wildlife Service, and 12 million by the Army Corps of Engineers (the military controls about 130 million acres). This measure authorized each of these four largest land management agencies to charge fees on up to 100 unspecified sites, up to 400 in all.

Traditionally, public lands are supported by our general taxes, and all Americans have a right to free access. That concept was reinforced by the Land and Water Conservation Fund Act of 1965, a law that explicitly prohibited any federal agency from charging us to access our public lands with the exception of National Parks and developed boating or campground facilities. In addition, strict limits were placed on commercial recreation activity. The Fee Demo Project lifted those restrictions.

The user fee system was extended when the Federal Lands Recreation Enhancement Act (FLREA) was passed in the 2005 Consolidated Appropriations Act. The 10-year Act authorizes the Secretaries of the Interior and Agriculture to establish, modify, charge and collect recreation fees at Federal recreation lands and waters as provided for in the Act.

The Fee Demo Project was and still is controversial all over the country. Citizens who oppose this project point to studies that show the new user fees lock out low-income users. In a study of New England sites conducted by the Forest Service and the University of Massachusetts, 23 percent of respondents with incomes under $30,000 said fees had reduced or eliminated their use of "pay to play" sites.[102] Soon after the paper emerged, the Forest Service barred one of the two authors of the report, Dr. Thomas More from talking to the press, a prohibition that continues. The agency issued "talking points" to its spokespeople around the country dismissing the

[102] More T., and T.H. Stevens. Do User Fees Exclude Low-Income People From Resource Based Recreation? *Journal of Leisure Research.* 32(3), 2000, p. 341-357.

findings as "statistically insignificant."[103]

There is also opposition against allowing "public/private partnerships that promote the commodification and commercialization of public lands." In1999, Francis Pandolfi, then the Chief Operating officer for the Forest Service (and former CEO of Times Mirror Magazines), was exhorting his agency to "fully explore our gold mine of recreational opportunities in this country and manage it as if it were consumer product brands," thus allowing private commercial recreation companies to profit off of public land. [104]

Opposition also arose against the prospect of subsidies being given to commercial recreation companies, similar to the already established subsidies to logging and mining interests.

And, there is an issue of subsidies to private recreation companies being tied to incentives to Forest Service recreation managers to push uses of the national forests that can be commercialized by allowing the Forest Service to profit off of the user fees at the district level. According to the Omnibus Consolidated Rescissions and Appropriation Act of 1996 which allowed the Fee Demo Project, 80 percent of Fee Demo revenues should go right back to the national forest district where the recreation took place.[105]

Appropriations for Recreation, Heritage, and Wilderness have fluctuated wildly between 2004 and 2007, going from $528,000 to $379,000 to $645,000, and then back down to $520,000. We are not sure why this is the case. The Forest Service is able to access other funds for recreation, as shown in Table 77. The receipts from the Fee Demo Project have gone steadily down from $320,000 to $271,000 over the same time period.

In Table 77, the Recreation, Heritage and Wilderness line item is the only line item that comes from Congressional Appropriations. All others come out of user fees or the Recreation Trail Program (RTP) grant funds. The RTP is an assistance program of the Department of Transportation's Federal Highway Administration (FHWA). Federal transportation funds benefit recreation by making funds available to the States to develop and maintain recreational trails and trail-related facilities for both nonmotorized and motorized recreational trail uses.

The RTP funds come from the Federal Highway Trust Fund, and represent a portion of the motor fuel excise tax collected from nonhighway recreational fuel use—fuel used for off-highway recreation by snowmobiles, all-terrain vehicles, off-highway motorcycles, and off-highway light trucks.

The RTP funds are distributed to the States by legislative formula—half of the funds are distributed equally among all States, and half are distributed in proportion to the estimated amount of non-highway recreational fuel use in each State.[106]

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[103] Associated Press, *Fees for National Park, Forest Stir Up Conflict*, Feb. 6, 2001. http://www.nepfa.org/muzzled.html

[104] Silver, Scott , The Commodification of Nature. http://www.wildwilderness.org/docs/commod.htm

[105] Silver, Scott , The Commodification of Nature.

[106] U.S. Department of Transportation, FHWA Recreational Trail Program. http://www.fhwa.dot.gov/environment/rectrails/

The program accounted for between 10 and 14 percent of the total WNF budget in years 2004-2007. After subtracting costs from receipts, Forest Service managers lost $833,000 in 2007, $1,227,000 in 2006, $966.000 in 2005, and $876,000 in 2004.

Table 77: WNF Recreation Revenues and Costs 2004-2007 (in thousands of dollars)

Recreation	**2007**		**2006**		**2005**		**2004**	
Receipts	$271		$309		$319		$320	
Expenditures								
Recreation, Heritage, and Wilderness	**$520**	**7%**	**$645**	**6%**	**$379**	**3%**	**$528**	**4%**
Unit Recreation Enhancement	$232	3%	$252	2%	$237	2%	$271	2%
Trails-Capital Improvements	$246	3%	$500	5%	$260	2%	$238	2%
Regional Recreation Enhancement	$10	0%	$55	1%	$52	0%		0%
Recreational Enhancement-Cost of Collection/Indirect	$30	0%		0%		0%	$52	0%
10% Roads and Trails Funds for States	$67	1%	$84	1%	$358	3%	$108	1%
Total Recreation Costs	$1,104	14%	$1,535	14%	$1,285	11%	$1,197	10%
Total Budget	$7,843	100%	$10,749	100%	$11,625	100%	$11,950	100%
Total Losses	**-$833**		**-$1,227**		**-$966**		**-$876**	

Source: Forest Service, WNF, FOIA

OHV riding accounts for more than 90 percent of trail permits sold on the WNF. In 2003, more than 16,800 motorized trail permits were sold on the Forest through the Fee Demo Program (FEIS, p. 3-222).

The Forest sold approximately 43 mountain bike trail permits and 257 horse trail permits during the same season, which account for one and two percent of total permit sales respectively (FEIS, p. 3-20). There is no charge for hiking on the Wayne, and therefore, visitor use information related to this activity is not available.

The Forest Service states in the FEIS, p. 3-195/196, that the WNF is "well positioned" to offer OHV usage on the forest.

"In an effort to find the Forest's recreation niche, the WNF recently examined the variety of recreation opportunities it was currently providing and compared it to opportunities that other Federal, State, local, and private organizations in the southeast Ohio region were offering. As a

result, the **Wayne identified and selected two recreation opportunities that formed the key components of its recreation niche**. They include: OHV trail riding and interpreting of heritage/cultural sites. These two activities are what the Wayne is best positioned to provide. **This does not imply that the Forest would stop providing other recreational opportunities**."

They also state that, "by clearly identifying what unique forms of recreation the WNF is best suited to provide, we can ensure that the opportunities which give the forest identity and value are sustained" (FEIS p. 3-196).

As the Forest Service points out elsewhere, however, the two recreation opportunities in which the WNF supposedly has a niche, namely OHV and interpreting of heritage/cultural sites, could be in conflict with each other. As the FEIS states:
"Cultural features such as historic barns, log structures, iron furnaces, covered bridges, and mineral developments also contribute to the landscape character. **These contrast** with areas of **significant environmental abuse**, such as abandoned mines, acid seeps, roadside trash dumps, **and the effects of illegal motor vehicle** use" (WNF FEIS, p. 3-232).

What did the WNF do with the $271,123 in recreation fees they collected from users in 2007? Some of the money was used to purchase "gator" equipment that is used to haul gravel onto trails for trail maintenance. The gravel is dumped into muddy areas and meant to keep ORVs from continuing to widen the trail by avoiding standing water and mud.[107]

According to their Program Summary, the Forest Service operated and maintained seven campgrounds and two group picnic shelters; maintained to standard approximately 75 miles of trails (OHV, horse, and mountain bike combined); recruited and trained eight volunteers to help implement a Forest Trail Patrol Program; constructed a 1/2 -mile ATV trail connector to the Town of New Straitsville, Ohio to provide trail riders access from the trail system to restaurants, shops, private campground, and other local businesses; installed new waterlines and hydrants at 24 campsites at Oak Hill Campground; purchased and provided equipment to Ward Township Fire and Rescue to help the Forest with search and rescue efforts on the Athens District's ATV trail system; and contracted additional law enforcement with Hocking and Washington County Sheriff Departments to help with patrols at developed recreation areas and on the ATV trail system. [108]

In 2008, most of the money collected in fees will again be spent benefiting OHV riders.
PROJECTS/ACTIVITIES PLANNED FOR NEXT YEAR (2008):

- Operate and maintain fee campgrounds and day-use areas to standard.
- Maintain to standard and patrol the Wayne's OHV, horse, and mountain bike trail system.
- Leverage RTP grant funds to construct approximately 30 miles of ATV trails.
- Work with local Fire and Rescue department to do rescue on ATV trail system.
- Order and distribute OHV brochures and OHV trail maps.
- Recruit and train additional volunteers to help implement Forest Trail Patrol Program.[109]

[107] USDA Forest Service, Recreational Fee Program FY 07 Program Summary. www.fs.fed.us/r9/wayne/recreation_sites/trail_permits/2007_stats.pdf
[108] USDA Forest Service, Recreational Fee Program FY 07 Program Summary.
[109] USDA Forest Service, Recreational Fee Program FY 07 Program Summary.

Many citizens may argue that since recreation is a public good, we should not count the money spent as losses, but as a cost of providing a high-value good.

From an economist's perspective, the recreation program follows a familiar pattern, echoing what is happening with timber and mining extraction and prescribed burns. Most of the recreation fees are collected from OHVs. What is not covered by fees is most likely paid for by the taxpayers out of appropriations. We cannot say for sure how much of the yearly appropriations for recreation is spent directly on OHV usage over other recreational activities. However, one can look at the projected costs of planned OHV trails on the WNF over the life of the Forest Plan, and surmise that not much will be left over for other activities. Therefore the public is subsidizing another form of commercial extraction off of a national forest. Since the WNF does not charge anything for hiking, there is no financial incentive to promote this use of the WNF over OHV usage.

Table 78: Estimated Construction and Maintenance Costs of New OHV Miles by Alternative

Management Activity	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. E Modified	Alt F.
Cost of New OHV Trail Construction ($22,000/mile)	$4,048,000	$4,048,000	$2,728,000	$3,388,000	$2,728,000	$2,728,000	$2,002,000
Cost of Maintaining New OHV Trails ($3,500/mile)	$664,000	$664,000	$434,000	$539,000	$434,000	$434,000	$318,500
Total	**$4,712,000**	**$4,712,000**	**$3,162,000**	**$3,927,000**	**$3,162,000**	**$3,162,000**	**$2,320,500**

Source: WNF Recreation Project File, 2004

Source: FEIS Table 3—57

What is in it for the Forest Service? Continued employment and career opportunities. The Forest Service latches on to whatever funding is available to maintain the agency and justify its existence.

Ultimately, it is Congress, not the Forest Service that gives a green light to the programs administered on our national forests. It is Congress that establishes funds like the K-V Fund, passes laws that allow the establishment of user fee programs, and subsidizes timber sales, prescribed burning and mining programs.

Amid the privatization movement of the 1990s, Congress slashed funds for the upkeep of public lands. For example, it cut the Forest Service recreation budget by more than a third between 1994 and 1999. Into this artificially created financial crisis stepped the American Recreation Coalition, a consortium of major corporations and their advocacy groups that profit from

motorized recreation and operating concessions, campgrounds, marinas and similar facilities.

This is probably this is how the WNF became “best positioned” to host the use of ORVs?

All the activities described above do more harm than just not paying for themselves. They also damage endangered species, pollute the water and the air, diminish the forest’s capacity to provide a range of ecosystem services, and discourage recreation that is more appropriate for and respectful of the natural forest environment, like hiking and wildlife watching, which are widely popular.

Why is all this happening? Follow the Money!

VII. Economic Impact of Extractive Industries on WNF Counties

A. Introduction

Our analysis so far has focused on the benefits and costs connected to goods and services provided by the WNF. The main question we tried to answer was whether the programs envisioned in the 2006 WNF Plan are likely to maximize public net benefits from the provision of WNF goods and services. We came to the conclusion that logging, mining, prescribed burns, and use of OHVs are expensive programs that add to the already very high pollution levels in the WNF region, and impair the ability of the forest to provide highly valued ecosystem services. Thus, we stated that overall, the 2006 WNF Plan probably creates higher public costs than benefits, and that there would have been other uses of taxpayer funds that would have yielded much higher benefits to the public.

This analysis did not address macroeconomic aspects of the 2006 Forest Plan, which include issues of employment, income, and economic growth. What is of interest here is the impact that the Plan activities have on income and employment in WNF counties.

Income and employment could be generated by WNF visitors who stay in area hotels or on local campgrounds, and by WNF program expenditures that benefit local businesses. Income earned by Forest Service personnel and spent locally will support local jobs. Income and employment could also be generated by mining companies that extract WNF oil, gas and coal, and by local companies that log or conduct prescribed burns on the WNF.

Obviously, some of the local income and employment comes from logging and mining, the very activities that are likely to generate higher public costs than benefits, according to our analysis above. Could it be argued that those activities should nevertheless be pursued in the future, because they support local income and employment? What role do mining, logging, and recreation play in the economies of the WNF counties?

B. WNF Counties Economy

The southeast region of Ohio, where the WNF is located, has a history of extraction of natural resources, including timber and oil, gas and coal.

The Forest Service describes this area as economically depressed (FEIS 3-314), and states that: “The current economic health and vitality of the rural counties in the WNF planning area continues to lag behind both national and State indicators” (FEIS p. 3-289).

The people who live in this area have below-average incomes, and poverty rates and unemployment are higher than the state average. For example, average household income in WNF counties is only two-thirds of the State average (FEIS, p. 3-290).

The counties in southeast Ohio "remain a part of the Appalachian Regional Commission, a national program created in 1965 and consisting of multiple state counties targeted for economic development to reverse the damaging trends of chronically higher unemployment, net outward migration, and acute lower levels of income" (FEIS, p. 3-289).

Population in WNF counties has increased at a rate that is only 1/3 of the average for Ohio as a whole. Average per capita income and household income is only two-thirds of the State average. As of July 2002, unemployment rates in 10 of the 12 Forest-wide counties exceeded the statewide average (FEIS Table 3-78). Poverty and infant mortality rates are higher in most of the WNF area than the state average, as is the percentage of people who earned a high school diploma.

Table 79: Demographic Information from WNF Counties

2005	Percent living in poverty	High School Graduates	Infant Mortality Rates
State of Ohio	13	83	7.9
County			
Athens	31.5	83	4.7
Gallia	22.8	73.7	8
Hocking	15.5	78	8
Jackson	16.5	73.5	9
Lawrence	20.3	75.6	4.1
Monroe	18.3	78.8	16.7
Morgan	18	80.6	6.2
Noble	14.5	78.6	0
Scioto	25.3	74.1	7.2
Vinton	20.6	70.7	12.2
Washington	13.3	84.5	7.1

Source: U.S. Census

Obviously, timber and mineral extraction industries have not brought prosperity to the people living in WNF counties.

Yet the Forest Service holds out this promise of economic prosperity through the promotion of these industries. The Forest Service tells us that:

"Leasing of Federally owned gas and oil rights, however, can contribute substantially to the local economy and regional energy needs" (FEIS 1-4).

One of the most powerful arguments that private mining and logging companies can muster in their quest for access to public land is that they offer rural communities and families something

that they desperately need—jobs. Local and state government officials, chambers of commerce, and local civic organizations typically also see these jobs as a boon.

Given the environmental destruction and associated costs that typically accompany oil, gas and timber extraction, communities and their citizens appear to face a stark and tragic choice—accept the degradation of their natural environment to reduce unemployment and poverty—or turn down those jobs and enjoy the resulting higher environmental quality, but face even greater unemployment and poverty.

How can we explain this systematic failure of mining and logging promises of prosperity for communities willing to embrace it? The answer lies in the economic characteristics of these industries.

- Extractive industries tend to be unstable, as prices are determined by international markets, and may fluctuate. Usually timber, oil, gas, and coal are not processed and manufactured in the counties where they are extracted, but they are exported out of the region as raw materials, therefore depriving communities of the employment and income from processing and manufacturing sectors. As our analysis of macro-economic data for WNF Counties below shows, this is true for those counties.

- Extractive industries are "mature" economic activities that have been with us since before the industrial revolution. We have had decades, even centuries, to advance technologies for mining and logging. The result has been a dramatic and impressive gain in labor productivity.

- This advance in labor productivity translates into a smaller and smaller labor force needed to extract and process the resources. Employment shrinks, even though the wages per worker may increase for the remaining workers, based on their higher productivity. Yet overall, total labor income from these industries is likely to decline (either absolutely or in relation to total income), due to a smaller number of workers. This is the case with the coal industry on a national level.

  Nationwide, between the years 1958 and 2000, total employment in coal mining has shrunk by 64 percent. (After the year 2000, the coal industry is lumped in with other extractive industries in the national accounts, so more recent numbers could not be found). Per employee, wages have increased by 87 percent during that time period, which is more than the national average of 46 percent, indicating a higher than average increase in labor productivity. However, total compensation of employees shrank by 29 percent, whereas it more than doubled for all domestic industries (after adjustment for inflation). So, even though the people who remain employed in the coal industry have better wages than people 40 years ago, total wage payments have shrunk.

Table 80: Full-Time Equivalent Employees: Coal Mining

Full-time equivalent employees	1958	2000	Percent Change
Coal mining	215,000	77,000	**- 64%**

Source: Bureau of Economic Analysis, National Income and Product Accounts Table 6.5

Table 81: Wage and Salary Accruals: Coal Mining

Wage and salary accruals per full-time equivalent employee 2006 Dollars	1958	2000	Percent Change
Domestic industries	31,150	45,352	**46%**
Coal mining	33,543	62,624	**87%**

Source: Bureau of Economic Analysis, National Income and Product Accounts Table 6.6

Table 82: Compensation of Employees in the Coal Mining Industry

Compensation of Employees by Industry 2006 Dollars (in millions)	1958	2000	Percent Change
Domestic industries	1,810,843	6,771,091	**274 %**
Coal mining	8,600	6,074	**-29 %**

Source: Bureau of Economic Analysis, National Income and Product Accounts Table 6.2

In petroleum and natural gas extraction industries, total employment shrank by 47 percent between 1948 and 2006. Per employee, wages have increased by 341 percent during that time period, which is more than the national average of 98 percent, indicating a higher than average increase in labor productivity. However, total compensation of employees increased only by 179 percent, whereas it increased more than 5 times for all domestic industries (after adjustment for inflation). Total wage payments have therefore not shrunk in real terms.

Table 83: Number and Percent Change of Full-Time Employees in the Coal Industry, 1948-2006

Full-time equivalent employees	1948	2006	Percent Change
Petroleum and natural gas extraction	251,000	134,000	**- 47%**

Source: Bureau of Economic Analysis, National Income and Product Accounts Table 6.5

Table 84: Wage and Salary Accruals in the Coal Industry, 1948-2006

Wage and salary accruals per full-time equivalent employee 2006 Dollars	**1948**	**2006**	**Percent Change**
Domestic industries	23,598	46,758	**98%**
Oil and gas extraction	29,997	132,407	**341%**

Source: Bureau of Economic Analysis, National Income and Product Accounts Table 6.6

Table 85: Compensation by Employees in the Coal Industry

Compensation of Employees by Industry 2006 Dollars (in millions)	**1948**	**2006**	**Percent Change**
Domestic industries	**1,186,768**	7,454,791	528%
Coal mining	**7,922**	22,066	179%

Source: Bureau of Economic Analysis, National Income and Product Accounts Table 6.2

- The larger than average compensation per worker in the coal, gas and oil industries explains why workers are eager to keep these jobs. But communities can still be negatively affected when total wage payments from those industries shrink or do not keep pace with other sectors, unless other employment opportunities develop to compensate for the loss of employment in the oil, gas, and coal industries.

- But this is just the beginning of an economic unraveling. Mining and clear-cut logging tend to have dramatic negative impacts upon the natural landscape—trees are stripped away, the topology is radically changed, streams are poisoned and silted up, fisheries are destroyed, wildlife habitat is fragmented, the recreational potential of the land is degraded; scenic beauty is lost, and air and water quality deteriorates. This is not just an environmental or aesthetic concern. It is also an economic failure as well, as it reduces the ability of such communities to attract new growth businesses and industries, and to offer an attractive, high quality environment for future residents.

C. Mining

How does the mining industry contribute to the WNF economy? The Forest Service tells us that:

"For over a century and a half, mineral production has been very important to the people of Ohio, providing jobs and products that sustain a higher standard of living. This economic contribution is felt statewide as well as locally. Also, the U.S. economy depends heavily on non-

renewable mineral resources" (FEIS, p. 3-244).

Clearly the statements made by the Forest Service about a higher standard of living provided by extractive industries contradicts all the other evidence of economic disparity they themselves lay out in the FEIS. Do their statements about contributions to the local economy make sense?

To answer that question we looked to the Department of Commerce's Bureau of Economic Analysis, Regional Economic Information System Data (REIS) readily available to the public on the Internet.

The Appendix 1 lists Mining for all 12 WNF counties from 2001-2005, with:

- Personal income;
- Earnings by place of work for mining and associated industries (all numbers inflation adjusted to 2005);
- Percentages of total earnings by place of work to personal income in general;
- Percentage of earnings from the mining industry in relation to total earnings by place of work;
- Percentage change of total earnings by place of work from 2001-2005; and,
- Percentage change of earnings from mining from 2001-2005.

It should be noted that not all of the mining that takes place in WNF counties is on public lands. The figures account for all mining on public land (WNF and Corps of Engineers Floodplain land), as well as mining on private land.

Personal Income is all income that is received by all persons residing in a county from all sources (including labor income, dividends, interest, rent, and transfer income). It may or may not be generated in the county. On the other hand, earnings by place of work is the sum of wages and salaries, including supplements to wages and salaries, and proprietors' income generated by workplaces in the county.

Personal income in all WNF counties has increased from 2001-2005, except for Morgan County, which has decreased by six percent, and Vinton and Washington Counties, which have experienced no change.

Earnings by place of work have increased in all counties expect for Monroe and Morgan Counties, which have gone down 30 and 17 percent respectively, and Washington County, which has remained the same.

In three of the counties, **Athens, Gallia, and Scioto**, **mining** accounts for l**ess than one percent of all earnings by place of work** for most years. Mining and the related industries can therefore be considered a negligible part of these local economies.

In **Jackson County**, **mining** (except for oil and gas) accounted for **5.2 percent of earnings in 2001**, but had **declined by 50 percent to 2.3 percent by 2005**, thereby becoming less and less of a contributor to the local economy.

In **Vinton County,** mining accounts for roughly **2 percent of earnings**, and is on the decline as well.

In **Hocking** County, data was unavailable for all years except in 2005, where mining reached more than **3 percent of earnings.**

In **Lawrence County**, oil and gas extraction and petroleum and coal products manufacturing both accounted for **less than 1 percent** of earnings. All other categories of mining were not released due to the fact that only one company was represented in that category, making the information proprietary and unavailable to the public.

In **Morgan County**, all information on mining was unavailable.

In **Monroe County**, **oil and gas extraction** is playing an increasingly important role in earnings, rising to **6.5 percent of earnings in 2005, up from 0.6 percent in 2001**, with some slight volatility. **Mining**, including oil and gas as well as other mineral extraction, went up from **1.5 percent to 7.6 percent.**

In **Noble County**, both total mining and "mining except for oil and gas" are on the rise, and a small contributor to the economy at **2.5 percent in 2005**, but numbers for 2004 and 2005 were unavailable for mining overall. **Support activities for mining** were 2.7 percent of earnings in 2005.

In **Perry County**, mining is on the rise and becoming more important to the economy at **8.4 percent** in 2005.

In **Washington County**, mining accounted for **2.4 percent of earnings in 2005**, and is also on the rise, in contrast to the overall earnings in the county, which are on the decline.

In conclusion, the majority of the WNF counties are not dependent on mining as a large contributor to the local economy. **Perry County is the most mining dependent, and can be said to have a significant percentage of their local wages dependent on mining.** Monroe, Washington and Noble Counties have a small percentage of earnings from mining.

D. Logging

The Appendix 2 lists all 12 WNF counties from 2001-2005, with:

- Personal income;
- Earnings by place of work for forestry and associated industries (all numbers inflation adjusted to 2005);
- Percentages of total earnings by place of work to personal income in general;
- Percentage of earnings from the forestry industry in relation to total earnings by place of work;
- Percentage change of total earnings by place of work from 2001-2005; and,

- Percentage change of earnings from forestry from 2001-2005.

In **Athens, Gallia, Hocking, Lawrence, Monroe, Morgan, Perry, Scioto, and Washington Counties,** the **percentage of earnings from forestry has been at or less than one percent for the five years studied**. For some of the years and categories, data were unavailable so no determination can be made as to earnings generated.

In **Jackson County**, earnings from forestry ran **slightly above one percent of all earnings for all years,** but has **overall declined 17 percent** 2001-2005.

In **Noble County,** forestry ran **slightly above one percent** from 2001-2003, but data are unavailable for 2004 and 2005.

Vinton County is the only county where earnings from forestry were significantly larger than one percent, **averaging slightly over 3 percent from 2001-2004**, with a decrease in 2002, and data from 2005 unavailable.

It should be noted that **not all forestry related earnings are directly attributable to the WNF**, as logging off of private forestland is included in these numbers.

Gallia County has a small **wood products and furniture related industry** that runs **under one percent of total earnings for all years**.

Hocking County's wood products and furniture related industry runs around **2.2 percent and .5 percent of earnings for all five years studied.**

Jackson County's wood products industry runs at **1.3 percent of earnings** with no data available for the furniture related industry.

Lawrence, Monroe, Morgan, Noble, Scioto and Washington Counties all have **wood products industry running below one percent**, making that industry an insignificant part of those county's earnings.

Only **Vinton County** has a wood products industry that can be called significant, with around **10 percent of earnings for the five years**. This industry seems volatile, with earnings going up and down over the course of the five years.

E. Other Economic Activity – What Drives Employment and Income in WNF Counties?

The Appendix 3 lists all 12 WNF counties from 2001-2005, with:

- Personal income;
- Earnings by place of work for important industries (all numbers inflation adjusted to 2005);
- Percentages of total earnings by place of work to personal income in general;
- Percentage of earnings from those important industries in relation to total earnings by place of work;
- Percentage change of total earnings by place of work from 2001-2005; and,
- Percentage change of earnings from important industries from 2001-2005.

Extractive industries are not making a significant economic contribution to the majority of WNF counties. Even the Forest Service acknowledges that the natural resources sector comprises a relatively small portion of the economy in that region (FEIS, p. 3-289).

If logging and mining do not make important contributions to the local economy then what does?

It turns out that **government services** is one of the largest sources of earnings in every WNF county in every year. Earnings in this sector range from **a low of 14 percent** in Washington County, to a **high of 54 percent in Athens County**, with the majority of that income generated by the state government, largely due to Ohio University. In all counties, the majority of earnings come from **state and local government**, and only a minor portion from military or federal government earnings. That means that income generated by employment in the Forest Service by itself also does not have a significant economic impact on WNF counties.

Health care and social services is another sector that is important to WNF Counties. In Scioto County, this sector accounts for 22 percent of earnings. In other counties it isn't as high, but in **every single county, the earnings in this sector are on the rise.**

Manufacturing still accounts for a **large amount of income from workplace earnings in almost every county**, with **Jackson County the highest at 38 percent**. Some counties are still experiencing a rise in this sector; some see a downward trend, like many other counties in the nation. **Retail trade** is also a significant earner, however, almost every county has seen a **decline in this sector over the five years studies**. Other important economic drivers for WNF counties include construction, transportation and warehousing, finance and insurance, and real estate. **Accommodations and other services** make up a **smaller percentage of earnings but are generally on the rise.**

F. Alternatives to Extractive Industries: Prospects for Future Employment and Income

Given the high unemployment and low income in most of the WNF counties, it is understandable that these communities, as well as individuals working in extractive industries, want to hold onto the jobs provided by these industries, even though they do not contribute substantially to the local economy. Similarly, Forest Service employees, as we showed earlier in this report, maintain employment and income for themselves by promoting timber cuts, burning, and mining activities. Therefore, these programs are supported by a broad coalition of stakeholders. Yet, mining, logging and burning on the WNF may reduce opportunities for other industries to develop and thrive.

As we showed earlier in this report, four of the WNF Counties are non-attainment areas with regard to the particulate matter. That means that business expansion in these counties, as well as attraction of new businesses, may have to be limited to bring the counties back into attainment. Burning tens of thousands of acres on the WNF and increasing particulate emissions in the area may therefore have the effect of stifling other economic activity.

When analyzing macroeconomic data for WNF counties, we noticed that recreation-associated industries did not do as well as we would have expected. We therefore did a quick comparison between the WNF in Ohio and two other National Forests that are fairly close to the Wayne, the Hoosier National Forest in Indiana, and the Monongohela National Forest in West Virginia. The counties associated with these national forests fare much better than the WNF counties in terms of recreation-associated earnings, especially from the food and accommodations sectors. The highest earning counties associated with the Hoosier and the Monongohela received 8 to 19 percent from the food and accommodations sectors, compared to the WNF counties that received a high of 3 percent for Hocking County.

What might explain these differences? We are not sure. Most visitors to National Forests come from nearby population centers. There are four major population centers, Columbus, Cleveland, Cincinnati, and Charleston. They are all within a daytrip of the WNF. Most people who are drawn to national forests come to enjoy hiking, fishing, wildlife watching, scenic beauty, historic sites, or backpacking.[110]

Is the WNF not as attractive as other forests? Or have WNF county communities not developed the necessary private accommodation and food services that would make people want to lodge and eat in the area? Does the Wayne not advertise enough? According to the Recreation Feasibility Study, page 22: “The lack of usage of WNF is an important consideration for this study. When asked a series of questions regarding their awareness and usage of WNF, relatively few area outdoor recreation users had heard of it, indicating that WNF may well be one of the best-kept secrets in Ohio.”

[110] Strategic Research Group, *Recreation Feasibility Study*, p. 16.

Or, has the Forest Service in Ohio simply focused on developing those activities for which fees can be collected (mainly OHV), and ignored other higher-value outdoor recreation activities like sightseeing, hiking, and wildlife watching?

Is the recreational potential on the WNF reduced because of ownership fragmentation? Because of abandoned mines, current mining activity, or mining-related pollution that discourages hunting and fishing? Could recreation potential be increased by having designated wilderness areas? What about charismatic species like black bear, that are currently missing from the WNF?

Is the presence of OHV a deterrent that keeps other visitors away? The FEIS hints at that: "Cultural features such as historic barns, log structures, iron furnaces, covered bridges, and mineral developments also contribute to the landscape character. These contrast with areas of significant environmental abuse, such as abandoned mines, acid seeps, roadside trash dumps, and the effects of illegal motor vehicle use" (WNF FEIS, p. 3-232).

Will increased logging and burning make the Forest less attractive to visitors? What are local communities doing to attract visitors?

We did not investigate this further, but would like to point out that it may make sense for WNF counties to analyze this issue further and find out what could increase the recreational potential of the Wayne, and with it recreation-related income and employment.

With regard to future employment opportunities for WNF counties, it is important to point out that jobs in the oil and gas sectors do not have long-term potential. Oil production in the U.S. peaked in the 1970s. And according to the WNF FEIS, p. 1-22, "oil production in Ohio peaked in 1896 *(probably a typo, and should be 1986)* at almost 24 million barrels. The State's peak year for gas production was 1984 at 186 billion cubic feet. Oil and gas production in Ohio generally declined from 1992 to 2001.

Today, it is getting more difficult and costly to extract the little oil that is left. However, prices for oil have increased considerably over the past years, due to surging worldwide demand. This will make oil and gas extraction on the Wayne more attractive, but it will only speed up extraction of remaining gas and oil reserves, and hold no promise of permanent prosperity. As far as the Forest Service's claims that they need to allow oil and gas leasing on the Wayne to contribute to the oil and gas supplies for the country, it has been calculated that if all the known oil and gas reserves on the Wayne could be pumped out in a single day (instead of over decades), that it would not be enough to meet U.S. energy needs for a single day.[111]

To bank on mining is therefore not a promising economic development policy for low-income rural communities, even though oil and gas prices are increasing. Coal probably will also increase in price, and thus coal mining will become more attractive as well. The reserves of coal in general will last longer than reserves of oil and gas, but other limiting factors may restrict this industry's growth. Coal is the fossil fuel with the highest emissions of CO2, and "clean coal" is still a far away dream. Any limitations on emissions of CO2 through, for example, a carbon tax, or regulations that require carbon sequestration, would greatly increase the cost of coal

[111] Heartwood and Buckeye Forest Council, *Notice of Appeal.*

extraction, and therefore decrease its potential as a source of income for WNF counties, because other, cleaner energy sources would likely start to replace it.

If WNF communities put their hopes into jobs and income from coal mining, oil and gas leasing, environmental degradation will continue and may pre-empt future attempts at attracting businesses that need a clean environment in which to operate.

The challenges presented by global warming, and the mounting evidence of peaking world petroleum supplies, give some signals to communities as to what industries will see an increase in demand in the future. As petroleum supplies start to diminish, and world energy demands continue to rise, energy prices are likely to increase more, and energy sources like wind and solar will become more and more competitive. In addition, energy conservation will become a growth industry, including every aspect of energy use in the home, transportation and workplace. Roughly 50 percent of all greenhouse gases are associated with buildings (space heating and cooling, lighting, water heating). All trades associated with energy efficient new building construction, and with retrofitting buildings for energy conservation, will see a rise in demand, as fossil energy supplies diminish or are restricted because of greenhouse gas emissions.

Increasing energy prices will also put increased pressure on all lands to supply renewable sources of energy from biomass. This is already starting to happen, with corn being grown for biofuel production. It is very likely that private land-owners and entrepreneurs will respond to these new market opportunities. The quest for new sources of energy has the potential to increase the intensity of land use, which could affect private forests in a number of ways. They could become sources of renewable fuels, or they may be cut down to make room for other, more profitable biofuels, like certain grasses. If forests are maintained as fuel sources, they may be managed more and more for fast growth and quick turn-around of investment.

In either scenario, the value of what public forests are uniquely positioned to offer this nation will increase tremendously as private lands are driven into biofuel production on a massive scale. By far, the highest value that forestland in the U.S. is providing today, according to ecosystem valuation research discussed earlier in this report, is related to habitat (refugia) for species that need large, continuous, and unfragmented areas of forest for their survival. It is easy to see that with increasing pressures on private forest and agricultural lands for biofuel production (including the possibility of large scale conversions of private forest land into agricultural land), this already very scarce type of habitat will become even more scarce, and therefore more valuable, as will other forest ecosystem services like water and air purification, water regulation, and pollination, and provision of scenic qualities and recreation.

The WNF today is far from having realized its full potential in providing highly valued ecosystem services for surrounding and far-away communities. The current Forest Plan is not doing much to move things in this direction, and is still proposing too many things that point the opposite way, promoting low value extraction of goods over the restoration and expansion of high-value ecosystem services. Local communities will probably pay the price.

Developing fully the WNF potential for offering highly valued ecosystem services would benefit the economies of the surrounding counties, by making the WNF a much more attractive

destination for recreation. Local communities could capitalize on this by promoting themselves for tourism related to wilderness experience and wildlife watching, and attracting people to see extremely rare remnants of old growth forest communities that have all but disappeared from private lands. Local communities could also attract businesses that want employees to have access to a beautiful, healthy, and scenic environment.

As global temperatures continue to rise because of increases in greenhouse gases in the atmosphere, droughts will be more likely, and water will become more valuable. Forests have an important role in storing and regulating water flows, and in filtering water. Water may become a more important and more highly valued commodity in the Eastern U.S. as global temperatures rise, and more communities may discover the value of forests in providing fresh water, just as New York City did years ago.

The Forest Service continues to allow mining and logging on National Forests not because local economies depend on it, but because Congress is willing to provide the appropriations for it.

But, Congress could just as well provide appropriations for activities that yield a net public benefit, and still create jobs for both the Forest Service and WNF counties. For example, more money could be spent on reclaiming mine land instead of on encouraging more mining. This would result in safer water, and higher scenic quality, which in turn could bring more visitors to the WNF. Or, more money could be spent on buying private agricultural land for land consolidation, increasing the prospects of reintroducing species that need large, uninterrupted blocks of forest to survive. This could bring more visitors to the Forest, who are interested in watching wildlife, benefiting local hotels and restaurants and other tourism-related businesses. The Forest Service's role may change, and fewer forestry experts would need to be employed, but there would be a greater need for experts in ecosystem restoration, and for a workforce skilled in removing obstacles for natural forest development (for example road decommissioning, and eradication of invasive species).

The funds to pay for some of this work may even come from revenues generated by ecosystem services. For example, it is possible that at some point in the future, forests can receive revenue reforestation projects, and thereby maintaining the carbon storage that is associated with an intact forest. This includes carbon stored in trees, under-story vegetation, vegetation and litter on the forest floor, dead trees and coarse woody debris, and carbon stored in the soil.

What are characteristics of communities that have adapted well to a decline in extractive industries, or that have benefited from the beauty and productivity of their natural environment? One prime example is the State of Montana. For over one hundred and thirty years, mining played a dominant role in the state. Now, after more than a century of rapid growth, Montana and many other old mining communities in other states have been transformed from their origins of mining, ranching and logging. Their economies are much more diversified and new people and businesses are streaming in seeking the quality of life associated with the region's growing cities and incredible natural places, such as the national forests.

VIII. Recommendations

These recommendations are based on the findings of this report, and are derived from basic principles of economic reasoning, which demand the maximization of net public benefit.

Simply put, net public benefit is maximized by preferring activities that generate a high net public benefit (= benefits minus costs) over those that create a lower net benefit. Net public benefit for any activity increases when costs of achieving that benefit go down, and decreases when costs go up. For this analysis, costs and benefits have both monetary and non-monetary components.

Net public benefit cannot be maximized when activities that have a low net public benefit (or that generate a net public loss), are preferred over activities that have a high net public benefit (large benefit, low cost).

Basically, our recommendations consist of pointing out activities that are likely to generate the largest possible positive difference between costs and benefits.

1. The Forest Service activities that generate the highest (long and short-term) financial costs on the WNF—prescribed burns, logging, mining, and OHV use—are also the ones that generate the most pollution and that most diminish the capacity of the Forest to provide highly valued ecosystem services related to air, water, climate, recreation, and biodiversity. Therefore, by simply stopping logging, burning and mining, the Forest Service can at once cut short-term and long-term costs considerably (including future costs of mine reclamation, or costs of removing roadbeds that were constructed to facilitate logging), and provide much larger public benefits from ecosystem services.

2. Stopping logging, mining and prescribed burning will give the forest the opportunity to heal from centuries of heavy abuse. With trees being allowed to grow beyond the age when it is economical to log them, second growth forest will, over 200 to 300 years, develop into old growth forests, in which early successional habitat is provided by natural disturbances, and the forest develops a fine grained structure of habitats at various stages of succession. Old growth forests have all but disappeared from the landscape, and facilitating its recovery will greatly enhance one of the most valuable of all ecosystem services, the provision of rare interior forest habitats that keep associated species from going extinct (currently valued at over $900 per acre/per year).

3. To further enhance the potential of the WNF to provide highly valued ecosystem services, the Forest Service needs to put increased emphasis on mine reclamation, removal of roads and trails, on reclaiming and reforesting areas with highly compacted or eroded soils, repairing damaged stream banks, and restoring wetlands. Forested wetlands and riparian areas have the highest ecosystem values of all forest land, and should therefore receive priority with regard to any necessary restoration work. (Ecosystem services from general forest land are currently valued at $1,476 per acre/per year, from wetlands at $11,568 per year, and riparian buffers at 3,383 per year).

4. We recommend that the Forest Service increase the recreational value of the forest by excluding OHVs from the WNF, by closing and rehabilitating all illegal trails, and by enacting an effective program for monitoring and enforcement of forest regulations related to OHV. The existing OHV network is too large to be effectively monitored and maintained at a reasonable cost. The negative effects of both legal and illegal OHV usage—air, water and noise pollution, damage to wildlife habitat and conflicts with other high value, low impact recreation activities—outweigh any perceived benefits from OHV use. Providing ORV trails should be a private landowner function and the federal government shouldn't compete on this.

5. Instead of expanding OHV trails, we recommend that the Forest Service focuses on facilitating more highly valued uses, such as hiking, wildlife viewing, visits to historic/cultural sites, use of highly developed recreational sites, and swimming. This can be accomplished for example by offering more hiking trails that are not open to conflicting uses by horses or mountain bikes, and more opportunities for wildlife watching. We support the Forest Service identifying, protecting and developing recreational opportunities related to cultural and historic sites, which have already been identified by the Forest Service as a niche for the WNF.

6. We also support the Forest Service in consolidating forestland within the WNF proclamation area through purchases of land from willing sellers, and recommend that priority is given to high-value riparian areas, areas with wetlands, areas suitable for wetland restoration, and areas that could help expand and restore large, continuous blocks of interior forest.

7. In addition, we recommend that the Forest Service addresses ownership fragmentation through buying conservation easements from private land owners.

8. To increase the prospects of expanding habitat for rare and endangered forest species we recommend that the Forest Service partners with other public and private land owners to create wildlife corridors that connect small remnants of still existing original forest with each other and with the emerging old growth forest.

9. We recommend that as a rule, prescribed burns for treatment of hazardous fuels on the WNF not be used, since they are ineffective in protecting home sites, and the risk of wildland fires is low on the WNF. If and when abnormal, significantly higher fire risks do develop on the Wayne, appropriate risk reduction activities should be considered on a case by case basis.

10. We recommend that any future Forest Plans provide a rigorous, focused, and complete analysis of monetary and non-monetary costs and benefits associated with different activities (including detailed budget projections), inspired by the format developed in this report.

11. Future Forest Plans should include reports on the values of different ecosystem services, and how they are affected by management activities. The values of different ecosystem services (per acre/per year) can be expected to change over time. Forest plans should keep up with new developments in ecosystem valuation. At some time, it may be appropriate for the Forest Service to conduct original studies on specific ecosystem services that may be of special importance for the WNF.

12. Instead of conducting benchmark analyses showing the largest possible timber output or OHV trail length, the Forest Service should develop benchmarks related to the highest benefits derived from the forest, for example the number and size of unfragmented interior forest blocks, the consolidation of forest land, the development of high value/low impact recreation opportunities, the reintroduction of charismatic species, the restoration and rehabilitation of disturbed lands (including wetlands and riparian areas), the rehabilitation of illegal OHV trails, and the effective enforcement of regulations on existing trails.

13. There will be jobs and income for the Forest Service and local communities from the implementation of these recommendations, but they will be different jobs with new job descriptions. For example, the Forest Service would not need experts in timber management any more, but instead would need to hire or contract with professionals trained in different aspects of ecosystem restoration, and re-introduction of rare species. People would be hired or contracted for monitoring trails and enforcing regulations. Experts in identifying, protecting and developing historic/cultural sites would be needed, and jobs and income opportunities would develop around expanding opportunities for high value/low impact recreation.

14. Currently, off-budget funds such as K-V and Salvage Sale Fund, and the Fee Demo Project, creates incentives for Forest Service managers to continue logging, mining and offering high-impact recreation such as OHV use. We recommend that Congress remove such incentives. Instead, new incentives should be created for managers to give priority to forest restoration, endangered species protection, and to increasing the capacity of the forests to provide highly valued ecosystem services, including different forms of low impact recreation.

15. We recommend that the Forest Service put together a task force that includes low impact recreation groups, wilderness advocate groups, and other interested parties to do a serious survey of areas on the WNF that might be designated Wilderness.

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