

# SHAWNEE STATE FOREST

## ECONOMIC STUDY

October 2010



**GreenFire Consulting Group, LLC**

**Study Commissioned by:**  
Buckeye Forest Council  
Ohio Environmental Council  
Sierra Club - Ohio Chapter  
Voices of the Forest

# **SHAWNEE STATE FOREST**

## **ECONOMIC STUDY**

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# Preface

In 2008, Ohio Department of Natural Resources' (ODNR's) Division of Forestry (DOF) advertised bids to log 89 acres of an area near the Day Hike Trail, rated as among the best in Ohio. Ohio Sierra Club and Buckeye Forest Council alerted their memberships, asking for emails to Governor Strickland and ODNR Chief, Sean Logan, in August 2008. Membership response approximated 2000 emails requesting that the site be spared from the proposed logging. DOF did not support our position as stated in a letter from Director Logan.

Following this decision, many hours of discussion with other environmental organizations provided a foundation for a strategic approach to state forest management oversight. Attending groups supported an economic study of the Shawnee that would examine the costs of logging and prescribed burning as well as economic benefits of environmental services provided by forests.

This economic analysis of the Shawnee State Forest was contracted with Greenfire Consulting Group LLC, as a result of concerns with the Ohio Department of Natural Resources' (ODNR's) Division of Forestry (DOF) management practices on the Shawnee State Forest.

Shawnee State Forest has experienced increased logging and prescribed burns in recent years, management practices that undermine the forest's provision of environmental services. Logging and prescribed burns have become the means of securing financial support for DOF in times of funding cuts and limited funding from the general revenue fund. This was done at the expense of biodiversity and environmental services, as this report reveals.

This study offers insight into the management of the Shawnee, economic costs and consequences of current management practices, and recommendations to manage for the much more valuable environmental services that Ohio's state forests can provide. As such, while the report's focus is on Shawnee State Forest, its recommendations have application to all Ohio state forests.

Trees may be renewable, but 21<sup>st</sup> century forests are not. With the depletion of soils over two centuries, increasing levels of logging, prescribed burns, spread of non-native invasive species (NNIS), air pollution and, most importantly, greenhouse gas emissions and resulting changes in climate beyond the capability of the planet to remedy, Ohio forests are facing great and rapidly escalating challenges.

At the present, "sustainable" is used by DOF simplistically and erroneously to suggest that if more wood grows than is taken out of the forest that its management is "sustainable." This ignores habitat loss and other ecosystem disruptions, nutrient and soil loss, decades-long carbon emissions following disturbance, promotion of NNIS, and other negative consequences of "harvesting" trees. Ecosystem services, such as protection of native biodiversity, air purification, flood control, low-impact recreation, and climate regulation, which are only possible if forests are left intact, are rarely addressed by DOF.

Ecological principles have generally been overlooked by DOF. The report's overarching message is to encourage ODNR and DOF to develop a comprehensive state management plan that considers the relationships among public and private forests for protection of biological diversity, and is based on a biological inventory of plants, animals, and other life forms. Such a scientific approach would provide the basis for more cohesive management based on the ecological strengths and needs of Ohio forests.

Ohio forests must be allowed to provide the critical environmental services of climate regulation and carbon sequestration at a time when greenhouse gas emissions are spiraling out of control on our planet. As the devastating death toll from Pakistan's recent floods highlights, water regulation from intact forests is also essential to the life and wellbeing of a region's inhabitants.

It is our hope that this document will serve to promote protection of Ohio's public forests from logging, prescribed burns and other destructive management practices. As its authors have shown, intact forests provide essential services and benefits critical to the people of Ohio. These services and benefits are of vastly greater value to the public than are logging and burning.

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## **II. Executive Summary and Recommendations**

### **1. Summary**

This study by GreenFire Consulting Group, LLC was commissioned by Buckeye Forest Council, Ohio Environmental Council, Sierra Club—Ohio Chapter, and Voices for the Forest. It addresses the question whether it is time to rethink the mission and goals for the management of Ohio state forests and especially Shawnee State Forest.

#### ***FRAMEWORK OF ANALYSIS***

Traditionally, the role of government has been to step in where private entrepreneurship and initiative alone cannot be relied on to meet important needs of society. Based on this line of thinking, public forest management should focus on the achievement of goals and benefits that cannot be expected to be delivered by forests in private ownership.

Another premise of this study is that public forest management should focus on those services and benefits to the public for which there is the greatest need and that are of highest value to society, rather than focusing on services and benefits for which there is already an abundant supply.

An important aspect of any economic study is the analysis of costs associated with providing public services and benefits. Those costs may be monetary (like appropriations to the state forest fund used to pay employees) or non-monetary (like air pollution and soil erosion impacts of prescribed burns). Obviously, goals and implementation strategies should be chosen in such a way that benefits to society outweigh the costs associated with any benefits.

#### ***CORE MISSION OF THE STATE FOREST SYSTEM***

The core mission of the state forest system has been summarized by DOF as “long-term forest management, demonstration of proper forestry practices, and revenue production.”

Currently, on the Shawnee State Forest, 81.4% of the forest area is managed for timber; 13% is dedicated as wilderness area where no logging occurs. In areas under silviculture, conflicts between recreation and silviculture are usually resolved in favor of silviculture, that is, recreational trails are closed or rerouted, and clearcuts and prescribed burns happen along trails. Some “screening,” or hiding logging from general public view, occurs along forest roads and around Shawnee State Park. Natural areas make up 1.8% of the forest area.

From FY1998 to FY2009, 25.7 million board feet of timber were taken out of Shawnee State Forest. Selective cuts were conducted on 1,573 acres of the Shawnee. Timber sales involving only clearcuts were conducted on 996 acres, and timber sales that involved both selective and clearcuts happened on 3,744 acres.

## ***HISTORICAL REORGANIZATIONS OF THE STATE FOREST SYSTEM TO ACCOMMODATE RECREATION AND ENVIRONMENTAL PRESERVATION***

The history of Ohio's state forest system shows that Ohio's legislature has responded to conflicts that tend to emerge between management of state forests for timber and their use for recreation. The legislature also responded to the public's increased desire for environmental preservation. As a result, some state forest land was completely removed from timber management in the 1940s (turned into state parks) and 1970s (land set aside for protection of rare and endangered species).

## ***FIGHTING WILDFIRES PART OF DOF MISSION SINCE 1920s***

Fighting wildfires in and around state forests has, according to DOF, been an important part of DOF's mission since the 1920s. Common causes of forest fires in Ohio have been identified as careless debris burning, arson, children, campfires, equipment, and smoking. These wildfires are thus primarily human-caused.

## ***PRESCRIBED BURNS ON THE SHAWNEE – A PARADOX***

After having fought accidental wildfires caused mostly by humans for decades, DOF has recently started to conduct prescribed burns on state forests. According to DOF, prescribed fire is used on the Shawnee as a "tool" to manipulate habitat and reduce dangerous fuel loads in an attempt to pre-empt wildfires.

This new development is contrary to positions held by DOF just a few years ago. In line with the fact that naturally occurring fires are rare and statistically insignificant in Ohio, DOF had stated as recently as its 1999 Shawnee Wilderness Plan that there is no natural role for fire in Ohio's forests, in contrast to forests in the American West.

In that document, DOF also addressed the concern that fire suppression policies may result in a heavy fuel build-up that could eventually lead to more damaging fires. DOF stated: "The forest ecology is much different in eastern Appalachian hardwoods such as Shawnee State Forest versus the western forests. In the West, fuels will indeed accumulate and frequent fire will prevent the serious damage of an occasional, large, crown fire. In Ohio, potential fuels decompose with sufficient speed to prevent dangerous fuel buildup levels."

DOF then logically concluded, "The facts given on fire being primarily human caused, combined with the need to protect wilderness soil, forest resources and adjacent private property points to a fire plan that involves suppression of all forest fires. Planned prescribed burns or 'let burn fires' are not necessary for fuel reduction. (Prescribed burns during an off season can cause as much tree mortality as fast-burning fires during peak fire season)." This assessment is in line with other sources that we found on this topic.

Between 1999 and 2005, DOF completely reversed its position on the role of fire in Ohio's forests and on the need for prescribed burns. This U-turn resulted in the 2005 strategy document that deals with areas on the Shawnee damaged by the 2003 ice storm. In this document, DOF claims the build-up of hazardous fuels from ice storm debris. In addition, forest managers now identify fire suppression and the resulting lack of disturbances through fire over the past 70 years as a cause for an observed decline of oaks and an increased occurrence of supposedly fire-intolerant species in the understory. The 2005 strategic plan calls for "low-intensity" prescribed

burns in areas damaged by the ice storm, to help oak regeneration and reduce dangerous fuel loads. The plan states that these “treatments” may have to be repeated several times to achieve the desired results of oak “regeneration.”

In April 2009, a wildfire began in close proximity to a DOF prescribed burn that did great damage to the Shawnee State Forest. Costs were huge in loss of trees, damage to the ecosystem and human health, and costs of firefighting. While DOF claims the fire was caused by arson, citizens suspect that it escaped from the prescribed burn. To this date, there has been no independent investigation into the cause of this fire.

### ***SHAWNEE STATE FOREST IS A MIXED MESOPHYTIC FOREST***

In DOF’s 2005 strategy plan for the Shawnee’s ice storm damaged areas, an explicit goal is to prevent conversion of the now supposedly oak-dominated forest to a mixed mesophytic forest, which is actually the climax forest for this area. Mixed mesophytic forests are dominated by beech, tulip, basswood, sugar maple, chestnut, sweet buckeye, red oak, white oak, and hemlock. A mixed-mesophytic forest also contains other more or less abundant tree species, including birch, black cherry, cucumber tree, white ash, red maple, sour gum, black walnut, and hickory, among many others.

It is hard to see how pursuit of the goals established in the 2005 strategy plan could be connected to any legitimate public need for which it is worth spending taxpayer funds and committing state resources. What need is there to “restore” an oak forest that would not occur naturally, and to systematically fight the forest cover that would naturally establish itself?

Besides being a highly questionable goal, there are also significant questions among scientists about the effectiveness of promoting oaks through prescribed burns.

### ***POSSIBLE REAL REASONS FOR OAK DECLINE***

Assuming that fire really does less damage to oaks than to other trees, one would expect oaks to have become more abundant as a result of frequent human-caused fires prior to the 20<sup>th</sup> century. As a result, oaks could have had a head start over less fire-tolerant species when fire suppression started in the 1920s, and this could explain why they may now be more dominant in many eastern forests. However, since the region is of the mixed–mesophytic forest type, we should expect that with human-caused fires largely under control and fires caused by lightning rare in Ohio, a gradual, natural shift in species composition away from oak dominance would occur over time.

However, there are also some real concerns about levels of white oak death recently observed in southeast Ohio. DOF itself, in its Shawnee Open House documents, has pointed out multiple stress factors (drought, insects, ice storm, etc) over the past ten years, which could explain this sudden increased oak mortality.

Oaks may indeed be weakened (and therefore more susceptible to insects and diseases) by a number of factors, including air pollution, changing global climate conditions, as well as by repeated logging and burning that have depleted and diminished topsoil and radically changed forest ecology, factors that are not considered by DOF.

## ***POSSIBLE REAL REASONS FOR PRESCRIBED BURNS ON THE SHAWNEE STATE FOREST***

We posit that it is unlikely that forest ecology in the East changed so drastically in the few years between 1999 and 2005 as to explain DOF now taking positions on fire opposite to its 1999 stance.

The study includes a chronology that shows how DOF systematically not only built up its capacity to conduct prescribed burns on state forests but also positioned itself to provide training and certification for prescribed burns to other public agencies and fire departments around the state.

A possible explanation for this new strategy and the otherwise paradoxical U-turn the agency took on prescribed burns may be found in fiscal realities DOF faced during that time period. Federal grants were generally greatly reduced in the late 1990s but DOF knew that federal grants would be increasingly available for fire suppression programs. The desire to maintain funding for the agency is explicitly stated as a reason for participation in the in the National Fire Plan initiatives in a document we obtained from DOF.

## ***“FOREST HEALTH” ACCORDING TO THE MODEL OF INDUSTRIAL FORESTRY (SILVICULTURE)***

Currently, Ohio’s state forests, with exceptions mentioned above, are managed for industrial timber, that is, for a continuous supply of timber to satisfy the demand of wood-processing industries for straight, tall, and large-diameter trees.

A forest managed for industrial timber production is considered healthy when it accommodates the output of such trees and guarantees its owner a good rate of return on investments. Those investments may include any measures that aim to foster the rapid growth of straight, tall, large-diameter trees, for example by spraying herbicides to fight competing vegetation and cutting small and odd-shaped trees to make room for larger, well-shaped ones.

In the industrial forestry model, trees are declared mature for harvest based on considerations of optimal financial return. That point of optimal financial returns comes when trees have reached a certain age, after which their growth rate will slow. For many tree species, this optimal age is reached when they are about 80 years old. A tree not harvested at that point is labeled as over-mature, even though its natural lifespan could be 300 years and more.

Another telltale sign of industrial timber production is the emphasis on “salvaging” trees damaged by wind and ice storms, fire, drought, flood, insects and diseases. Trees that die naturally and slowly decompose would be considered a waste. Trees that are damaged and whose growth therefore slows are also undesirable.

The management of a forest to optimize the number of harvestable trees over time is the hallmark of silviculture. That means that harvests are planned in such a way that there emerges an even distribution of age classes (up to the age of maturity) across the forest, making harvest volumes and revenues somewhat steady and predictable over time.

To reduce costs associated with logging (which involves building logging roads and trails and using large machinery for cutting and transporting trees), it makes sense to plan for trees of each age class to grow in close proximity to one another rather than being spread out through the forest. This is achieved by clearcutting, where all trees above a certain size in an area are cut at once and the area then prepared for a new “crop” of even-aged trees to mature on that site.

Industrial Forestry practices (silviculture) are outlined for the state forest system in DOF’s Land Management Manual, and other documents referenced in the Manual.

While industrial forestry maximizes output of industrial-grade trees, it weakens the forest ecosystem as a whole, depletes nutrients in forest soil, and decreases the forest’s integrity and natural resilience, rich biodiversity, ability to produce and maintain rich layers of productive forest soil, and capability to provide ecosystem services, such as air purification, climate regulation, water retention, water flow regulation, and water purification.

### ***FOREST HEALTH FROM AN ECOLOGICAL PERSPECTIVE***

Signs of forest health from an ecological perspective would be the presence of large tracts of unfragmented interior forests with multilayered canopies that are the result of small-scale natural disturbances, resilience of a forest in response to natural disturbances, a rich biodiversity of early and late successional species and of species with small and large space demands, and thick layers of organic forest soil. This kind of forest doesn’t need much in terms of management. What it most needs is the absence of human disturbances.

In a more natural forest ecosystem, damaged, weakened, dead and decaying trees have important ecological functions. They replenish and stabilize the soil, help retain and purify water, and create habitat for many forest species. Trees that are considered “over-mature” in the industrial model produce mast and shelter for various forest species for possibly hundreds of years and protect smaller trees from heavy storms.

The question for this study is what kind of forest makes more sense in light of the benefits and services they provide. What services and benefits are needed more or are scarcer? What services and benefits are more valuable?

### ***CERTIFICATION AS CONTINUATION OF STATUS QUO***

Certification of forests has the purpose of assuring the buyer of wood products that the wood has been sustainably harvested. Certification is likely to increase the price at which wood is sold and therefore benefits forest owners, wood processors, and retailers.

DOF is seeking certification from two certifying agencies: Sustainable Forest Initiative (SFI) and Forest Stewardship Council (FSC). We found that the two certifying agencies differ somewhat in their requirements and procedures, with FSC having stricter standards and a higher degree of independence from the timber and timber processing industries than SFI.

However, certification does not change the basic premises under which the state forest system has been operating. Using the word “sustainable” in the context of certification is just another way of saying that the goal is a continuous supply of timber over the years. Certification is in line with the current mission of DOF.

## ***WHAT PUBLIC BENEFITS RESULT FROM FOREST LOGGING?***

We assessed several benefits that the practice of silviculture on state forests is supposed to bring to Ohio. The framework for this assessment, as stated above, includes the question of whether a service or benefit can be provided by private forests, how highly valued a service or benefit is, and what the costs are of providing the benefit or service.

DOF highlights the following benefits:

### **a) Timber as input to the wood processing industries.**

**Assessment:** Trees logged on all state forests make up only 2.6% of all timber harvests (in board feet) from Ohio, and, even assuming all that wood stays in Ohio, these harvests are not significant economically in supplying the wood-processing industry. They could fairly easily be compensated for by wood from private lands.

### **b) Employment in timber and wood processing industries.**

**Assessment:** Logging and wood processing are not economic drivers in counties that contain Shawnee State Forest (Scioto and Adams counties). As far as employment and income associated with logging and wood processing industries is concerned, Adams County receives less than 1% of county income from forestry; for Scioto County no number is published. Wood processing in Adams County reaches 2.4 % of county income; in Scioto County the number is 1.18% for the year 2007. Industrial timber inputs, as far as they are actually processed in the state of Ohio, come mostly from private forests, and most of the timber from Shawnee State Forest is exported. Since private forests could easily supply the amount of wood now taken from state forests, there would be no negative employment or income effects if logging on Shawnee State Forest ceased or was reduced.

### **c) Timber revenues distributed to counties, townships and schools.**

**Assessment:** Timber revenues are distributed on a yearly basis among the Ohio General Fund, DOF, and among the counties, townships and school districts where logging took place. Timber revenues for specific schools and townships in Adams and Scioto Counties vary considerably from year to year, including years when there is no revenue from timber. In other words, timber revenues are not a reliable source of funding and, for most of these entities in most years constitute a very small percentage of overall budgets. For Adams County schools, the highest percentage from 2004-2007 was 0.011 percent. In Scioto County, one school received close to 2 percent of its budget in stumpage in one year; in all other years Scioto schools received between 0.05 and 0.95 percent. For counties and townships, the percentages are smaller than 0.1 percent in most cases and between 0.1 and 1 percent in some others. There is one exception: Nile township ranged between 3.6 and 20.6 percent between 2004 and 2007, probably due to the ice storm salvage sales.

Before distributing timber revenues to local counties, DOF subtracts costs associated with timber sales. The net amount is then distributed. We found that the costs that were subtracted between 1998 and 2007 were not anywhere close to the actual costs of practicing silviculture. Therefore, the net return from timber for distribution among local governments is made to look larger than it actually is. The actual costs of practicing silviculture then have to be covered by other revenue sources besides timber, most likely by Ohio general revenue funds appropriated to DOF. In other words, a portion and in some cases maybe all of the money distributed to local counties is actually financed by taxpayers, not by timber revenues. Instead of running the money through

DOF, Ohio legislature could give it directly to schools in need and provide them with more regular and predictable financial support.

### ***DO TIMBER REVENUES COVER COSTS?***

We attempted to determine whether revenues from logging Shawnee State Forest actually cover the costs associated with logging, in other words, whether logging is a burden on the taxpayer. We were not able to obtain necessary data from DOF to answer this question, since the Division doesn't track expenditure data for individual forests in a way that would allow it to assign expenditures to a particular program, in this case the timber program.

However, with the documents we received from DOF, we were able to do some rough calculations comparing timber revenues and timber costs for all of the state forests. The results indicate that in some years, revenues do not seem to cover costs.

### ***LARGE BLOCKS OF INTERIOR, MATURE FOREST – NOT AVAILABLE ON PRIVATE LANDS***

Based on the assumption that public forests should specialize in providing benefits that cannot be provided by private woodland owners, we looked at the sizes of Ohio's public and private forests. Private forests are generally small, with little continuity in management between parcels. Public forests are larger; Shawnee State Forest is the largest of all Ohio state forests. This makes public forests uniquely qualified to provide one of the most endangered habitats - large tracts of unfragmented interior forest land. For some species of mammals and birds, the size of habitat determines whether they survive as a species. Fragmentation of habitat is considered to be one of four major threats to our forests and rangelands that impair ecosystem functions and biodiversity. Currently, the opportunity to provide large tracts of undisturbed forestland is not fully utilized on state and federal forests because logging continues.

### ***EARLY SUCCESSIONAL HABITAT FOR WILDLIFE –PLENTIFUL ON EASTERN FORESTS***

DOF presents clearcuts, and logging in general, as instruments or tools to achieve wildlife benefits. Disturbance created through removal of large trees and the subsequent growth of young trees and other vegetation are indeed conducive to certain species that need early successional habitat. DOF asserts that without this disturbance there would be too little of this habitat type. DOF has therefore set a goal of 20% in early successional habitat, a goal in line with a plan from the Division of Wildlife.

**Assessment:** DOF is correct in stating that some species will benefit from clearcutting. However, if there were no logging, there would be more room for interior forest and late successional species. Early successional habitat would not be absent, it would still be generated by natural disturbances, like ice storms, floods, droughts, insects and diseases, and by the natural death of large, old trees on both private and public forest.

Which habitat type is scarcer? In the 2007 Update of the 2000 Renewable Resource Planning Act Assessment (RPA), the United State Forest Service points out that in the eastern U.S., 23 percent of all timberland is between 0-20 years old. Only 4% of all timberland in the East is between 100-199 years old, and the age class of >200 years is listed as 0%.

What is rare, and unlikely to be provided by private forest owners, are large, interior tracts of unfragmented late successional forest lands. The goal of having 20% of state forest land in early successional habitat adds more to what is already relatively abundant, rather than expanding what has become increasingly scarce.

### ***OLD GROWTH FOREST ALMOST EXTINCT IN THE EAST - MANAGED TIMBER LAND ABUNDANT***

Old growth forest that remains in the eastern United States is usually on very small tracts in private ownership. As was shown above, forests older than 200 years register with zero percent in a comparison of forest age classes. Only 4% of all forests are in the 100- to 199- year age bracket, which, if left undisturbed by logging, might develop into an old growth forest a few hundred years from now. Old growth forests are not only defined by the age of some of their trees but have other characteristics that set them apart from younger forests managed for timber:

- **Presence of Trees of Commercial Value** in all age classes (evidence that they have not been logged).
- **Uneven-Aged Canopy Structure.** Eastern old-growth forests are generally characterized by trees of all ages and diameters, in fine-grained distribution all across the forest caused largely by small-scale natural disturbances.
- **Downed Logs.** Coarse woody debris and logs on the forest floor from trees of various ages and sizes and in various states of decay. These logs contain much of the nutrients present in a stand, are important in maintaining forest hydrology, and function as important wildlife habitat.
- **Standing Snags.** Standing dead trees are a prominent element of the old-growth forest. Snags perform many of the same ecological functions as do logs and are a vitally important component of the ecosystem.
- **Pit and Mound Topography.** When trees are thrown, their root mat and associated soil are ripped from the forest floor, creating a pit or depression. As the root ball decays, the soil is loosened and falls into a mound adjacent to the pit. These pits and mounds are important in forest nutrient cycling and understory diversity but are generally absent from human-disturbed forests.
- **Undisturbed Soils.** Old-growth forests typically have soil that is not compacted and is high in organic matter, with a thick organic layer and considerable numbers of ferns, mosses, and fungi.
- **Ecosystem Stability.** In most old-growth forests, mortality generally balances growth, and nutrient input is roughly equivalent to nutrient output, whereas in forests managed for timber, nutrients have been depleted.
- **Diversity of Plants and Animals.** Old growth hardwood forests have an abundance of ferns, mosses, and fungi, and a diversity of understory herbs. In addition to plants, there is a variety of other species associated with old-growth stands. Certain species of

salamanders, soil invertebrates, small mammals, songbirds, and black bear are often found in much greater abundance in old-growth stands compared to younger stands.

### ***NON-NATIVE INVASIVE SPECIES – THRIVING IN DISTURBED AREAS***

Non-native invasive species have been identified as a major threat to native biodiversity. They tend to establish themselves and spread in areas of soil disturbance. Logging and burning create conditions favorable to the establishment and spread of non-native invasive species.

### ***A DIFFERENT MODEL FOR SHAWNEE STATE FOREST – PROVIDING PUBLIC BENEFITS FROM INTACT FORESTS***

The practice of silviculture, for the most part, conflicts with and diminishes the delivery of a variety of benefits that intact forests provide. These benefits include native biodiversity, protection and restoration of endangered species habitat, soil stabilization, water storage, water purification and regulation of water flow, air purification, non-naïve invasive species control, carbon storage and sequestration, and recreation as well as taxpayer benefits.

We have shown above that unlike timber revenues' insignificant impact on schools or the wood processing economy, DOF has the potential to make a significant contribution to maintaining and increasing biodiversity by providing habitat that cannot be found on highly fragmented private lands in the East. The value of public forest land allowed to develop into an old growth forest on large uninterrupted tracts and the resulting protection and expansion of native biodiversity far exceed the value of this land for timber, based on the scarcity of this forest type and the high value that the public associates with protecting rare and endangered species and endangered biodiversity.

Economists have found ways to measure the value of these services, even if market values are not readily available. The most valuable of all ecosystem services, according to an in-depth 2005 economic study on the value of ecosystem services, is the protection of biodiversity. The value of this ecosystem service alone far exceeds the value of the forest from timber. When other services like air pollution control and water related services are added, the value of forests from provision of ecosystem services increases even further.

### ***THE NEED FOR ECOSYSTEM SERVICES - BIODIVERSITY***

The scarcity of large tracts of unfragmented interior forest habitat in southeastern Ohio and resulting diminished biodiversity are highlighted in a biodiversity assessment of that region, conducted by the World Wildlife Fund. The mixed mesophytic forest ecoregion is considered one of the most biologically diverse temperate regions of the world. However, over 95 percent of this habitat, perhaps more, have been converted or degraded at some point in the last 200 years, with fragmentation being the highest in southwestern Pennsylvania and Ohio. Most large blocks of this forest presently occur in federal and state forests, wilderness areas, and state natural areas. However, management plans do not strictly protect them but allow logging that is accompanied by road building and other ecologically damaging practices. Logging and development are primary threats to these forests and the biodiversity associated with them.

With its current mandate of producing timber and generating revenue, DOF is not likely to take the measures necessary to not only protect rare and endangered species where they are today but to actively advocate for provision of more habitat that is suitable for them. The current DOF

practice of identifying sites where rare species exist, and then “protecting” these sites but logging all around them, is not helpful in facilitating the re-establishment of those species in sites where they cannot presently be found.

With regard to the more limited goal of protecting sites where rare and endangered species can be found today, we could not verify that DOF has the staff or procedures in place to actively look for and identify those sites. For identifying sites with rare species DOF relies on a DNAP database that seems to be in urgent need of updating. In addition, we found evidence that endangered species were identified in or close to logging sites, but no indication that logging was stopped or protective or mitigation measures taken.

### ***EFFECTIVE MEASURES TO PROTECT NATIVE BIODIVERSITY***

There is potential for increased protection of biodiversity by linking secondary forests (forests that have regrown after being logged) with remnants of old growth forest, so that source populations of rare species in undisturbed forest fragments may become imbedded in adjacent, re-growing large areas of secondary forests. To facilitate this process, linkage areas have to be protected, as well as large core areas of secondary forest.

### ***THE NEED FOR ECOSYSTEM SERVICES – AIR***

Southeast Ohio, the area of the Shawnee, receives heavy air pollution, especially particulate matter. Both Adams (in part) and Scioto counties are considered in non-attainment for particulate matter. Shawnee forest management removes vegetation that would be valuable for purifying the air. Moreover, timber management actually adds to air pollution through prescribed burns, which have adverse health effects, especially for people living close by.

### ***THE NEED FOR ECOSYSTEM SERVICES – WATER***

Streams in the Shawnee forest area seem to be in comparatively good condition. However, the area experiences a lot of flooding, causing damage even on the forest itself. Intact forests have the capacity to intercept and hold rainwater, especially if the soils are rich and deep in organic matter and are uncompacted. Shawnee forest management, through logging operations and burning, compacts the soil, diminishes the organic soil layer and removes vegetation. As a result, the forest is less capable of intercepting, holding and slowly releasing rainwater, thus increasing flooding risks.

### ***THE NEED FOR ECOSYSTEM SERVICES – CLIMATE CHANGE MITIGATION AND CARBON SEQUESTRATION***

None of the ODNR publications we analyzed for this study addresses global climate change. Climate change poses two distinct problems – how forests may adapt to it, and how forests could help to reduce the build-up of carbon dioxide in the atmosphere.

Climate change will likely affect the Shawnee State Forest through introduction of new diseases and damaging insect species, more frequent droughts, and changes in tree species composition. Any predictions, at this time, of what the climate in this region will be in the future and what tree species may be best suited to the changing climate are highly speculative. There is some potential for forests to be so weakened by changing climate conditions that they might die on a

large scale and thus further release large amounts of carbon into the atmosphere. The potential for such a catastrophe might be lowered by choosing the right path for adaptation.

Given uncertainties as to how climate change will play out regionally, it seems reasonable to allow nature itself to govern the process of adaptation, because a forest with minimal human disturbance will likely be best suited to weather the storm of climate change. The mixed mesophytic forest that dominates the Shawnee State Forest area is rich in species diversity. If left unlogged, this forest will be composed of a large number of different tree species in different age groups. Each of these species may have different potential for thriving under new climate conditions and may be present in sufficient numbers to occupy niches left by species that won't do as well. Reducing outside impacts on forests should include drastically reducing air pollution, especially from coal-fired power plants, which is weakening forests.

Another issue is whether appropriate management of the Shawnee and other state forests could help increase carbon storage and thus contribute to a slow-down in the increase of global temperatures. Research shows that older forests do not only store, but also sequester more carbon than younger forests. This research suggests that trees should be allowed to grow old, and forests to develop naturally, for the purpose of mitigating climate change.

Another way of increasing carbon sequestration is reforestation, or turning of non-forest land into forest land. Helping private land owners reforest had been a DOF mission in the past and may become more important in the future again as a means to increase carbon sequestration. The DOF itself could expand state forestland by acquiring and reforesting agricultural land.

The drive to use forests for the production of biofuels and electricity is likely to lead to increasing withdrawals of Ohio's forest biomass. This increases the urgency for Ohio's state legislature to take a stand and to clearly establish that the use of state forests should provide valuable public benefits and services that cannot be provided by private forests. As markets for woody biomass develop further, pressure on native biodiversity will increase, and public forests will be even more valuable as refugia for native species than they were before.

### ***THE NEED FOR ECOSYSTEM SERVICES – RECREATION***

Shawnees State Forest offers a variety of recreational opportunities including bridle trails, hiking and backpacking trails, trails through back country and wilderness areas. However, these activities currently do have to accommodate silviculture. When there is logging and burning going on, trails may be closed or re-routed, and frequently logging and burning happen right up to recreational trails.

## **2. Recommendations**

### **Recommendation 1:**

Abolish stumpage payments to counties, townships and schools, and replace them with regular, predictable contributions from the general revenue fund.

#### Rationale:

Stumpage payments to individual local entities are generally very small compared to total budget and are unreliable. In most years, they have been at least partially financed by general revenue funds, since the net timber revenue out of which they are paid was overestimated (direct timber costs were underestimated).

### **Recommendation 2:**

Ban commercial logging from Ohio state forests. Instead, give DOF a mandate to protect and expand native biodiversity, recreation and ecosystem services.

#### Rationale:

There is no legitimate role for government in producing goods or services, like timber, that could just as well be provided by private initiative. However, when it comes to protecting biodiversity, private land holdings cannot be expected to halt and reverse the trends of species extinction, due to their small size and increasing fragmentation. Shawnee and other state forests, due to their size, would be well suited to ensure the survival, re-establishment and thriving of rare and endangered native species, and it would be a proper role for state government to own and protect forests for that purpose, as well as for the provision of other ecosystem services. The greatest economic benefit to the people of Ohio, at this time, comes from intact public forests and the ecosystem services they provide, not from logging.

### **Recommendation 3:**

Stop all prescribed burning on public forested land.

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#### Rationale:

The justifications for prescribed burns – halting a decline of oaks that is supposedly due to fire suppression, and reducing fuel loads from the 2003 ice storm – are not supported by science. This new DOF approach contradicts previous DOF statements that there is no natural role for fire and no need to reduce fuel loads with prescribed burns on eastern forestland.

### **Recommendation 4:**

Account for the true costs of the timber program.

#### Rationale:

We requested but were not given a detailed breakdown of costs associated with silviculture on the Shawnee State Forest. We were told that such calculations do not currently exist. It was therefore impossible for us to assess exactly what silviculture on the Shawnee State Forest costs taxpayers. What we were able to determine by analyzing summary data for all state forests, is that the published costs (that are deducted from timber revenue before it is distributed among local governments) very likely don't come close to the actual costs of the program, and in some

years, were higher than revenues. It is possible that with complete information about all costs reasonably attributed to timber (which we did not have), the Ohio legislature will determine that timber revenues do not cover costs in most years. If this turns out to be the case, there would also be a strong fiscal reason to halt silviculture on Shawnee and other state forests.

**Recommendation 5:**

Promote late, not early successional habitat.

Rationale:

DOF is currently putting great emphasis on the need to create more early successional habitat, which is habitat that develops after clearcutting. Early successional habitat also results from natural disturbances like ice storms. Due to intense logging, early successional stages exist in abundance on eastern forests, while late successional stages, forests that are more than 200 years old, register as 0%. There seems to be no logic or common sense in creating more of something of which there is already a lot, while actually undermining and further reducing that which is in extremely short supply – large expanses of unfragmented older forest.

Protected from logging and burning, this late successional forest will develop on its own; it won't need much in terms of human management. What is needed is the expertise of biologists who can direct re-introduction efforts for rare and endangered species and who can advise on creating linkages and corridors of forest remnants that have high biodiversity with second-growth forests that are currently devoid of such biodiversity.

**Recommendation 6:**

Conduct an independent investigation into the cause of the April 2009 wildfire on the Shawnee State Forest. Establish the costs of this fire with regard to forest values lost and costs of fighting the fire.

**Recommendation 7:**

To increase carbon sequestration, stop logging state forests and allow them to grow old. Promote and support reforestation of private lands and add agricultural land to the state forest system for the purpose of reforestation. Do not allow state forest biomass to be used as a fuel.

Rationale:

Research shows that forests are important carbon sinks, and that older forests store and sequester more carbon than younger forests. Logging can lead to net carbon emissions for decades and sometimes centuries. Burning so-called logging waste to generate electricity will create more carbon emissions within a shorter period of time than if that debris is left behind in the forest. Prescribed burns do the same. Logging and burning need to stop so state forests can serve as effective carbon sinks during this critical time, when efforts are under way to keep global temperature increases to 2°C above pre-industrial levels.

**Recommendation 8:**

Do an analysis to determine if DOF is in compliance with the Endangered Species Act (ESA) and other state and federal laws regarding the Indiana bat and other endangered and threatened species.

Rationale:

The Indiana bat management plan raises serious questions about DOF's current ability to bring about recovery of this indicator species.

**Recommendation 9:**

Do a thorough inventory of all plant and animal and other life on all Ohio state forests.

Rationale:

This inventory will greatly help in efforts to protect and to re-establish rare and endangered species, including the Indiana bat, across the Ohio state forests.

**Recommendation 10:**

Initiate regional planning for the protection and expansion of rare and endangered species habitat.

Rationale:

Important protection and restoration measures such as creating corridors between patches of old growth and second growth forest cannot always be taken by one entity alone, but may require cooperation from federal, state, county, non-profits, and private land owners.