PINE CREEK HISTORIC FOREST RESTORATION PROJECT

Environmental Analysis

Ironton Ranger District

Wayne National Forest

Chapter One

Photos from top right show damage from 2003 ice storm, a managed forest with healthy regeneration following thinning and fire, and prescribed fire.

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INTRODUCTION

This chapter presents the reasons for developing and analyzing this project proposal. It also defines the scope of the decision to be made, discusses compliance with federal laws, and describes other decisions which affect the scope of this decision.

Context of project area at Ironton

The Pine Creek Historic Forest with Off Highway Vehicle (OHV) Management area on the Ironton Ranger District lies west of State Highway 93 beginning in the vicinity of Telegraph Road and extending to approximately Wolcott Hollow and Howard Ridge on the south. A long history of mining has shaped the vegetation and land disturbance in the area. In the late 19th century several iron furnaces operated in the area, requiring vast supplies of timber for charcoal, limestone and coal. A network of roads was developed over 100 years ago and many are in use today (see Project File 8-14).

The Pine Creek Historic Forest Restoration Analysis area, including the Kosmos analysis area to the south, is 28,202 acres, of which 18,260 are national forest and 9,079 are in private ownership. The upper ½ or approximately 14,000 acres in the Historic Forest w/Off-Highway Vehicle (OHV) management area were analyzed for their current and desired future. Over 17,500 acres are in hardwood forest types and 11,300 acres are greater than 60 years of age (see Project File Table 4).

Lawrence County - Decatur T3N R18W and Elizabeth Township T2N R18W.

Scioto County - Vernon Township T3N R19W.

Concurrent analyses

The District interdisciplinary team saw a need to treat the historic forest to restore ecological conditions (see Purpose and Need below); at the same time they also saw a need to analyze user-developed OHV trails in the Historic Forest Management Area and the adjacent Diverse Continuous Forest management area to the south. The Kosmos OHV Trail Addition analysis took place concurrently by the same interdisciplinary team members in an area overlapping the Pine Creek analysis area in the vicinity of the Wolcott Trailhead and Howard Ridge. Proposed actions for each project were considered in the cumulative effects for the other. Approximately 5.6 miles of existing OHV trail will be used as skid or haul roads during harvest operations. Numerous other OHV trails will be used temporarily as fire lines. The analysis for these two projects overlapped in time because increasing mortality in the Pine Creek drainage due to damage caused by an ice storm four years ago drove us to plan a silvicultural treatment project in that area. The need to respond to economic conditions which point to the suitability of the Hanging Rock area for additional OHV trails miles in Historic Forest and the adjacent Diverse Continuous Forest management area has driven us to plan the Kosmos project at the same time (See notes on team discussion in Project File 2-3 and a summary in 2-15).

The Kosmos analysis in its entirety is included as a reference in the Project File, as is the Wayne National Forest Forest-wide Non-native Invasive Species EA and Decision Notice (see Project File, 9-5and 9-6).

The Ironton District Ranger (decision maker) and the interdisciplinary team considered including both projects in the same analysis because a portion of both project areas is adjacent to the other and because both proposals are being considered at about the same time. After some consideration and initial analysis it was decided that analyzing the two project proposals together would create a complicated array of alternatives and complicate the effects analysis. At the same time the interdisciplinary team was directed to be sure that the actions of both proposed projects be adequately covered in the cumulative effects analysis of both projects. Chapter Three of this Pine Creek Restoration environmental analysis includes references to project activities in the Kosmos Trail Addition EA, which includes designation of existing closed roads as OHV trail and construction of 7 miles of new trail. Project activities overlap when harvest or prescribed burning activities require access or occur adjacent to existing or proposed OHV trails.

Specialists analyzing each resource will determine the significance of past, present, and reasonably foreseeable future activities in the cumulative effects analysis.

Other projects in vicinity

Other projects being implemented in the vicinity include the Young's Branch and Darby Creek prescribed burns, salvage harvest from the 2004 Heavy Fuelwood Decision Memo, and heavy maintenance on the Pine Creek OHV Trail. Other projects occurring elsewhere on the District include the Buckhorn Restoration harvest activities, continuing maintenance of campgrounds, trails and roads, and watershed restoration in Kimble Creek and Lawco Lake. These projects are considered in the cumulative effects analysis for both the Kosmos and Pine Creek analyses.

New Forest Plan

The Wayne National Forest began implementing its Revised Land and Resource Management Plan (2006 Forest Plan) beginning in March 2006. The Forest Plan and accompanying Environmental Impact Statement (FEIS) and Record of Decision (ROD) specify the overall direction for managing all resources on the Forest and consist of forest-wide and site-specific goals and objectives, standards and guidelines that provide for land uses with anticipated resource outputs. The Forest Plan and its parts are included in the Reference section of the Project File.

PURPOSE AND NEED

The 2006 Wayne National Forest Land and Resource Management Plan prescribed a desired future condition and a management prescription for each of 14 management areas on the Forest. National forest ownership west of State Route 93 and north of Wolcott Run on the Ironton Ranger District is in the Historic Forest with Off-Highway Vehicles (OHV) Management Area. The Pine Creek project area was chosen based on the high percentage of acres in older forest in the area and the need for treatment following the 2003 ice storm in southern Ohio. The desired future condition of this management area is a mix of vegetation more nearly resembling the historic range that existed prior to 18th/19th century settlement and development. The pre-settlement forest would have primarily been in a Fire Regime Condition Class 1, which classes categorize departure from the historical fire regimes based on five ecosystem attributes: disturbance regimes, disturbance agents, smoke production, hydrologic function, and vegetative attributes.

Purpose

The purpose of this project is to restore the oak-hickory forest ecosystem within the Pine Creek analysis area to the desired future condition. The current conditions of stands in the Pine Creek project area differ greatly from the estimated historical conditions and the objectives in the Forest Plan (Figure 2 pg 8 in silvicultural prescription (Project File 4-7). The Pine Creek historic forest restoration project will begin to restore the stand structure and address the discrepancies between the current condition, the historical condition and what is prescribed by the Forest Plan based on fire, light and shade as key processes in maintaining these ecosystems. Because the scientific literature is incomplete in the difference between how these processes will affect the dry-upland vs. mesic sites, the Pine Creek project will be adaptable as new scientific information comes to light (see Silvicultural Prescription, Project File 4-7).

The long-range goal of the proposed management activity is to create an open forest dominated by large, widely-spaced mast producing trees, in which a broad ecological diversity of vegetation and wildlife occupy the landscape. This type of forest landscape existed prior to European settlement and was managed by Native Americans through routine prescribed burning. With a lack of regular landscape-level fire across the landscape, a dense under- and mid-story has developed, creating a more shade driven ecosystem across all ecological land type phase (ELTP) alliances within the landscape (see below for a discussion of ELTP alliances). This is evident in a comparison of current versus historic stocking levels for species such as red maple, sugar maple, beech, spice bush and also evident in the lack of oak regeneration in the understory.

The purpose of this prescription, as a first entry following an ice storm event in 2003, is to implement management actions which restore historic species composition and address crown health and longevity. This project will implement the first of a series of silvicultural practices (see Project File 4-7) since current stand conditions do not make it possible to achieve the restoration in one step. Due to the last century of forest use, lack of landscape-level fire occurrence and the stand-damaging 2003 ice storm event, it will take many years to recreate the open, well-developed canopied forests that once dominated this landscape. The resulting stand will be more vigorous and more likely to withstand insect and disease attacks. A further discussion on the potential threat from insects and diseases is provided in Appendix B to the Silvicultural Prescription (see Project File 4-9).

This proposed action will restore the forest to healthier conditions by

1) targeting long-lived tree species and creating a condition in the overstory that allows light to penetrate through to the open-understory;

2) removing damaged, stressed, short lived tree species, and species not suited for the site.

In order to achieve the goal of restoring these woodlands to the open, healthy canopied conditions that once existed, a landscape-level silvicultural treatment is proposed across a portion of the Historic Forest management area. The initial harvest will target

1) dead trees and high hazard trees,

2) trees with crown or bole damage and

3) trees not expected to live over the next ten-year timeframe.

A secondary goal is to move the fire regime condition class of the area toward its historic fire regime by increasing fire frequency on the landscape. Prescribe fire and selective use of herbicide, depending on ELTP and proposed treatments, will be used to adjust the species composition of regeneration, which is hindering the stands' movement toward desired species compositions.

The proposed actions in mature stands will implement initial actions to

Create a forest more like historical conditions

Restore the oak-hickory forest ecosystem in the analysis area to the estimated historic condition

Restore the historic fire regime condition class

Create an open canopy that allows desirable regeneration to grow

Protect or enhance resources in analysis area during the restoration activities

Create or maintain conditions favorable to the Indiana bat per Standards and Guidelines

Create habitat conditions for species dependent on large oak and hickory trees with continuous canopy

Provide water sources that promote insect production and provide drinking water along suitable flight paths, especially in upland areas and designated trails and roads

Prevent NNIS plant invasion or spread

Reduce and strive to eliminate illegal off-road vehicle use

Manage mixed stands for pine warbler

Protect vegetation from insects, diseases and wildfire

Restore a healthy canopy condition after the ice storm of 2003

Reduce fuel loading from 2003 ice storm

Treatment of Native Pine Stands: While the emphasis of the Pine Creek project is to manage for a dominant oak-hickory forest, the Forest Plan does endeavor to keep the small percentage of naturally occurring pine that exist on the forest. The objective of keeping the native pine is for those wildlife species that this habitat provides (Forest Plan C-3). Areas of hardwood within the stands are consistent with the other Hardwood Treatment Areas of the Project and should be managed the same.

Treatment of White Pine Plantations: The emphasis within the Pine Creek project area is to move existing stands towards a desired condition of a primarily mixed oak ecosystem. White pine stands in this area will be directed toward future conversion to hardwood while still maintaining the integrity of the white pine type in the short term.

Natural fire regime: Forest managers 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 recreate a pattern of fire occurrence similar to Native American burning. Historical fire

regimes are broken into five classes based on the average number of years between fires (fire frequency) combined with the severity (amount of stand replacement) of fire on the dominant overstory vegetation. The classification system includes the following five fire regimes:

I – O to 35 year frequency with low (surface fires most common) to mixed severity (less than 75% of the dominant overstory vegetation replaced)

II – 0 to 35 year frequency with high (stand replacement) severity (greater than 75% of the dominant overstory vegetation replaced)

III – 35 to 100+ year frequency and mixed severity (less than 75% of the dominant overstory vegetation replaced)

IV – 35 to 100+ year frequency and high (stand replacement) severity (greater than 75% of the dominant overstory vegetation replaced)

V – 200+ year frequency and high (stand replacement) severity

Fire Regime Condition Classes (FRCC) are used by federal land management agencies, particularly the Forest Service, as a qualitative measure to describe the degree of departure from historically normal ranges. The current condition of key ecosystem components, such as species composition, structural stage, canopy closure, and fuel loadings define these three classes (Hann and Strohm 2003):

Class	**NRV or HRV departure**	**Description**
Condition Class 1	Low	Vegetation composition, structure, and fuels are similar to those of the natural regime and do not pre-dispose the system to risk of loss of key ecosystem components. Wildland fires are characteristic of the natural fire regime behavior, severity, and patterns. Disturbance agents, native species habitats, and hydrologic functions are within the natural range of variability.
Condition Class 2	Moderate	Vegetation composition, structure, and fuels have moderate departure from the natural regime and pre-dispose the system to risk of loss of key ecosystem components. Wildland fires are moderately uncharacteristic compared to the natural fire regime behaviors, severity, and patterns. Disturbance agents, native species habitats, and hydrologic functions are outside the natural range of variability.
Condition Class 3	High	Vegetation composition, structure, and fuels have high departure from the natural regime and pre-dispose the system to high risk of loss of key ecosystem components. Wildland fires are highly uncharacteristic compared to the natural fire regime behaviors, severity, and patterns. Disturbance agents, native species habitats, and hydrologic functions are substantially outside the natural range of variability.

Identifying condition class in the above types becomes muddled according to the degree of disturbance, but condition class in some of these three types can still be described. Except for some mining-related fires, fire has largely been excluded from this area for the past 80-100 years, leaving

most of the analysis area in a Fire Regime Condition Class 3. The pre-settlement forest would have primarily been in a Condition Class 1.

HISTORIC CONDITIONS

Oaks have been a dominant component of eastern forests, including the forests of southeastern Ohio, for more than 5,000 years. Prior to Euro-American settlement (1700s), written accounts from described open, park-like forests and the use of fire by Native Americans for hunting and land management. An ongoing forest ecosystem study (Hutchinson, et al) involving four study sites in southern Ohio, including one in the Pine Creek project area, documents historical evidence for the composition of historic forests in southeastern Ohio. Early land surveys from the time of the Ohio Company Purchase from 1796-1802 indicate that 45 to 71 percent of the witness trees were oaks. White oak was the most common species (comprising 40% of observations), with black oak, chestnut oak and hickory also being major components. Long-term pollen records from two study sites within 250 km of the four Hutchinson study sites indicate oak pollen accounted for more than 40 percent of the total pollen from 6000 to 500 BP (Hutchinson et al 2003). Hickory was also a major component during that time. Maple accounted for less than 5 percent of pollen.

In several accounts forests were described as open and park-like. In 1765, George Croghan frequently described "clear Woods" in eastern Ohio. Thaddeus Harris, traveling from Marietta, Ohio, to Wheeling, West Virginia, in 1802 wrote, "there is but little underwood; but on the sides of the creeks and near the river, the papaw, spicebush, or wild pimento and the dogberry grow in the greatest abundance" (Thwaites 1904).

An oak dominated forest was maintained through repeated fires that killed less fire adapted (tolerant) trees. It is believed that Native Americans frequently burned the forest of eastern North America to facilitate game hunting and to enhance the growth of herbaceous plants (Goebel and Hix, 1996). Several accounts provide direct evidence of Native Americans using fire in the Ohio Valley. Joseph Barker ([1790]1958), described burning near Marietta, Ohio "The Indians, by burning the Woods every Year, kept down the undergrowth and made good pasture for the deer and good hunting for himself." Traveling west from Pittsburgh, Pennsylvania, David McClure ([1772] 1899) 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 of seeing game at a distance among the trees" (Hutchinson et al 2003).

The role of fire in the Central Hardwoods region varied according to landscape position. Fires on xeric or upland slopes occurred every 3-7 years in southeastern Ohio and allowed our current oak-hickory forest to develop. Fire frequency and intensity, light levels and shade levels, which historically varied on the landscape, created diverse vertical and horizontal forest structure. Though fire likely played a lesser role on mesic (moister, downslope) sites historically, Nowacki (*pers. comm.*) indicates that these areas may have burned two to four times in the last century. The absence of fire may have led to recruitment of smaller diameter trees, thus explaining why the old growth studies (see Figure 2 in Silv Prescription Project File 4-7) report higher basal areas then observed today.

Ecological Communities

Since research uses species alliances based on slope, aspect and available moisture to describe both historic and current conditions, the alliances will be described here and referred to in the following discussion. The International Vegetation Classification of Ecological Communities was developed by NatureServe, its natural heritage member programs and The Nature Conservancy and is a systematic way of describing and assessing ecological diversity (Grossman, 1998). It is based on vegetation as it currently exists on the landscape. Landforms, soils, and other features are not directly considered as part of the classification criteria.

An association is based on species composition, structure and habitat and closely relates to the scale of an Ecological Land Type Phase Unit. Associations are grouped into the next level called the *Alliance,* primarily on the basis of having common dominant species in the upper stratum of the vegetation. Alliances correlate to forest cover types used in stand mapping. This classification system was chosen for this project for its standardized descriptions that include attributes useful in articulating a desired future condition and because it has been accepted as the standard approach to be used by all U.S. federal agencies.

Fourteen ELTP units were combined and assigned to four forest alliances representing the following categories: upland, dry mesic, mesic and rich mesic (see table 1-1 below).

Table 1-1: Forest Alliances and Associated Ecological Land Type Phase Units

Dry-Upland Forest (approximately covers 43% of the Pine Creek Project Area)

Chestnut Oak – (Scarlet Oak, Black Oak) Forest A.248	Dry Mesic lower hillslopes, >30% slope
	Dry-Xeric upper hillslopes, <30% slope Dry-Xeric upper hillslopes, >30% slope Infertile Uplands, more southerly
	Ridgetop

Dry Mesic Forest (approximately 33% of the Pine Creek Project Area)

Black Oak – White Oak – (Scarlet Oak) Forest A.1911	Dry Mesic lower hillslopes, <30% slope
	Mesic-dry upper hillslopes, <35% slope Mesic-dry upper hillslopes, >35% slope
	Fertile Uplands, more northerly

Mesic Forest (approximately 21% of the Pine Creek Project Area)

Northern Red Oak – (Sugar Maple) Forest A.251	Mesic lower hillslopes, >35% slope
	Mesic lower hillslopes, <35% slope

Rich Mesic Forest (approximately 3% of the Pine Creek Project Area)

Tuliptree – Appalachian Basswood – Yellow Buckeye - Sugar	Flat Bottomlands

Maple Forest A.235	
	Less fertile bottomlands, southerly
	Very fertile bottomlands, northerly

The historic condition of the Central Appalachian hardwood forest had large diameter, widely-spaced trees and plenty of light reaching the forest floor. The oak-hickory community occurs on dry-mesic hillsides, less well-drained slopes, and some of the broader, relatively flat ridgetops. Exact values for historic basal areas are not available but some numbers have been identified based on fire behavior and land surveyors reports. A lower range estimate for xeric (dry-upland) forests is 40 trees/acre (Anderson 1979, Anderson and Anderson 1975) (Figure 2). For mesic woods, the only range of numbers reported in the literature for oak-hickory forests comes from the current condition studies of old growth forests (Ohio: McCarthy et al 1987, Indiana: Schmelz and Hodde 1970, Lindsey et al 1969 and Illinois: Fralish et al 1991; Ebinger and Newman 1984). It is estimated that Dry-Upland forests had 40 trees/acre (Anderson 1979, Anderson and Anderson 1975) (Figure 2).

Coves and northern slopes were a mixture of oaks with maple, beech, and tulip poplar. The open nature of the forest provided suitable habitat for species including the Indiana bat and the cerulean warbler, while hard mast produced by oak and hickory fed many other mammals and birds.

This historic condition is the Desired Future Condition for the project area. The forest pictured in Figure 1-1 above was managed by researchers using selection harvest and prescribed burning and resembles the desired forest condition for this management area. This management area allows for adaptive management in which monitoring shows forest managers which practices are more effective than others, depending on site characteristics. The types and mix of silvicultural treatments, fire, and mid-story control will be adapted to suit the different Forest Alliances.

The Historic Forest canopy will contain small gaps as single or small clumps of trees blow down, die, or are removed. Tree canopy cover will average 60-80% (or 20-40% open) over the management area, allowing light to reach the forest floor. Because fire will play an important role in maintaining the dry-upland sites, these areas will have an open, grass and forb dominated understory. These conditions will be created over time using mostly uneven-aged management techniques and prescribed fire as management tools.

Habitat conditions especially favor plant and animal species dependent on large oak and hickory trees and a near-continuous canopy with a mosaic of small openings. The open understory and mid-story provides suitable foraging habitat for the Indiana bat, while the hard mast produced by the oak and hickory benefits many mammals and birds. Dappled lighting created by open oak canopies favors many species of plants that are characteristic of oak woodlands, barrens and savannas.

The following sections in Chapter One lead the reader through a description of Current Conditions on the landscape based on ecological alliances through the desired future condition – again described by alliances, an on to how the proposed action was developed based on ecological conditions and responses.

General descriptions of each forest alliance are found below, and are adapted from a botanical and wildlife survey conducted for Pine Creek (Minney 2006).

Dry-Upland Forest: Chestnut Oak – (Scarlet oak, Black Oak) Alliance

This is the common forest type of dry, well-drained slopes and narrow ridges. The canopy is dominated by the nominal species. Other canopy species may include pignut hickory (*Carya glabra*), white oak (*Quercus alba*), red maple (*Acer rubrum*), and black gum (*Nyssa sylvatica*). Common understory trees are sassafras, red maple, pignut hickory, and white ash (*Fraxinus americana*). Oak regeneration appears to be good into the seedling and sapling stages. Shrub species include maple-leaf viburnum, serviceberry (*Amelanchier arborea*), and redbud (*Cercis canadensis*). Heavy growth of greenbrier (*Smilax rotundifolia*) is common.

Characteristic herbaceous species include panic grass (*Panicum boscii & dichotomum*), tickfoil (*Desmodium nudicaulis)*, *Coreopsis major*, and whorled loosestrife (*Lysimachia quadrifolia*). In general, the understory is overgrown with dense thickets of greenbrier, redbud, ash, and sassafras among others. This is especially apparent in areas where the canopy has been partially opened due to the 2003 ice storm damage.

A segregate of this community dominated by chestnut oak and scarlet oak and an ericaceous understory of sourwood (*Oxydendron arboretum*), blueberry (*Vaccinium pallidum*), huckleberry (*Gaylussacia baccatta*), and wintergreen (*Gaultheria procumbens*) occurs on some steep, south-facing, upper slopes on the most acidic soils.

Dry Mesic Forest: Black Oak – White Oak – (Scarlet Oak) Alliance

This community occurs on dry-mesic hillsides, less well-drained slopes, and some of the broader, relatively flat ridgetops. This community was often not well defined in the study area. White oak and black oak (*Q. velutina*) are dominant, occurring with a mix of other species such as scarlet oak (*Q. coccinea*), chestnut oak (*Q. prinus*), or red maple (on drier sites) and red oak and yellow poplar (more mesic areas). Shagbark hickory (*Carya ovata*), pignut hickory, and mockernut (*Carya alba*) are rather sporadic and tend to be somewhat local. Some of these areas may be better placed in a mixed oak community such as white oak - black oak - scarlet oak.

Common understory species include red maple, sugar maple, sassafras, white ash, green ash (*Fraxinus pennsylvanica*), redbud, greenbrier, brambles (*Rubus* spp) and very locally, pinxter flower (*Rhododendron nudiflorum*). Common herb species include Solomon's seal (*Polygonatum* spp), tickfoil (*Desmodium nudicaulis*), sunflower (*Helianthus hirsutus*), ipecac (*Porteranthus stipulata*), early bluegrass (*Poa cuspidate*), and *Panicum boscii*.

Mesic Forest: Northern Red Oak – (Sugar Maple) Alliance

Stands occurring on low to mid-slopes with northerly aspects and along lower slopes and hollows with western or southern aspects. This community is most commonly dominated by white oak (*Quercus alba*) and yellow poplar (*Liriodendron tulipifera*). Red oak (*Q. rubra*) is uncommon and sugar maple (*Acer saccharum*) only locally co-dominant in the canopy. The less fertile soil types of the Ironton District (compared to the Athens District), deforestation in the late 1800's and periodic fire most likely contributed to the higher presence of white oaks on more mesic sites. True northern red

oak has a greater presence on the Athens RD, with scarlet and black oak making up the red oak species group within the Pine Creek analysis area.

Formerly, American chestnut may have been a significant component of this community. Tree species common in the understory are red maple, sugar maple, white ash, and sassafras.

Ice storm damage is common in this community allowing for dense understory and shrub growth. The mesic sites maintain cooler annual temperatures than do the drier slopes. From an examination of aerial photos of ice storm damage and from field experience, it was evident that a temperature inversion caused greater amounts of ice to build on the branches of trees on the lower slopes. As a result, greater crown damage, uprooting and mortality occurred on these sites. Invasive plant communities are now taking advantage of the increased sunlight reaching the forest floor.

Oak regeneration appears to be rather poor in these mesic sites. Sugar maple and American beech (*Fagus grandifolia*) are common understory species in the south-facing hollows and low slopes threatening the long term sustainability of this community. Spicebush is somewhat characteristic and often strongly dominant to the point of inhibiting regeneration of shade-intolerant canopy species. Other species may include redbud, dogwood (*Cornus florida*), hazelnut (*Corylus americana*), and black haw (*Viburnum prunifolium*). Herb species may include Indian cucumber (*Medeola virginiana*), mayapple (*Podophyllum peltatum*), plumelily (*Smilacina racemosa*), skullcap (*Scutellaria elliptica*), Christmas fern (*Polystichium acrosticoides*), and graminoids such as *Brachyletrum erectum, Diarhenna americana*, and sedges (*Carex digitalis, laxiculmus, laxiflora*).

Rich Mesic Forest: Tuliptree – Basswood – Yellow Buckeye – Sugar Maple Alliance

This community is restricted to north-facing, streamside slopes and bottoms. Yellow poplar is often prominent but species dominance is diffuse. Other canopy species include sugar maple, white oak, red oak, shagbark hickory, white ash, black walnut (*Juglans nigra*), black cherry (*Prunus serotina*), American beech, and slippery elm (*Ulmus rubra*). Common understory species include sugar maple, American beech, white ash, ironwood (*Carpinus caroliniana*), paw-paw (*Asimina triloba*), witch-hazel (*Hamamelis virginicus*), and local occurrences of American strawberry bush (*Euonymous americanus*). The herbaceous layer is comprised of a variety of spring ephemerals, ferns, and rich bottomland species.

MOVING TOWARD THE DESIRED FUTURE CONDITION

General Trends of Structure and Processes

The four alliances are not distinct units, but rather are a means of describing the plant and wildlife communities found along a gradient. The alliances will blend into one another, and characteristics will overlap. We generally expect to see the following trends when moving through the gradient from the upland alliance (ridgetops and dry southern slopes) to the rich mesic alliance (coves and bottomlands) (Figure 1-2):

- Canopy cover will increase
- Midstory density will increase
- Fire frequency and intensity will decrease
- Dominance of oaks will decrease
- Density of maples, poplars, and other shade-tolerant species will increase

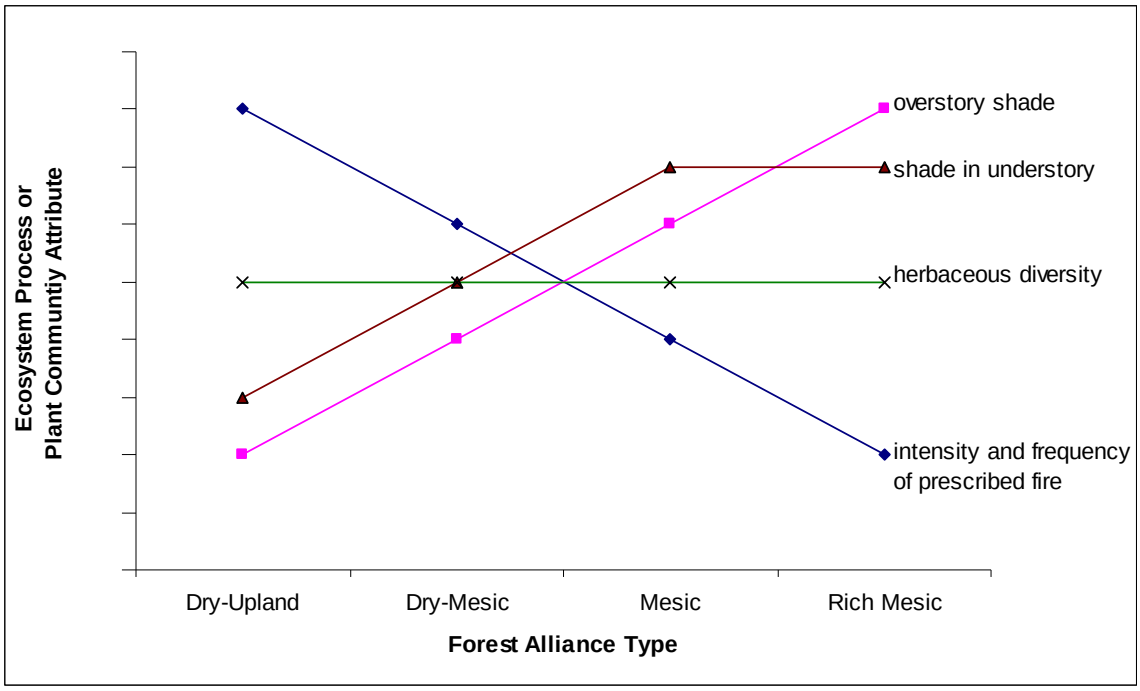


Figure 1-2: Conceptualization of structure and processes that will maintain the desired future conditions of the four alliance types in the Pine Creek historic forest project area

Fire frequency and intensity, light levels and shade levels, which historically varied on the landscape, created diverse vertical and horizontal forest structure. Frequent fires are thought to have kept basal area low in historic forests because smaller trees with thinner bark (e.g. red maple) are killed by these fires. Therefore, species such as oaks, which can re-sprout from below ground buds and have thicker bark, are better adapted to fire prone environments.

The current conditions of stands in the Pine Creek project area differ greatly from the estimated historic conditions and the objectives in the Forest Plan (Figure 1-3 below). The Pine Creek Historic Forest Restoration Project will begin to restore the stand structure and address the discrepancies between the current condition, the historical condition and what is mandated by the Forest Plan based on fire, light and shade as key processes in maintaining these ecosystems. Because the scientific literature is incomplete in the difference between how these processes will affect the dry-upland vs. mesic sites, the Pine Creek project will be adaptable as new scientific information comes to light.

One method of measuring and describing forest structure is basal area per acre. Basal area per acre is the amount of cross-sectional square footage trees contribute to the forest's vertical structure on a per acre basis. Basal area is related to tree density through forest stocking charts and can also be used as a surrogate variable for canopy openness. Frequent fires are thought to have kept basal area low in historic forests because smaller trees with thinner bark (e.g. red maple) are killed by these fires.

Therefore, species such as oaks, which can re-sprout from below ground buds and have thicker bark, are better adapted to fire prone environments.

REFERENCE COMPARED TO CURRENT CONDITIONS

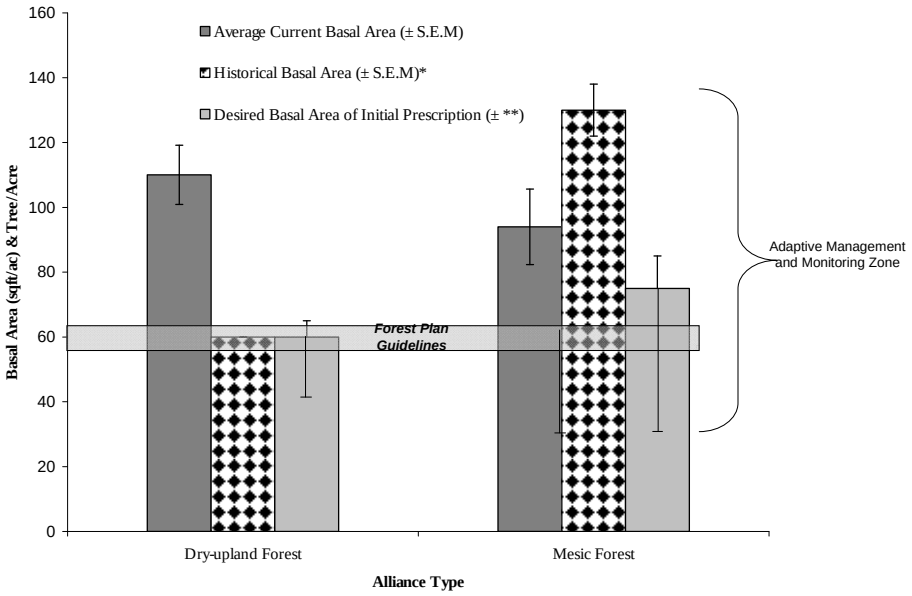


Figure 3: Estimated current vs. historic basal area two of the four alliance types in Pine Creek Historic Forest restoration project. Though only two alliance types are shown, the authors recognize that there are, at minimum four alliance types with the Pine Creek project area. These alliances fall along a gradient of basal areas, rather than into district groups. *Estimates for Dry-Upland Forest Alliance based on an >40 trees per acre in a pyrogenic forest (Andeson & Anderson 1975; Anderson 1979). Estimates for Mesic Forest Alliance based on current condition of old growth oak-hickory forests in Ohio (McCarthy et al 1987), Indiana (Schmelz and Hodde 1970; Lindsey et al 1969), and Ilinois (Fralish et al 1991; Ebinger and Newman 1984). ** The variation in the prescription of the mesic forest takes into account the large numbers of stands damaged by the ice storm which will be salvage logged to remove trees that will not live more than ten years.

As discussed above, the role of fire in the landscape varied according to landscape position in the Central Hardwoods region of the U.S. Exact values for historic basal areas are not available but some numbers have been identified based on fire behavior and land surveyors reports. For example, a lower range estimate for Dry-Upland forests is 40 trees/acre (Anderson 1979, Anderson and Anderson 1975) (Figure 2). For mesic woods, the only range of numbers reported in the literature for oak-hickory forests comes from the current condition studies of old growth forests (Ohio: McCarthy et al 1987, Indiana: Schmelz and Hodde 1970, Lindsey et al 1969 and Illinois: Fralish et al 1991; Ebinger and Newman 1984). These old growth studies' numbers (Figure 2) probably overestimate the basal area that was historically present given that fire has been excluded from these sites for over century. Though fire likely played a lesser role on mesic sites historically (see discussion below), Nowacki (*pers. comm.*) indicates that these areas may have burned two to four times

in the last century. The absence of fire may have led to recruitment of smaller diameter trees leading to, and thus explain the higher basal areas reported in the old growth studies (Figure 2).

The current condition of stands in the Pine Creek project area differs greatly from the estimated historical conditions and the objectives in the Forest Plan (Figure 2 above). The Pine Creek historic forest restoration project will begin to restore the stand structure and address the discrepancies between the current condition, the historical condition and what is mandated by the Forest Plan based on fire, light and shade as key processes in maintaining these ecosystems. Because the scientific literature is incomplete in the difference between how these processes will affect the dry-upland vs. mesic sites, the Pine Creek project will be adaptable as new scientific information comes to light.

DESIRED FUTURE CONDITIONS BY ALLIANCE

Dry-Upland Forest

Structure and Processes: The upland forest alliance occurs on dry, upper ridgetops where fire is thought to have played an important role in maintaining diversity in this system in the Central Hardwoods region (Patterson 2006, Guyette et al. 2006, Ruffner 2006, Moser et al 2006, Abrams 2005, Hutchinson et al 2003, Taft 2003, Sutherland, 1997; Delcourt and Delcourt 1997). Frequent prescribed fires and overstory thinning will lead to a landscape dominated by oak woodlands with open mid-stories and also some scattered oak savanna across this alliance.

The initial target basal area of these oak woodlands will be 55-65 sq.ft./ac. in areas not damaged by the ice storm. This basal area will create a forest canopy which will consist of 25% to 40 percent openings. In more heavily ice-storm damaged areas, dead trees and damaged trees that will die in the next ten years will be salvaged. In these damaged areas this might result in a basal area lower than the range stated above while still maintaining uneven-aged characteristics. Thus in those stands the initial basal area after treatment will be low but will allow the residual trees to recover more quickly. To maintain these open conditions, the target fire return interval will be between 5-15 years (Nowacki, *pers comm.*, Shumway et al 2001, Guyette el al 2003) however, fires may be prescribed more frequent initially due to the lack of fire in the these systems over the last 100 years. In areas in which fire is prescribed, it is expected that at least two fires will be required following harvest within the first five years. The first fire removes the fine fuels and begins the process of removing some of the shade tolerant, light barked species. The second burn not only removes more of the shade tolerant species but helps to shift and establish the oak –hickory component in the regeneration. After the second burn the stands will need to be evaluated to determine whether further burns would be necessary. The emphasis would be to establish a component of oak on the dry-upland and dry-mesic sites with less emphasis on the more mesic sites. Fire intensity will be lower on the more mesic sites and maple and tulip-poplar are expectedly to dominate.

Plant Communities and Rare Plants: Due to increased light levels in the understory from frequent prescribed fires and canopy tree removal, understory plant richness and cover should increase. For example, studies in Illinois (Taft 2003), the Missouri Ozarks Dry Oak Forests (Hartman and Heumann 2003) and in Ohio Dry-Mesic Oak Forests (Hutchinson

2005, Huthcinson 2004) show increases in overall plant diversity and cover, but specifically increased diversity and cover of grasses, sedges, legumes (i.e. *Lespedeza*) and woodland sunflowers). In addition, to increased diversity herbaceous plants, this management regime will increase the competitive ability of oak seedlings and decrease the competitive ability of fire intolerant species such as maple (Brose and Van Lear 1998).

On the Dry Upland sites, in the WNF, Historic Management Area, this diverse assemblage of understory grasses, sedges and forbs will replace dense thickets of greenbrier, maple leaf viburnum and other shade-tolerant mid-story tree species.

Rare herbaceous understory species which are threatened by canopy closure, such as wild pea (*Lathyrus venosus*), white milkweed, sweet goldenrod (*Solidago odora*), (*Asclepias variegata*), flame azalea (*Rhododendron calendulaceum*), juniper sedge (*Carex juniperorum*), butterfly pea (*Clitoria mariana*) and Tall nut-rush (*Scleria triglomerata*) may also increase in abundance (Ohio Division of Natural Areas and Preserves, 2007).

The tree species composition is will be dominated by chestnut oak and also include a high proportion of white, black and scarlet oaks, with smaller amounts of hickory, ash, red maple, beech and blackgum.

Wildlife Communities and Rare Wildlife: Large, mature oaks will provide favorable nest sites for canopy-nesting birds, such as cerulean warblers, a RFSS. A heterogeneous canopy, will allow sunlight to reach the trunks and branches of some snags and large oaks and hickories, providing summer roost habitat for tree-roosting bats, including the federally endangered Indiana bat. The open midstory will provide favorable foraging conditions for Indiana bats.

Standing dead trees and mature live trees with splits, crevices, and cavities will provide habitat for cavity nesting birds and small mammals, as well as insect food sources for woodpeckers. Large-diameter woody debris from the periodic death of overstory trees will provide den sites for bobcat and black bear. The hard mast provided by the oaks and hickories that dominate this alliance provide an important food source for deer, turkey, and a wide variety of other animal species (McShea and Healy 2002).

Dry-Mesic Forest

Structure and Processes: The dry-mesic alliance is very similar to the upland forest alliance and difficult to distinguish in the field. For that reason, fire behavior and forest structure is assumed to play similar roles and have similar plant community benefits as the upland forest sites. However, this alliance will experience somewhat lesser intensity and frequency of fire as a result of topography. The canopy in this alliance will likely be heterogeneous, though somewhat more closed than the canopy in the upland alliance, with a slightly higher basal area and number of trees per acre.

The target basal area and prescribed fire frequency would be similar to the Dry-Upland forest alliance.

Plant Communities and Rare Plants: Common plants such as graceful sedge (*Carex gracilescens*), Bosc's Panic grass (*Panicum boscii*), lanceleaf wild licorice (*Galium lanceolatum*),

hairy Solomon's seal (*Polygonatum pubescens*) and native legumes such as *Desmodium* spp. and *Lespedeza* spp. will benefit most in this alliance type**.**

Rare plants that need and would benefit from this semi-open woodland condition include Carolina thistle (*Cirsium carolinianum*), Running buffalo clover (*Trifolium stoloniferum*), Small whorled pogonia, (*Isotria medeoloides*) and Dwarf Iris (*Iris verna*) (Ohio Division of Natural Areas and Preserves, 2007).

On these sites, white oak will become dominant in the stand. It is the most shade tolerant of the oaks and equal or only slightly less tolerant than the associated hickories. It has the ability to live vigorously for long periods as an overtopped tree responds quickly to sunlight, has a moderate fast growth rate in full sunlight and has a great longevity (USDA Forest Service 1965) Black oak exhibits similar characteristics,; however, it grows slightly faster but does not demonstrate the longevity of white oak. Both pignut, shagbark and mockernut hickory are intermediate in shade tolerance, slightly more tolerant than oaks; however have a slower growth rate.

Wildlife Communities and Rare Wildlife: Large, widely spaced oaks will provide favorable nest sites for canopy-nesting birds, such as cerulean warblers. The heterogeneous canopy, will allow sunlight to reach the trunks and branches of some snags and trees, providing summer roost habitat for tree-roosting bats. The open midstory will provide favorable foraging conditions for Indiana bats. Standing dead trees and mature live trees with splits, crevices, and cavities will provide habitat for cavity nesting birds and small mammals, as well as insect food sources for woodpeckers.

Large-diameter woody debris from the periodic death of overstory trees will provide den sites for bobcat and black bear. The hard mast provided by the oaks and hickories that dominate this alliance provide an important food source for deer, turkey, and a wide variety of other animal species.

Mesic Forest

Structure and Processes: The mesic forest alliance is a more closed canopy system and represents a transition between pyrogenic and non-pyrogenic landscapes. In drier sites, where prescribed fire trickles down from the ridgetops and upper-mid slopes, the mid-story canopy would be more open. In moist areas, prescribed fire intensity will be reduced by virtue of this topographic position and the mid-story will appear more closed. Fire will burn at low intensities and in a patch pattern, if at all, in this alliance.

To maintain and perpetuate shade tolerant overstory species, the target basal area and tree densities of this alliance will be 70-80 sq.ft./ac (Figure 2) in areas not damage by the ice storm. Initially, this will leave some canopy gaps (~5-10% of the canopy will be open) but on these mesic sites, tree canopies will expand and fill these gaps in to produce a continuous canopy with large widely-spaced tree. (If the canopy is reduced from 120 down to 80 ft2 will create more than 5-10 percent. Looking at Roach and Gingrich the stocking percent will be reduced to 60 – 70 percent). Initially the canopy will be reduced to 60 -70 percent but the stands are still fully stocked according to stocking guidelines. Complete canopy closure is expected within seven to ten years. Reducing the tree canopy down to 60-

80 percent over the management area, allowing light to reach the forest floor is in consort with the Forest Plan (3-16).

In more heavily ice-stormed damaged areas, dead trees and damaged trees that will die in the next ten years will be salvaged. In these damaged areas this might result in a basal area lower than the range stated above. Thus in those stands the initial basal area after treatment will be low but will allow the residual trees to recover more quickly.

Though fire likely played less of a role in this alliance than the alliances above, an estimated mean fire return interval of 20-50 years (Nowacki, *pers comm.*) will be applied. The northern and lowest slopes in this alliance may burn on an even higher interval of 35-200 years (Wade et al. 2000). When present, prescribed fire will be of low-intensity and burn in a mosaic pattern due to higher moisture conditions in some areas.

The first two burns will be more intense and more variable because fire has been excluded from the ecosystem for so long and because of the added influx of fine fuels generated by the ice storm and logging slash. After the second burn the stands will stabilize the burning will become more uniform. The first burn will reduce the fine fuels such as slash, broken off tops of trees, pockets of green briar and the second burn will further reduce the small understory seedlings less than two inches in diameter. Even though the first burns will be more intense, the intensity will be controlled by backing fires and by controlling the timing of the prescribed burns.

Plant Communities and Rare Plants: Since the understory is maintained by shade, species such as Indian cucumber (*Medeola virginiana*), may apple (*Podophyllum peltatum*), large-flowered Trillium (*Trillium grandiflorum*), Christmas fern (*Polystichum acrosticoides*) and hairy solomon's seal (*Polgonatum biflorum*) will flourish. These species require higher moisture and nutrient levels found in the mesic sites and can persist even when the canopy is closed. The cover and abundance of the herbaceous layer will be variable depending on the cover of the midstory and shrub layer that develops.

Rare shade tolerant plant such as sparse-lobed grape fern (*Botrychium biternatum*), lined sedge (*Carex striatula*), umbrella magnolia *(Magnolia tripetala*) and rock skullcap (*Scutellaria saxatilis*) may also increase in abundance once the canopy recovers from the ice storm (Ohio Division of Natural Areas and Preserves, 2007).

Wildlife Communities and Rare Wildlife: The largely continuous canopy and well-developed, patchy understory of shrubs will provide nesting habitat for interior forest ground-nesting birds, such as worm-eating warblers. The continuous understory shrub layer will also benefit shrub-nesting birds such as the wood thrush and Acadian flycatcher. Small light gaps will form periodically as a result of tree fall or single tree selection harvesting (Runkle 1982).

Mesic-site tree species, including sugar maples and tulip poplars will be significant members of the canopy of this alliance. Historically, American elms would have also been a component of the overstory of this community type and were a potentially important roost tree for Indiana bats. Large, mature trees in this alliance will provide nest sites for cerulean warblers and other canopy-nesting birds, and potential roost sites for tree-roosting bats.

Standing dead trees and mature and over-mature live trees with splits, crevices, and cavities will provide habitat for cavity nesting birds and small mammals, as well as insect food

sources for woodpeckers. Large-diameter woody debris from the periodic death of overstory trees will provide den sites for bobcat and black bear.

Rich Mesic Forest

Structure and Processes: The rich mesic alliance is very similar to the mesic forest alliance in that shade is an important driver in the plant species found in this alliance. Intensive fires are rare in this alliance (historically fires returned to these mixed mesophytic forest on an interval > 200 years, Wade et al 2000), and when present, will be low intensity and burn in a patchy mosaic pattern due to the moist conditions, retaining the majority of the shrubs and debris. Because fire will not play a large role in this alliance, more shade will be cast by a mostly continuous understory shrub and tree layer.

Plant Communities and Rare Plants: The heavy shading will favor common species such as maidenhair fern (*Adiantum pedatum*), bloodroot (SANGUINARIA CANADENSIS*) AND JEWEL WEED (*IMPATIENS CAPENSIS*)* will flourish. Rare shade tolerant plant such as sparse-lobed grape fern (*Botrychium biternatum*), lined sedge (*Carex striatula*), umbrella magnolia *(Magnolia tripetala*) and rock skullcap (*Scutellaria saxatilis*) may also increase in abundance once the canopy recovers from the ice storm (Ohio Division of Natural Areas and Preserves, 2007).

Wildlife Communities and Rare Wildlife: The high insect abundance associated with small creeks and streams provides favorable foraging conditions for forest bats, including the Indiana bat. These water resources also provide habitat for many woodland salamanders, and a water source for many forest-dwelling animals. Small, fast-flowing streams in mature stands provide breeding habitat for interior moist forest breeding species, such as Louisiana waterthrushes. A well-developed understory and large coarse woody debris (>10") will provide nesting habitat for interior forest ground-nesting birds, such as worm-eating warblers. The continuous understory shrub layer will also benefit shrub-nesting birds such as the wood thrush and Acadian flycatcher. Historically, American elm would have been a component of the overstory of this community type and were a potentially important roost tree for Indiana bats.

The desired condition following the use of fire is shown in the following table by alliance.

	Existing Fire Regime	Target Fire Regime (Presettlement Reference)[1,2]	Existing Nat Veg	Target Veg (Presettlement Reference)[1,3,4,5]
Upland Forest	>5000 yrs	Mean Fire Interval = 8-23 yrs; probably more like 5-15 yrs as these ecosystems are most dry. [MFI = 14 yrs (NJ; Buell et al 1954); 8 yrs (MD; Shumway et al. 2001); 23 yrs (IN; Guyette et al. 2003).]	Chestnut Oak – (Scarlet Oak, Black Oak) Forest	Some oak savannas; mainly open oak woodlands, some closed-canopy oak forests.
Dry Mesic Forest	>5000 yrs	Mean Fire Interval = 8-23 yrs; probably more like 10-25 yrs as these ecosystem are dry-mesic. [MFI = 14 yrs (NJ; Buell et al 1954); 8 yrs (MD; Shumway et al. 2001); 23 yrs (IN; Guyette et al. 2003).]	Black Oak – White Oak – (Scarlet Oak) Forest	Increasing representation from oak savannas to woodlands to forests.
Mesic Forest		This oak-maple ecosystem probably represented a transition between		Probably mainly closed-canopy oak-maple forests.

	>5000 yrs	pryogenic and non-pryogenic landscapes. Estimated MFI of 20-50 yrs.	Northern Red Oak – (Sugar Maple) Forest	Drier, more fire-prone areas = more oak; moist, less fire-prone areas = more maple.
Rich Mesic Forest	>5000 yrs	These mesic bottomlands wove through a largely pyrogenic landscape. As such, surface fires probably carried into these areas during severe drought. Estimated MFI = 50-150 yrs.	Tuliptree – Appalachian Basswood – Yellow Buckeye – Sugar Maple Forest	Closed-canopied mixed mesophytic forests.

PROPOSED ACTION

Goal:

The long-term goal of silvicultural treatments in the Pine Creek Historic Forest with OHV Analysis Area is to restore forest structure, age class distribution, species composition, and ecological condition and function similar to what existed prior to European settlement.

- Create and maintain open canopy conditions to encourage regeneration in the damage areas and encourage regeneration.
- Maintain dominant species compositions within the ELTP Forest Alliances.
- Restore an uneven-aged stand condition with a variety of tree ages and diameters.
- Restore fire occurrence and intensity modeled on what is thought to have occurred under Native American "management".

Management Practices to Implement the Historic Forest Prescription

- Individual selection harvest in which the canopy will be reduced to 60 – 70 percent. Initial harvest would be from all size classes to help in the development of a multi level uneven-aged stand. The majority of the trees harvested will be damaged and stressed trees from the 2003 ice storm. The residual stand will include larger, less damaged, longer-lived trees such as oaks. Selection of trees to retain should favor those species dominant to ELTP Alliances. After the initial harvest and once regeneration is initiated, the stand canopy will need to be maintained at 80 percent to provide light to the newly created seedling layer. Maintaining 15-20% open canopy (i.e. 80% tree canopy and 20% open sky), would encourage some oak regeneration, and be more like the relatively open stand conditions thought to be prevalent in this area historically.

- Prescribed fire to encourage oak regeneration to perpetuate into future stands, discourage maple, cherry and poplar reproduction, reduce fuel load levels, and to diversify the herbaceous plant community. Initial prescribe fire regimes are planned after the thinning treatments and are designed for two to three treatments in the first ten years. After the initial ten-year period, use prescribed fire every 5 to 10 years. Both spring and fall burns could be conducted to provide varying fire behavior and ecological effects.

- Herbicide application or manual methods to control re-growth on stumps and/or stems of species which could out-compete slower growing oak seedlings in the Dry-Upland and Dry-

Mesic Forest Alliances. These treatments will favor regeneration that will meet the Desired Future Condition.

Treatments within the analysis area are planned to meet each component of the purpose and need.

Action	Quantity
Selection harvest in hardwood overstory	2309 acres
Selection cut in white pine	63 acres
Uneven-age harvest in native pine	100 acres
Prescribe burn	2875 acres
Treat mid-story vegetation with herbicides	1036 acres
Treat mid-story vegetation mechanically	2032 acres
Mechanical stand improvement in young stands	1677 acres
Herbicide stand improvement in young stands	838 acres
Mechanical NNIS treatment in project area	41 acres
Herbicide NNIS treatment in project area	199 acres
New temporary road construction	1.0 miles
Clear landings	15 acres
Build skid roads	71 acres
Improve visitor parking areas	8 areas
Construct waterholes	up to 100 waterholes

Connected Actions:	
Close user-developed orv trails	As needed
Treat non-native invasive species	250 acres

According to C.K. McMahon and J.H. Miller of the US Forest Service (1994), environmentally safe, selective herbicide treatments can be adapted to manage habitats and direct succession toward desired future conditions within the principles of Ecosystem Management. Among the six roles for herbicide treatments identified by McMahon and Miller, three roles have been identified in the Pine Creek project: create and maintain desired habitats; create mixed and uneven-aged stands; and control exotic, noxious and poisonous plants. These roles are consistent with the management area direction for the Historic Forest MA on the Wayne National Forest (USDA FS 2006(b)).

See Chapter Two for more detail on the proposed action and other alternatives.

SCOPE OF THIS DECISION

The Ironton District Ranger will decide whether to implement one of the alternatives proposed to meet the purpose and need or to defer any action at this time. The decision to be made is limited in scope to the implementation of the proposed actions in the Pine Creek analysis area. The decision to increase OHV trail mileage in the Kosmos Trail Addition analysis is a separate decision. The decision to allow OHV use on the Forest was made in the Forest Plan. No decisions would be made for actions that are not responsive to the expressed purpose and need.

No other agencies, federal or state, are directly involved in this decision. See Chapter 4 for agencies consulted.

CONSISTENCY WITH FOREST PLAN

This project meets goals and objectives as detailed in the Forest Plan.

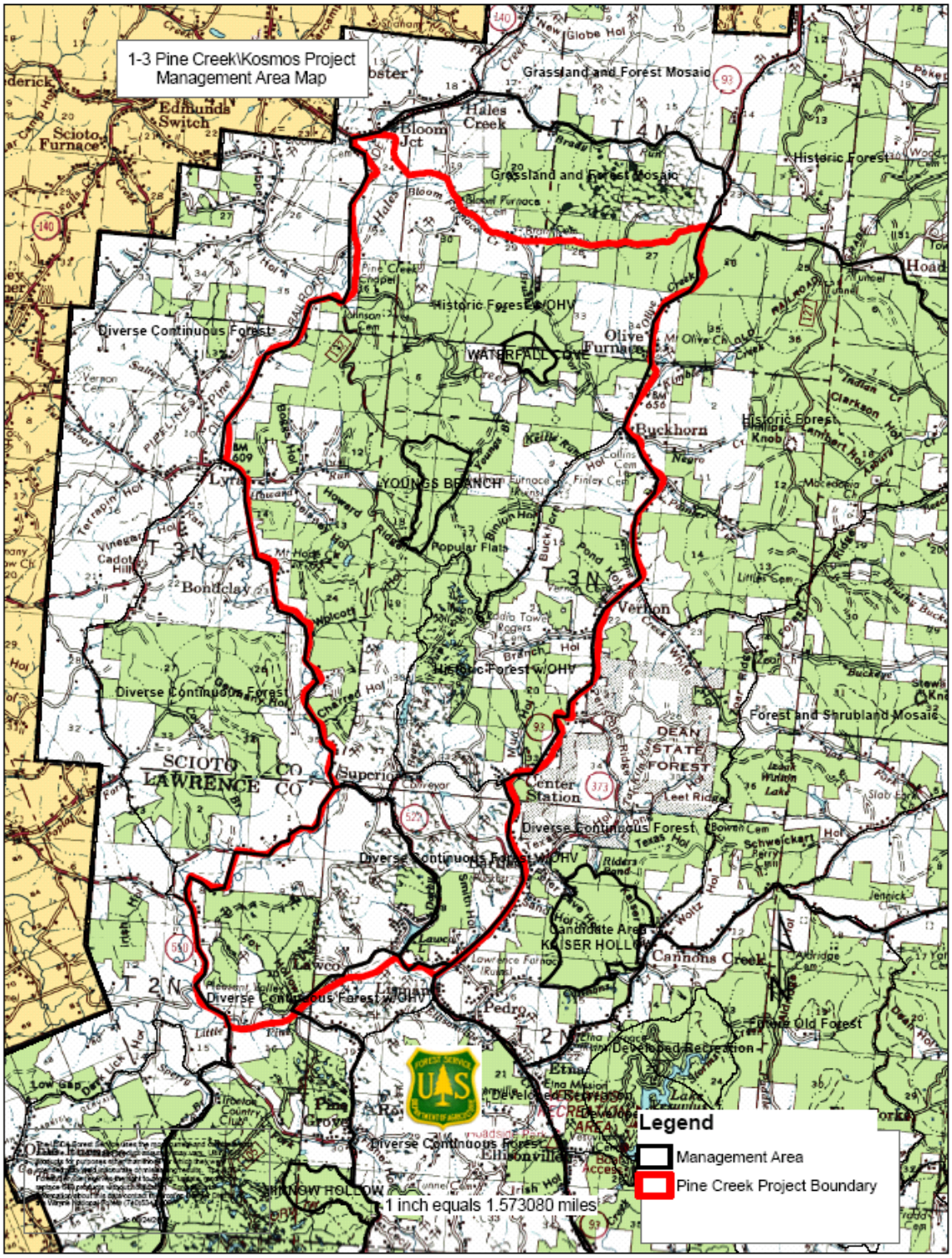
Goal 7.4*: GFW-FH-6 which calls for the use of commercial thinning of timber stands to promote growth of crop trees and to maintain forest health.*

G-HFO-VEG-6: *After stand conditions are established through silvicultural treatments, maintain these conditions through periodic spring or fall prescribed fires (every 3-10 years) in order to:*

- *Control maple, poplar, beech and cherry reproduction*
- *Allow oak regeneration to develop*
- *Diversify the herbaceous plant community*

G-HF-VEG-1: *To meet the desired condition canopy cover, thin stand overstories to a basal area of between 55 and 65 square feet.*

Map 1-2: Management Areas in Vicinity of Pine Creek/Kosmos Project Areas



G-HF-VEG-3: *As initial treatments, thin stands from below.* ***Trees to be left after the thinning is finished should be primarily long-lived oaks***

G-HF-VEG-5: *Favor oak regeneration by controlling non-oak species (particularly red and sugar maple) in the understory. Control may be a combination of mechanical removal, herbicide, and/or prescribed burning, whichever is best suited to individual stand conditions.*

SFW-TES-14 *Provide water sources that promote insect production and provide drinking water along suitable flight paths, especially in upland areas and designated trails and roads*

FEIS pg 3-57 *manage mixed stands for pine warbler*

For the application of timber stand improvement activities in young stands*:*

Guidance from the 2006 Wayne Land and Resource Management Plan (Chapter 2, page 25) gives the following direction for Timber Stand Improvement activities:

GFW-VEG-14: Treat stand understories prior to and/or after timber harvest to develop advanced reproduction of desired tree species and to control grapevines where necessary to meet regeneration objectives. Such treatments may include the use of prescribed fire and/or chemical control of understory species and soil scarification to regenerate native pines. Leave adequate grapevines to meet wildlife needs. Do not remove pigeon grapes.

GFW-VEG-15: Pre-commercially thin regenerated stands to favor desired species and improve health, vigor, and growth.

GFW-VEG-16: When conducting crop tree release treatments, girdle (rather than felling) trees which could serve as future snags.

Goal 11.2 *Reduce and strive to eliminate illegal off-road vehicle use (Forest Plan 2-46)*

REFERENCE TO OTHER GUIDANCE OR DECISIONS

A full analysis of herbicides and methods used to treat non-native invasive species is in the referenced Wayne National Forest NNIS EA, Decision Notice signed in April 2007. Some analysis completed in the 2006 Forest Plan is referenced in this decision.

SUMMARY OF SCOPING

An initial scoping invitation was sent to approximately 400 individuals and groups. We received 19 responses. A comment response table was prepared (Project File ext_scoping_response) for all comments received. Comments are used to identify issues which help the interdisciplinary team to 1) define alternatives, 2) further refine the analysis or 3) identify mitigations to the proposed actions. The following comments were utilized to identify issues.

Comment: Timber equipment will have adverse impacts on the area's soil and water. Road reconstruction will impact the water quality of the area's streams and the surrounding riparian areas. Concern about the impacts from road and forest fragmentation in the Wayne on water quality and soils. There are effects such as increased soil pH, increased temperature, loss of nutrients, increased sediment loads, increased water temperature and pH.

Issue Statement:	Harvest and road building causes impacts to water quality and soils.
Response:	Alternative Four was added, which drops harvest and one mile of temporary road construction from the treatment alternatives. See analysis of alternatives in Chapter Three.
Comment:	Fire will negatively impact non-target plant species; analyze fire dependant species vs. effects of non-adapted species.
Issue Statement:	Fire causes impacts to non-target plant species.
Response:	We added Alternative Three, which excludes the use of fire. See analysis of alternatives in Chapter Three.
Issue Statement:	Herbicides may negatively impact human health, soil, water, plant & wildlife resources.
Response:	Mechanical treatments for mid-story treatment, timber stand improvement and treatment of non-native species are included in all action alternatives. See herbicide analysis in Chapter Three, Project File 4-16 and cited publications.
Issue Statement:	Proposed actions, i.e. logging, herbicide, fragmentation, will negatively affect TES species.
Response:	Standards and guidelines specifically protect threatened and endangered species. See Chapter Two for additional mitigations were added to this project. A concurrence was received from the US Fish and Wildlife Service. See analysis in Chapter Three.
Issue Statement:	Implementing the aggressive approach to harvest and burning treatments generates a risk to ecosystem function.
Response:	The prescription for this analysis area was developed using current research. See the Silvicultural prescription in the Project File 4-7. Monitoring will allow us to use adaptive management to achieve our purpose and need.
Issue Statement:	If fire is so great, why do you need mechanical or herbicide treatments?
Response:	Research and experience has shown us the benefits and limitations of prescribed burning as a treatment method to control understory species competition. Mechanical and herbicide treatments are included to accomplish the purpose and need. See the silvicultural impacts in Project File 4-12 and analysis in Chapter Three.