Ohio Department of Natural Resources

Division of Forestry

Five Year

Forest Management Plan

For

State Forests

Reviewed and Approved By:

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Table of Contents

1. Forest History

a. Land Use History

The state forest system in Ohio began in 1912 when the Ohio legislature amended the Ohio Constitution to allow for the creation of a forest reserve system. At that time, laws were passed that encouraged the propagation and cultivation of forestry on all lands. The first state forests were purchased in 1916, consisting of 221 acres in Athens County and 1,500 acres in Lawrence County, which led to the creation of Waterloo State Forest and Dean State Forest. By the end of the 1920s, the Division had acquired more than 30,000 acres of marginal and degraded farm land in need of restoration.

The Land Utilization Program helped the division acquire more than 40,000 acres from the federal government during the late 1930s, which resulted in the creation of Blue Rock, Tar Hollow and Zaleski state forests. The objective of the Land Utilization Program was to return land to its most productive capacity by generating a forest community, aiding flood control and preventing soil erosion, and by so doing, establishing an economic base to maintain a rural population.

In the 1940s, the Ohio legislature appropriated $1.5 million to add more than 32,000 acres of forest land to the state forest system. The following state forests were created: Yellow Creek, Shade River, Richland Furnace, Maumee, Memorial (at Mohican), Athens (now Stroud's Run State Park), and the forest-parks of Hueston Woods and Beaver Creek – both of which are now state parks. State forests stood proud at 138,628 acres.

In 1949, the Ohio Department of Natural Resources was created. Of particular note was the consolidation of recreation areas under the newly created Division of Parks. The "forest-park" areas managed by the Division of Forestry were combined with the Canal Lands from the Department of Public Works to create a new state park system. All lands in five state forests and portions of seven others were transferred to this new division. The remaining state forests continued to be managed for their original purposes: long-term forest management, demonstration of proper forestry practices, and revenue production. State forests continued to provide areas for "back-country" activities.

In the 1960s, the Division of Forestry took responsibility for mine reclamation areas in Perry County, Jefferson County, and Harrison County. These areas contained approximately 8,000 acres of badly damaged, strip-mined land in desperate need of rehabilitation. The Division of Forestry retained responsibility for Perry, Fernwood, and Harrison state forest areas and has since maintained stewardship.

The Division of Forestry continues to purchase land from willing sellers and receive lands by donation. The most recent additions to the state forest system include Beaver Creek State Forest which was purchased in 1998, the Vinton Furnace State Forest purchased in 2010, and West Blue Rock State Forest which was acquired in 2012.

Past Land Uses: Most of the lands that are now part of the state forest system were heavily used and abused. Several state forests were historically mined for both coal and iron ore prior to the turn of the century. Charcoal had to be produced as part of the iron making process so the timber was heavily cut several times to make charcoal. Remains of iron furnaces can still be seen today at Vinton Furnace and Zaleski state forests. Eventually the iron ore was depleted and these areas were then mined for the coal resources that also underlay the forests. Many old mineshafts and strip mined areas from prior to and leading up to the early 1900s are still evident in these forests. These areas were also subject to many wildfires in the forest due to train routes that run through the middle of the current properties.

In addition to mining on the properties mentioned above, subsistence farming was common on lands that later would become Mohican-Memorial, Yellow Creek, Hocking, Blue Rock, Sunfish Creek, Shade River, Tar Hollow, Scioto Trail, Pike, Brush Creek, and Shawnee. Trees were cut, and the hillsides were cleared to make way for farm fields. Over time, the soils were depleted and eroded to the point where crop production suffered and many of these lands were abandoned. Other lands in southern Ohio were abused through unsustainable timber harvesting practices, primitive agricultural practices, and uncontrolled wildfires. These lands were commonly viewed as wastelands. They became candidates for inclusion into the state forest system.

The efforts of the Civilian Conservation Corps in the 1930s led to a mass reforestation project that resulted in thousands of trees being planted on state forests for erosion control. The CCC crews also built many of the roadways, dams, lakes, buildings and other infrastructure still used by the state forest system and state parks today. Since that time, state forest lands continue to be restored and managed into healthier forests through sound science and proper care and protection. For example, nearly 8,000 acres of Shawnee State Forest were administratively designated as a wilderness area in 1972. Timber management activities and public motorized travel have been eliminated in the area.

Other factors continue to influence our forests such as the ice storm of 2003 that had significant impact on Shawnee State Forest. This ice storm resulted in much downed woody debris. Many trees became uprooted and fell over; some snapped off at the trunk, and excessive amounts of limbs were broken from the treetops. This weather event created a higher fuel loading on the forest floor, stressed living trees, and caused a reduction in growth and vigor, along with other impacts to the forested environment. The ice storm also introduced additional stress on the already declining white oak population. This white oak decline is a symptom of many different influences including root disease and years of stress introduced by several species of insects. Throughout the forest, much white oak mortality can be found. These two factors have created an abundance of understocked and poorly stocked stands throughout the forest.

2. Forest Description

a. Landscape Description

i. Forests in Ohio

The Forest Inventory and Analysis program of the U.S. Forest Service provides current status of Ohio's forests and how they change over time[1]. Through this program, Ohio's forests are inventoried annually, and every 10-15 years the data are summarized in a comprehensive report. Some of the findings from the newest report are encouraging such as the net increase in forestland statewide. Other findings from the report cause concern such as the shift of species composition away from oak species to maples species.

From these data, several trends have been identified that guide our management of state forests:

- Ohio's forests are being affected by urbanization and fragmentation.
- The economics of farming have the greatest potential to affect future changes in Ohio's forest land.
- Oaks represent more than 35 percent of the trees 20 inches and larger in diameter, but only 5 percent of trees in the 2- and 4-inch diameter classes.
- The lack of recruitment of oaks into larger diameter classes is changing the composition of Ohio's forests away from oaks to maples and other species. This will have a dramatic negative impact to biodiversity in Ohio.
- The lack of oaks growing into the larger diameter classes is attributed to inadequate oak regeneration. Past forest practices, control of fire, deer browsing and other factors do not promote oak regeneration. Forest practices that do promote oak regeneration such as leaving oak seed trees and prescribed burning are not used extensively enough and should be employed to a higher degree.
- Emerald ash borer and other forest health pests are causing major financial costs to municipalities, private forest land owners, and the forest products industry.
- Only 12 percent of Ohio's forests are young stands of seedlings and saplings also known as early successional forests. Ohio's forests are shifting to conditions where trees are becoming crowded and more shaded. Animal species that require early-successional habitats are declining because of this change in the forests.

ii. Social and Economic Factors

Currently it is estimated that the wood products industry in Ohio is a 22 billion dollar per year industry[2]. This industry is dependent on sustainably managed forestlands throughout the state. Direct economic benefits from state forests result each year as proceeds from the sale of stumpage through the state forest timber sales are shared with counties, townships, and school districts where the sales are located. Between $1.5 and $2 million is shared to local governments each year. State forests also serve as a demonstration that long-term

[1] Widmann, Richard H. et al., Ohio's Forests 2011. Resource Bulletin NRS-90. U.S. Forest Service, Newtown Square, PA. 2014. Pages 1, 2, 27, 30.

[2] McConnell, Eric. Ohio's Forest Economy. Agricultural and Natural Resources Fact Sheet F-80-12. The Ohio State University. 2012.

sustainable management can be applied to private lands. This demonstration function of state forests is an indirect economic benefit.

The Division of Forestry provides many informational and educational opportunities. Forest employees often lead local students, interested forest visitors, and other clubs and groups on informational tours. Special Use Permits are issued each year for research projects and recreational uses. Recreational users contribute to the community both economically and socially.

Forests are an important aspect of outdoor recreation in Ohio. All state forests managed by the Division of Forestry are open to public recreation and the Division maintains a Recreation program to administer those recreational uses of the forest. The 2013 Statewide Comprehensive Outdoor Recreation Plan (SCORP) is a five year plan that provides a contemporary assessment of outdoor recreation in Ohio and gives recommendations that agencies such as ODNR-Division of Forestry may use to meet recreation needs. Among the issues identified in this plan relevant to state forest management include[3]:

- Keeping forests healthy is essential to providing the backdrop for some of Ohio's most popular outdoor recreation opportunities. Threats to forest health must be addressed.
- Segregation of conflicting recreational activities is effective. Restricted access can be beneficial to sensitive areas.
- Maintenance of existing trails and recreational facilities is a top priority for most users. Partnerships, grants, volunteers, and many other factors can be used to help improve maintenance issues.
- Multi-use trails are used most frequently by forest visitors. Trail connectivity is a potential future issue.
- Land acquisition for recreation purposes is a high priority of this effort.
- Wildlife-related recreation is one of the most popular forms of recreation in Ohio.
- There is a concern that outdoor recreation does not appeal to youth and that land managers should invest in outreach efforts to youth.

The evaluation, incorporation, and monitoring of social and economic impacts of forest management is conducted by the Division in several ways. Data used in our evaluation of social and economic impacts comes from sources including the Ohio Statewide Forest Action Plan[4] and a suite of particular programs and efforts specific to state forest management. The Federal Farm Bill requires each state to complete a Forest Action Plan. The purpose of the Forest Action Plan document is to provide a basis upon which future strategic directions and actions can be evaluated and selected. It is to be used by the Division of Forestry as well as existing and potential partners to marshal limited resources towards addressing identified forest issues and threats.

[3] 2013 Ohio Statewide Comprehensive Outdoor Recreation Plan. Ohio Department of Natural Resources. Pages 91-99.

[4] Ohio's Statewide Forest Resource Assessment. 2010. http://forestry.ohiodnr.gov/overview

Other social and economic factors are evaluated through various efforts and programs within the Division of Forestry. These efforts include involvement in civic activities and organizations, involvement in trade associations and logger's chapters, involvement with NGO's and conservation organizations, and involvement with several outreach programs.

The Division of Forestry is committed to incorporating the social and economic concerns into management decisions in the following ways:

- State Forest personnel will be trained on the relevant aspects of social impacts to state forest management.
- The Division will continue to promote public awareness campaigns reaching citizens living in the wildland-urban interface and the small family-forest owners.
- We are committed to producing a supply of quality forest products and forest services from State Forests indefinitely into the future.
- We are committed to providing and maintaining diverse forest-based and wildlife-related recreational opportunities.
- Enhance Ohio's diverse markets for forest products and services.
- Improve the quality of urban life through proper urban forest resource management.

iii. Climate

Most of Ohio lies within a climatic region classified as Humid Continental, warm summer phase, with predictable general changes. The climate of the southern state forests is much different than the northern forests. The state forest system ranges from about the furthest south location in the state to the most northern. The following is a climate snapshot from south to north. The climate in Scioto County near Shawnee State Forest is relatively mild with an average July temperature of 87º F and a January low of 24º F. The mean annual precipitation is 41.02 inches of rain and 13.5 inches of snow. Weather and climate data from the Toledo Express Airport near Maumee State Forest indicates the annual average maximum temperature is 58.5º F and the annual average low temperature is 38.3º F. The average annual rainfall is 32.5 inches and average annual snowfall is 37 inches. The average annual relative humidity is 60 and the average annual wind speed is 9.4 mph.

Within the state forests, many microclimates exist, each producing its own combination of vegetation and wildlife. Wind, solar radiation, and soil moisture vary between ridges and slopes and hollows, resulting in a variety of flora and fauna. Annual localized floods are common in such areas.

The climate is expected to continue to change in the future and very likely at an accelerated pace. Climate models all show warming and precipitation increases in the northern latitudes, an increase in the number of days with temperature extremes, and a more vigorous hydrological cycle. The potential increase in the growing season and the change in the hydrological cycle in Ohio would potentially mean a change in our forest composition and dynamics. Data models show that within 100 years, Ohio's climate may resemble the current climate of Arkansas. The potential changes in species composition as a result of climate change may lead to ecosystem vulnerabilities such as susceptibility to insects and disease, moisture stress in higher elevations, and adverse effects on wildlife populations.

The Division of Forestry consults tools such as the USDA Forest Service Climate Change Tree and Bird Atlas[5] for potential impacts to Ohio's forests due to climate change. In order for our forests to be able to accommodate climate change, they should contain greater genetic diversity, be adapted to disturbances, be adapted to warmer and drier climates, and contain a diversity of plant communities and species. The goals and objectives of state forest management were formulated to create forests resilient to climate change.

iv. Geology

With the exception of Maumee and Mohican state forests, the state forest system lies entirely within the unglaciated portion of the Appalachian Plateau. The topography of these forests ranges from rolling hills to steep rugged terrain. Streams and valleys penetrate the forests, which are typified by narrow ridges, steep valley slopes and level valley floors. Maumee State Forest is part of the wave-planed ground moraine created by the Wisconsinan glacier. Mohican State Forest is part of the Glaciated Allegheny Plateau and was impacted by the Illinoian glacier.

Surface strata are composed of residual soils formed by the weathering of bedrock and are composed predominantly of calcareous sandstone and shales, except for a few areas that are formed on limestone and limey shale. Most soil is generally light colored and well drained due to the steep, sloping relief. The deepest, richest soils are located within the valley bottoms. However, most of the soil is low in natural fertility and organic matter.

[5] http://www.fs.fed.us/nrs/atlas

b. State Forest Description

i. Soil Resources

With the exception of Maumee and Mohican-Memorial state forests, all the state forests are located in the hill country of east-central and southeastern Ohio. This area is referred to as the "Southern Unglaciated Allegheny Plateau Section of the Eastern Broadleaf Forest Province" and is characterized as a maturely dissected plateau of high hills, sharp ridges and narrow valleys.[6] Maumee State Forest is located in the Maumee Lake Plains which is characterized as flat-lying Ice-Age lake basin with beach ridges, bars, dunes, deltas, and clay flats. The area contained the former Black Swamp and is slightly dissected by modern streams. Mohican-Memorial State Forest is located in the Glaciated Allegheny Plateau which is characterized as ridges and flat uplands generally above 1200′, covered with thin drift and dissected by steep valleys; valley segments alternate between broad drift-filled and narrow rock-walled reaches.

The table below summarizes the soil region for each state forest:

State Forest	Soil Region[7]
Maumee	Hoytville-Nappanee-Paulding-Toledo
Mohican-Memorial	Westmoreland-Homewood-Loudonville
Beaver Creek, Yellow Creek, Harrison, Perry, and parts of Zaleski	Coshocton-Westmoreland-Berks
Hocking, Tar Hollow, Richland Furnace, Vinton Furnace, Dean, Scioto Trail, Pike, Brush Creek, Shawnee and parts of Zaleski	Shelocta-Brownsville-Latham-Steinsburg
Fernwood, Sunfish Creek, Blue Rock, Gifford and Shade River	Gilpin-Upshur-Lowell-Guernsey

The Ohio Forest Action Plan recognizes the importance of conserving soil resources, and the Division of Forestry requires and promotes the use of Best Management Practices for logging practices to control erosion. The Division also developed guidelines for acceptable working conditions for logging during times of wet weather to prevent sedimentation and minimize rutting. Guidelines for the retention of biomass in the forest including live tree, fine woody debris, and snag retention are also in place to promote long-term soil productivity. The Division promotes carbon sequestration tree plantings on state forests. Finally, the Division conducts training for all relevant state forest staff on BMPs and biomass retention.

[6] McNab, Henry W. and Avers, Peter E. Ecological Subregions of the United States. U.S. Forest Service. WO-WSA-5. July 1994.

[7] http://soilandwater.ohiodnr.gov/soil-conservation/ohio-soil-regions

ii. Water Resources

The following table indicates the major watersheds that include state forest land:

State Forest	Drainage	Watershed
Maumee		Maumee River
Mohican-Memorial	Clear Fork of Mohican	Muskingum River
Blue Rock		Muskingum River
Perry	Johnathon Creek	Muskingum River
Perry and Hocking		Hocking River
Harrison	Conotton and Stillwater Creek	Muskingum River
Beaver Creek	Little Beaver Creek	Ohio River
Yellow Creek	Beaver Creek, Little Yellow Creek, Yellow Creek	Ohio River
Fernwood	Cross Creek	Ohio River
Sunfish Creek	Big Run & Stillhouse Run	Ohio River
Shade River	Forked Run & Shade River	Ohio River
Zaleski, Vinton Furnace and Richland Furnace	Raccoon Creek	Ohio River
Richland Furnace, Tar Hollow and Hocking	Salt Creek	Scioto River
Dean	Pine Creek	Ohio River
Shawnee	Munn Run, Odell-Turkey Creek, Briery Branch, Pond Run, Rock Run, Upper and Lower Twin Creek & Quicks Run	Ohio River
Shawnee and Brush Creek	Scioto Brush Creek	Scioto River
Scioto Trail, Shawnee and Brush Creek		Scioto River
Brush Creek and Pike	Ohio Brush Creek	Ohio River
Pike	Sunfish Creek	Scioto River
Tar Hollow	Walnut Creek	Scioto River

This amount of forest within a watershed is a very important factor on infiltration rates and timing of surface runoff that reaches a stream. The US EPA provides data that show the water quality of the most heavily forested watersheds in Ohio varies. These data show that the principle cause of impairment of Ohio's forested watersheds is related to landscape

modifications from agriculture and urban development.[8] Specifically, the pollutants that enter streams in these impaired watersheds are from 1) human or livestock sewage, and agriculture chemicals and 2) sediment from agriculture or urban development. Acid mine drainage is also cited as a factor. The Ohio EPA has designated many Superior High Quality Waters and Outstanding State Waters based on a number of factors, including aquatic life.[9] High quality waters that are located on state forests include the Clear Fork of the Mohican at Mohican State Forest, Brush Creek at Brush Creek State Forest, and Scioto Brush Creek at Shawnee State Forest.

The Division of Forestry promotes good water quality by requiring the use of Best Management Practices for logging practices to control erosion and by complying with a pesticide use policy on state forests with the intent of limiting pesticide use to only directed applications mostly for invasive species control. State forests implement streamside management zones (SMZs) on all harvests. Furthermore, we review the Ohio EPA high quality water locations for possible gaps with the intent to maintain and protect the current high quality status of those streams. All relevant state forest staff are trained on BMPs, SMZs, and EPA water quality data.

The Division of Forestry is the recipient of a federal grant to conduct BMP assessments on forests in Ohio and will be completing those activities during this planning cycle. Division staff also serve as BMP inspectors for the Ohio Forestry Association's member organizations. Each year, a sample of timber companies who are members of the Ohio Forestry Association are inspected for BMP compliance as part of their commitment to sustainable forestry.

iii. Mineral Resources

State forests' geologic layers contain a mixture of previously extracted minerals, strata with future potential, and strata with a lack of known useable resources. It is difficult to estimate the long term potential of these resources. Recent history in the Utica and Marcellus shale booms have proven that technology improvements may result in extractable resources in strata previously thought to be uneconomical.

Historically, many areas were drilled or mined prior to state ownership. The remnants of these activities are still evident today through abandoned openings, mining highwalls, spoil piles, and the remnants of iron furnaces.

Previous mining activities that took place prior to modern reclamation laws include small ore pit mines at Zaleski and Vinton Furnace and large abandoned coal mine sites at Perry, Fernwood, Harrison, Beaver Creek and West Blue Rock. Large sandstone blocks were actively mined in Ohio prior to the industrial production of bricks and concrete. This activity ceased in the 1920s. Evidence of these mines is still visible in Shawnee, Pike, and Brush Creek state forests.

[8] http://water.epa.gov/type/watersheds/index.cfm
[9] http://www.epa.state.oh.us/dsw

Many of the streams near coal and ore sites cannot support aquatic life and only harbor the most pollution-tolerant organisms. In most cases, these sites need a modern reclamation project to achieve long-term water quality improvements. The Abandoned Mine Lands (AML) program administered by ODNR – Division of Mineral Resources Management (MRM) represents a future opportunity for many of these sites to provide the fundamental ecosystem service of clean water expected from forests.

State forest acquisitions that were reclaimed pursuant to state and federal reclamation laws include tracts at Fernwood, Harrison, and West Blue Rock. Most of these sites have compacted soils not suitable for productive forest growth. The long term goals for these sites include soil improvement measures, like ripping, that promote future tree growth. However these processes are expensive, so project partners are needed.

Two large storage fields exist on state forests at Hocking and Mohican. These fields are currently owned by Columbia Gas. The rights of the storage well gas owner predate the creation of the state forest system. The severance of the subsurface ownership is a result of a gas boom in the Clinton Sandstone formation during the early 20th century. The division has a legal responsibility to allow maintenance of the wells and infrastructure associated with this use.

Production wells located on state forests include wells at Blue Rock, Shade River, Perry, and Zaleski. Recently, some horizontally drilled wells, with surface footprints located on private property, have drilled underneath state forests. Division of Forestry staff work with the ODNR – Division of Oil and Gas to ensure the above activities are properly monitored when impacting the surface of state forests. When abandoned wells are discovered, the state's Orphan Well Program can fund permanent caps.

The most viable mineral development potential in state forests includes oil, gas, and coal. The mineral rights on state forests can be divided into three categories: completely owned by the state, partially owned by the state, and completely owned by another party. In recent history, every acquisition is vetted for mineral interest prior to purchase. However, historically this was not the case. Legal status of oil and gas rights, in particular, can be a complicated matter to determine and typically must be done on a parcel-by-parcel basis. Work is ongoing to determine the legal mineral ownership for some of the state forest system.

Lands acquired from the federal government through the work of the Resettlement Administration have mineral rights that are split 75%/25% between the federal government and the state. The state forests that contain many of these lands include Zaleski, Blue Rock, and Tar Hollow. The Bureau of Land Management (BLM) manages these rights on behalf of the federal government. The Division has historically worked with the BLM to manage this property interest, but ultimately the state does not have controlling rights.

Any license or lease for minerals required from the department is managed through the Office of Real Estate and must be approved by the Governor pursuant to the ORC. The

Division is committed to minimizing permanent forest conversion and tracks any conversions through geographic information systems (GIS).

iv. Cultural / Historical Resources

Most state forests have had a history of Native American use. There is evidence of use by mound-building cultures related to the Adena group which lived from 1500 to 2500 years B.C. Indian mounds from this time period are found on several state forests. The mounds, ranging in height up to 20 feet, were used for burial and signaling purposes. The use of the forest in this period is likely connected to an ancient trail passing from present day Marietta to Chillicothe. This road continued to be used through the European settlement period.

There are no federal- or state-recognized Native American tribes in Ohio. However, known Native American cultural sites, such as earthen mounds, are mapped and protected from site disturbance activities and from desecration by the public. The Ohio Historical Preservation Office provides important data and consultation to the Division of Forestry regarding the protection of historical and cultural sites.

The remains of building foundations and old cemeteries can also be found in many areas across state forests. Cemeteries and historic structures are mapped and protected from site disturbance activities.

v. Non-Timber Resources

Forest understory vegetation has many significant ecological roles including regulating microclimate, mitigating runoff, and providing habitat for wildlife. Data from the FIA program shows that there are at least 769 different species of plants that grow in Ohio's forests; they include herbs, grasses, shrubs, vines, and trees.[10] The greatest number of species is in the forb/herb growth habit. Grasses make up the next group that represents a great number of species in the understory.

The most common understory plants include eastern poison ivy, Virginia creeper, black cherry, multiflora rose, and other seedling/saplings of eastern hardwood trees. A diverse mix of plant species is important to wildlife. Understory plants help to filter pollutants and increase air quality. Understory plants also serve as indicators of air pollution such as ozone. State forest management generally promotes the growth and vigor of understory plants by providing increased areas of sunlight.

Carbon sequestration is also a resource that is of potential significance on state forests. The Division of Forestry has entered into long-term agreements with two power companies for carbon credits on small portions of state forest land. These areas previously contained no trees. In exchange for the carbon credits, the Division of Forestry received newly planted stands of trees that are additive to the forest resource. These agreements will be maintained during this planning cycle.

[10] Widmann, Richard H. et al., Ohio's Forests 2011. Resource Bulletin NRS-90. U.S. Forest Service, Newtown Square, PA. 2014. Page 50.

State forests are also areas where visitors may collect nuts, berries, and wild edible mushrooms. Collection of these particular non-timber resources is permitted by law.

vi. Timber Resources

Most state forests lie within the oak-history forest type and contain a heterogeneous composition of forest species referred to as the Central Upland Hardwoods. Mixed oak species are commonly located on all aspects and slope positions. Mesic species of trees that have higher moisture requirements are often located in the hollows and low areas or on north-facing slopes. Principal tree species include northern red, white and black oak, red and sugar maple, various hickories, beech, yellow-poplar, and ash, with occasional walnut and other species. Plantations of conifers are common throughout some forests. Principal conifer species include white, red, and shortleaf pine.

The Division of Forestry possesses a comprehensive inventory of the eight largest state forests[11] (Brush Creek, Hocking, Pike, Richland Furnace, Scioto Trail, Shawnee, Tar Hollow, and Zaleski). The inventory data was modeled for growth and yield using the Forest Vegetation Simulator (FVS) Northeast Area TWIGS variant. FVS is a publicly available growth and yield model produced by the U.S. Forest Service. For over 400 different stands that contained plot data, growth rates were estimated according to site conditions. Net growth rates incorporated in-growth and mortality, and were evaluated for a 10-year period. Net growth rates were summarized and averaged for each stratum that occurred on the state forest project area.

The Division of Forestry's current inventory data for state forests show the following current condition:

- 75% of forested stands are classified as oak/hickory, meaning oak species dominate the overstory trees.
- 76% of forested stands are in the sawtimber or large sawtimber size class.
- Fewer than 10% of forested acres are under 20 years old; 90% of state forest acres are between 20 and 80 years old.
- 82% of forested acres are between 76% - 100% crown closure, which means the trees in these forests have crowns that have grown tightly together allowing little or no sunlight to hit the forest floor.
- Approximately 16,000 acres of State Forest have been identified as High Conservation Value Forests. These areas receive only passive management or restoration activities. The timber volume on High Conservation Value Forests is not included in harvest calculations, because it is considered unavailable for harvest.

For each state forest, the inventory and the net growth rates were calculated based on the data output from the FVS model and applied to the entire state forest. This calculation is noted in the table below as the "Total" growth rate. However, each state forest has a system of management zones that define the management options for those areas. Several zones provide for limited or restricted management. Therefore, the calculation of growth & yield is also provided for only zones 3B and 3C where forest management is active. This calculation

[11] Inventory of eight Ohio State Forest by LandMark Systems. 2009. http://forestry.ohiodnr.gov/forestmanagement

is noted in the table below as the "Constrained" growth rate. The purpose of this table is to provide evidence that the harvest of forest products from state forests was sustainable over the previous five-year planning cycle.
The composition and structure of stands on state forests is cause for great concern. Even though oak species dominate the overstory trees, oak species are a minor component of the midstory and sapling layers. This is because most of the forested acres consist of a dense overstory and midstory with very little sunlight hitting the forest floor. Oak and hickory species are intermediate in shade tolerance meaning they require more direct sunlight for part of the day to regenerate and grow. The shady conditions in our forests perpetuate an understory dominated by red maple and beech seedlings and saplings that tolerate shade. Herbaceous forbs and grasses, which are so important to the ecosystem, are also scarce on these sites.

Within the central hardwood region, data from forests that have oak and hickory timber and a maple and beech understory of saplings show a 90 percent drop in biodiversity (defined as species richness and cover)[12]. This drastic loss of biodiversity, understory forbs, and fruit producing shrubs has serious negative implications for insect and bird populations, as well as other dependent wildlife populations. It also indicates that these forests are potentially susceptible to the negative impacts of climate change, forest health pests, or other natural events.

vii. Wildlife Resources

One of the most important management activities that occur on state forests related to wildlife is hunting and fishing. All state forests are open to hunting and fishing which ensures that game populations will be managed at sustainable levels. Hunting also contributes to a healthy forest by limiting tree damage from over-browsing of deer. State forests provide visitors with a place to hunt, and the economic impact of these visitors is important to the communities surrounding these forests. The dollars spent by hunters and fishermen are used by the ODNR - Division of Wildlife to manage wildlife in Ohio.

State forests also have several wildlife species-specific management areas. Tar Hollow and Zaleski state forests have a ruffed grouse management area where management activities are planned specifically for ruffed grouse habitat. Zaleski State Forest also has a wild turkey management area where management favors wild turkeys. Several state forests have received grant funding from the National Wild Turkey Federation for plantings of native plants or mast producing shrubs for turkey habitat. A few state forests have also received support from The Wildlife Management Institute for the creation of early successional habitat that favors bird species of concern such as the American woodcock. Other state forest efforts exist in relation to the conservation of Cerulean warbler, Karner blue butterfly recovery, black bear, and bobcats. All of these efforts will be maintained or promoted during this planning cycle, and new opportunities will be assessed as they become available. Future grant funding will be pursued. New management areas may be proposed through a special use permit process.

[12] Fralish, James S., the Keystone Role of Oak and Hickory in the Central Hardwood Forest. From Spetich, Martin A., ed 2004. Upland oak ecology symposium: history, current conditions, and sustainability. Gen. Tech. Rep. SRS-73. Asheville, NC: USDA Forest Service, Southern Research Station. Page 78.

Certain threatened and endangered wildlife species exist on state forests. Most notable among these species are the Indiana bat and the timber rattlesnake. There are protection mechanisms and procedures in place to prevent negative impact to these species. The Division complies with all relevant threatened and endangered species laws and policies.

Finally, the management objectives of the Division of Forestry are designed to promote wildlife habitat. It should be noted that the area of timberland in Ohio that contains large diameter sawtimber trees increased by 60 percent while the area in small diameter trees decreased by 65 percent during the past three decades.[13] This has implications for wildlife species. Wildlife species that depend on early successional forests for either forage or cover will be negatively impacted by this trend. This is a concern, and management objectives are designed to address this trend. Many local and regionally appropriate conservation initiatives and recovery plans are in some way promoting the maintenance of early successional habitat (young forests) and oak forests through methods such as prescribed burning and/or timber harvesting.[14] Young forests, shrub land, and oak forests are recognized by these conservation efforts as being critically important.

viii. Invasive Species Concerns

Invasive plant species pose a significant threat to state forests. Invasive species threats have been recognized by many Ohio conservation organizations as one of the major issues of concern for the last decade. Invasive species displace native species and disrupt ecological communities. Controlling invasive species can be an expensive proposition for land managers.

The most common invasive plant species on state forests include multiflora rose, Japanese honeysuckle, garlic mustard, autumn olive, and tree-of-heaven. Data from the FIA program shows that invasives are widespread throughout Ohio, and they have the potential to alter forest communities.

Invasive insect and disease pests are also a concern on state forests. The emerald ash borer has caused widespread mortality in ash trees across Ohio, and on state forests, ash trees are routinely targeted for salvage harvesting. Other invasive pests of concern include white pine adelgid, hemlock woolly adelgid, and thousand cankers disease. Management approaches on state forests consist mostly of monitoring efforts to determine the abundance and distribution of pest problems. Some control efforts on state forests are in progress including biocontrol trials for EAB at Maumee State Forest and hemlock woolly adelgid control at Hocking, Zaleski, Dean, and Shade River state forests. Over this planning cycle, insect and disease control efforts will be variable and infrequent due to being dependent on federal funding that is associated with insect and disease control.

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[13] Widmann, Richard H. et al., Ohio's Forests 2011. Resource Bulletin NRS-90. U.S. Forest Service, Newtown Square, PA. 2014. page 55.

[14] e.g. The Golden-Winged Warbler Conservation Initiative, http://www.gwwa.org/. Managing Habitats for Migrating Land Birds in the Western Lake Erie Basin, http://www.nature.org/ourinitiatives. American Woodcock Habitat Best Management Practices for the Central Appalachian Mountains Region, http://www.timberdoodle.org/. The Ruffed Grouse Conservation Plan, http://www.ruffedgrousesociety.org. Managing Forest Birds in Southeast Ohio, http://obcinet.org/management-guides. Ohio Bird Conservation Initiative All Bird Conservation Plan, http://obcinet.org/abc/.

3. Management Objectives

a. Desired Future Condition

The management objectives listed in this plan are designed to promote biodiversity on state forests and are the result of analysis of the key threats in Ohio as determined by local and regionally appropriate conservation initiatives and organizations (e.g. Forest Inventory and Analysis project, Wildland-Urban Interface data, Division of Wildlife, The Nature Conservancy, NatureServe, LANDFIRE, 2007 State of Birds Report, the Ohio Bird Conservation Initiative, and the Appalachian Mountains Joint Venture).

In this region, there is sufficient evidence to classify oak and hickory tree species as keystone species[15]. A keystone group of species includes those that make an unusually large contribution to forest structure or processes. Keystone species have an effect on other species, or they cause other species to exist or persist in the forest. Managing for keystone tree species such as oak and hickory is a way of managing for all species in a forest community.

The Division of Forestry has adopted the following management objectives to promote oak and hickory and forest biodiversity:

1. Maintain and promote the regeneration of oak-hickory forests by:
   - Enhancing oak regeneration as appropriate in state forest Zone 3
   - Favoring oak and hickory in pre-commercial treatments
   - At a minimum, attempt to preserve an oak component in oak-hickory stands where oak regeneration is unlikely

2. Protect rare or threatened species and communities by:
   - Protecting High Conservation Value Forests through limiting disturbance, restoration efforts, and monitoring
   - Assessing potential impacts to unique or rare forest plant species and communities for each forest management activity and mitigate as necessary

3. Maintain and promote habitat for a diversity of forest-associated wildlife by:
   - Managing for a diversity of forest wildlife by maintaining a sustainable distribution of successional stages
   - Increasing the area of early-successional forest habitat (age class < 20 years old in zone 3)
   - Maintaining High Conservation Value Forests that contain old forests.
   - Ensuring that critical habitat requirements for rare forest wildlife species are being met

[15] Fralish, James S., The Keystone Role of Oak and Hickory in the Central Hardwood Forest. From Spetich, Martin A., ed 2004. Upland oak ecology symposium: history, current conditions, and sustainability. Gen. Tech. Rep. SRS-73. Asheville, NC: USDA Forest Service, Southern Research Station. Page 79-80.

b. Zoning

Zones are spatially defined areas for which the management and use of those areas is clearly outlined. Zoning on state forests is a method of area control. All state forest acres fall into one of four zones and associated subzones. The descriptions for each zone and subzone are described in detail in the Division's Land Management Manual.

The purpose of the zoning system is to classify areas by their most appropriate use while taking into consideration factors such as protecting sensitive resources or preserving areas of important aesthetics. Zoning also promotes biodiversity on areas that can receive management activities such as prescribed burning and harvesting. Zoning takes into consideration soil and water resources, recreational facilities, and administrative areas. The zoning requirements and restrictions govern the activity.

The management objectives listed above have been incorporated strategically into our zone descriptions in order to meet these objectives. For example, rotation ages in managed zones will be between 80 and 120 years. Regeneration harvesting and prescribed burning will be used in managed zones in order to promote and favor oak regeneration. Intermediate stand treatments will focus on improving forest health and timber quality. Timber harvesting levels will be limited to 40% of the annual growth averaged over a five-year time frame.

Certain areas on state forests are identified and zoned as High Conservation Value Forests. This zone is intended to protect and maintain specific areas that are environmentally, historically, or culturally special. High Conservation Value Forests possess attributes such as significant concentrations of rare, threatened, or endangered species; areas that are fundamental to meeting basic services of natural or human communities; and areas that have critical cultural or religious significance. Examples of these areas are Native American earthworks, historic cemeteries, the Shawnee Wilderness Area, the Maumee Muck Farm prairie, and several other areas containing rare features.

During this five-year planning cycle, as new properties are acquired they will be evaluated and assessed for the presence of unique or rare features and will be assigned into the appropriate zone. From time to time, certain areas on existing state forests need zoning adjustments. With any zone change, a procedure involving management approvals, consultations, and public involvement is followed.

4. Land Management Activities

a. Inventory Goals

Forests are divided into compartments, and these compartments are inventoried roughly every 20 years. During these inventories (commonly called "cruises"), the trees are statistically sampled to give the foresters numerical data that assists in detailing the prescription for that particular area. Tree health, forest health, wildlife and aesthetic values, and tree reproduction are just some of the other important assessments that are made during the cruise.

Once the forested stand has been cruised, the data are analyzed, and foresters recommend the most appropriate course of action for the area. Data collected during this process will be analyzed with the best available peer-reviewed science. State foresters use the Oak SILVAH computer program, which is a tool that aids in determining site level prescriptions for forest types in this region as a decision support tool for most native hardwood forest types. Variances from the Oak SILVAH program are allowed on case-by-case basis.
After the public comment period, the stands are prepared for the actual harvest operation. This entails painting boundaries around the sale, flagging trails and roads that will be utilized, and depending on the type of sale, marking individual trees to be kept or harvested. These preparations will guide the loggers in performing the harvest according to the prescription.

During each year of this five-year planning cycle, approximately 7,000 to 10,000 acres will be cruised and 2,000 to 3,000 acres may receive some type of written prescription. Once the area has been cruised, appropriate prescriptions have been written, the trees have been marked, and timber volumes have been estimated, a timber sale may result.

b. Harvesting

Timber harvests are prescribed and used in order to meet the stated biodiversity goals for the forests that were listed above. Oak and hickory trees have two fundamental requirements for successful regeneration: 1) the presence of competitive sources of oak regeneration and 2) the timely, sufficient release of these oak regeneration sources.[16] Harvesting helps meet these two requirements by altering the light characteristics in the stand and by releasing competitive oak regeneration.

Harvest prescriptions are written to meet those goals, but they also must be sustainable. Over the next five years, the allowable harvest limit will be set at an average of 40% of the annual growth volume. Annual growth volume is defined as additional board foot volume that the forest has accumulated over the past year due to diameter or height growth. Annual growth is <u>not</u> the total volume of the entire forest. Additionally, the allowable harvest limit is calculated based only on "available" acres, not on total acres of the forest. Sensitive and restricted areas not zoned for timber management are considered "not available" and are removed from this calculation.

[16] Loftis, David L., Upland Oak Regeneration and Management. From Spetich, Martin A., ed. 2004. Upland oak ecology symposium: history, current conditions, and sustainability. Gen. Tech. Rep. SRS-73. Ashville, NC: USDA Forest Service, Southern Research Station. Page 163.

The allowable harvest limit will not exceed 40% of the annual growth over a five-year rolling average. On occasion, harvesting on an individual state forest may exceed 40% annual growth in a year as long as the total harvest remains below 40% for the five-year rolling average, and harvests over all the combined state forests remain below 40%.
As the timber inventory of the state forest grows each year, and only 40% of that growth is removed, then the remaining 60% of the growth is added to the total forest inventory. This means that not only will harvesting be sustainable but also that the timber inventory should increase after this period of time, provided there are no significant weather or natural disaster emergencies. Harvesting 40% of annual growth will help to increase biodiversity by creating more early successional forests, which are in short supply, and by increasing oak regeneration which is a statewide issue of concern.

Stumpage timber sales are sold on a competitive sealed bid basis. Merchandised log sales are also sold on a competitive basis to local timber markets. Silvicultural practices are employed that promote the health and vigor of Oak regeneration or other hardwood species and are based on established scientific norms for this region. The size and type of harvesting machinery is outlined in the Timber Sale Agreement for each timber sale. In general, conventional ground-based logging equipment including rubber tired skidders and dozers are used to remove designated timber.

c. Environmental Impact Considerations and Restrictions

In order to verify the sustainable management of the state forests of Ohio, the Division of Forestry has committed to be certified to the forest management standards of the Forest Stewardship Council (FSC) and the Sustainable Forestry Initiative (SFI). This certification is verified each year by an independent third party. As in the previous five-year planning cycle, the Division has committed to this independent certification for another five-year term. These forest management standards include significant environment protections. The results of each year's audit are publicly available on the Division's website.[17]

Because timber harvesting is a site-disturbing activity, many other considerations and restrictions must be in place prior to or during harvesting. Foresters will follow all ODNR policies regarding site-disturbing activities.

Before being marked on the ground, planned timber harvests are displayed in publicly available open houses for public comment. After public comments and prior to conducting a timber harvest, a pre-harvest assessment is completed. The pre-harvest assessment covers a review of any sensitive features, rare or threatened species, the presence of any cultural or historical feature, how water features will be protected, and consideration of visual aesthetics. Mitigation measures for identified issues are determined prior to harvest. Various consultations occur with wildlife biologists and other experts on potential considerations that need to be made prior to the harvesting.

During the timber harvest operation, many other considerations and restrictions are used to prevent unnecessary damage to the site. A Wet Weather Logging Policy has been designed to protect water quality, public infrastructure, and soil productivity during times of wet soil

[17] http://forestry.ohiodnr.gov/stateforestcertification.

conditions while harvesting. All timber harvests will use Best Management Practices listed in "BMPs for Erosion Control for Logging Practices in Ohio" to prevent soil erosion and provide for water quality.

Finally, all timber sales are harvested by trained Master Logger Companies that have been certified by the Ohio Forestry Association. These companies receive training on safety and Best Management Practices. They are required to wear personal protective equipment and they have been trained on spill kits on site and have been trained on mitigating chemical and fuel spill mitigation. All timber sales are monitored by a trained Timber Sale Administrator who inspects the timber sale to ensure protection measures are in place and to verify compliance with contract provisions.

Forest	Forested Acres	Harvestable Acres	Total Inventory (Board Feet)	Total Annual Growth (Bd Ft/Yr)	Growth on Harvestable Acres (Bd Ft/Yr)	Average Harvest Last Five Years (Bd Ft/Yr)	Harvest as % of Growth
Beaver Creek	1,026	272	6,594,102	225,474	59,775	0	0%
Blue Rock	4,560	4,272	29,060,880	1,002,106	938,815	244,741	26%
Brush Creek	13,348	12,639	146,279,794	3,761,280	3,540,777	1,056,417	30%
Dean	2,745	2,517	5,000,000	549,000	503,400	124,871	25%
Fernwood	3,029	2,866	11,885,796	665,653	629,832	112,709	18%
Gifford	319	237	2,282,445	70,103	52,083	14,811	28%
Harrison	1,321	1,232	5,071,319	290,303	270,744	99,158	37%
Hocking	9,217	7,369	130,317,737	2,706,693	2,181,748	331,950	15%
Maumee	3,070	2,977	19,730,890	674,663	654,226	102,738	16%
Mohican-Memorial	4,500	1,800	32,033,966	647,000	257,400	48,824	19%
Perry	4,619	4,485	29,265,984	1,015,071	985,624	153,928	16%
Pike	11,861	11,125	147,183,603	3,294,300	3,097,107	1,055,412	34%
Richland Furnace	2,430	2,383	28,762,834	643,561	631,609	30,436	5%
Scioto Trail	9,451	9,016	107,120,887	2,756,918	2,614,641	772,156	30%
Shade River	2,815	2,331	16,785,845	618,624	512,261	191,274	37%
Shawnee	63,118	52,251	628,456,616	18,682,097	15,555,692	3,220,627	21%
Sunfish	637	637	4,140,500	125,000	125,000	0	0%
Tar Hollow	15,104	13,743	209,315,204	3,839,947	3,436,070	1,156,412	34%
Vinton Furnace	12,089	9,437	51,000,000	2,656,679	2,073,875	68,406	3%
Yellow Creek	753	753	3,977,346	165,479	165,479	50,831	31%
Zaleski	27,313	19,844	319,366,663	7,369,785	5,295,709	1,987,689	38%
Total	**193,325**	**162,186**	**1,933,632,411**	**51,759,736**	**43,581,867**	**10,698,519**	**25%**

d. Research

The Division of Forestry has a long history of commitment to forest-related research and will continue over this planning cycle to maintain a commitment to research that relates to the mission of the Division.

Several state forests provide sites for on-going forest or wildlife-related scientific research. Among these forests is Vinton Furnace State Forest which serves a dual role of being not only a state forest but also the location for a U.S. Forest Service experimental forest. The Division of Forestry supports and collaborates with many organizations by providing research sites and in-kind labor. Those organizations include the U.S. Forest Service, the Ohio State University, and Ohio University.

Current topics of research include prescribed fire, oak regeneration, and invasive species management. Many of the research projects on state forests are long-term projects such as the Fire and Fire Surrogates Study that is part of a national research program. Aside from providing forest sites and in-kind labor, the Division also organizes and oversees a Research Advisory Committee particular to the Vinton Furnace State Forest that reviews and coordinates potential research projects.

Research is a part of our culture. Over the course of this planning period, the Division will maintain its commitment to providing forested sites for existing research as well as evaluating any new potential research projects as they are proposed by partner organizations. New research proposals will be evaluated on a case-by-case basis through the special use permit procedure.

e. Outreach and Demonstration Areas

The Division of Forestry has long maintained outreach and demonstration areas to show the importance of forest management. These areas are devoted to show the public the benefits of forest management. The following is a list of the areas devoted to such use. The Division is always looking for new opportunities that can showcase the importance of forest management to the general public and private forest landowners.

State Forest	Name of Area
Maumee	Stewardship Trail
Maumee	Windbreak Arboretum
Maumee	Tree Improvement Area
Mohican-Memorial	Discovery Forest
Zaleski	Backpack Trail interpretive signage
Zaleski	Driving Loop
Vinton Furnace	Demonstration Area
Mohican, Hocking, Zaleski, Tar Hollow, Scioto Trail, Shawnee, Blue Rock	Fire Towers interpretive signage for fire management

5. FIRE MANAGEMENT

a. History

Wildfire protection in Ohio has its origins in southern Ohio in the early 1920s. Division of Forestry Fire Wardens had the responsibility to organize fire crews, keep hand tools and equipment ready, and enforce burning regulations. In this period, the fire towers were constructed to help detect wildfires. Only seven towers remain on state forests today. Most towers, when closed in the late 1970s, were dismantled and sold for scrap metal.

When a wildfire occurs today, its suppression falls primarily to the local fire department. Within the Forest Fire Protection District of the state, the ODNR Division of Forestry has cooperative agreements with over 300 rural volunteer fire departments (VFDs). These VFDs receive a nominal payment in return for providing a wildfire report to the Division. The Division maintains an online database for the fire departments to enter the wildfire reports.

The Division also offers training to firefighters ranging from basic wildfire instruction to specialized courses to improve skills necessary in the complex and dangerous business of wildland firefighting. The Division maintains some larger specialized equipment such as bulldozers to assist in suppression efforts. A limited number of federally owned vehicles and equipment are also loaned as available to cooperating VFDs through the Federal Excess Personal Property Program (FEPP). The Firefighter Property Program (FFP) also administered by the Division of Forestry makes federal excess vehicles available to cooperating VFDs which are titled to them at no cost.

Most fire activity in the state is confined to the far southern, river counties. The state wildfire protection area follows the line of glaciation through the state, covering the eastern third of the state, with the exception of an area around Maumee State Forest. This area was defined in this manner since most of the timber resources in the state are located in these counties. The western two-thirds of the state are generally agricultural lands. The U.S. Forest Service, through a cooperative agreement, also has responsibilities for fire control in their Athens and Ironton Ranger Districts.

b. Fire Suppression Objectives

The Division of Forestry has the statutory authority for fire suppression and protection within the designated forest fire protection area of the state. Division employees serve as initial attack resources within the forest boundaries and assist VFDs outside the forest boundaries, when requested. Most requests are for specialized equipment. Most of these fires occur on privately-owned lands.

c. Prescribed Fire

Prescribed fire is a very important part of the overall forest management on the state forest system. Burning will primarily fall into three categories: site preparation/release, restoration, and fuel reduction.

Site preparation/release burning will target oak/hickory stands to aid in regeneration. Oak/hickory stands benefit from the use of fire by reducing the competition from thin barked tree species such as red and sugar maple and yellow-poplar. Oaks and hickories concentrate

early seedling growth to the root system whereas thin barked species such as maple and poplar concentrate growth upwards. Prescribed fire is used to top-kill the oak/hickory competitors which are not able to re-sprout as vigorously once top-killed. However, this may take repeated burns to accomplish.

Prescribed fire will also be used to manage rare habitats located on state forests such as at Maumee State Forest in the oak openings region. Many rare, threatened, and endangered species located there are part of a fire-dependent ecosystem.

Fire is also used as a restoration tool to help reduce the amount and density of woody vegetation that is present on the site. Fuels reduction is inherent to a site preparation or release burn, but specific fuels reduction projects have taken place in the past and will continue to be used where appropriate. Events such as the 2003 ice storm at Shawnee State Forest, which impacted nearly half of the forest acreage, is one such event where fuels reduction burning was undertaken. By reducing the amount of fuel on the forest floor, there is less potential for a large scale and catastrophic wildfire event. Other such natural disasters such as wind storms, ice storms and events that impact large areas of forestland are areas that would be targeted for fuels reduction burning to reduce the amount of fuel available to burn if a wildfire started.

Stands to be burned for oak/hickory regeneration purposes will be drawn from recommendations of the foresters and other land management staff. GIS layers will be used to track when the stands were last cut or burned. Generally, areas will be targeted to burn 5-8 years after the first stage of shelterwood, other harvests, or the last burn. This gives the oak regeneration time to develop adequate root systems so that it can re-sprout vigorously after being top-killed. Areas where harvests are not immediately scheduled and have good oak regeneration that may not be competitive with thin barked competitors are also stands that will be targeted to burn. This will reduce the number of oak/hickory competitors prior to opening the canopy and releasing the regeneration that is already present.

Once stands are identified to burn, the area will be inventoried to determine the regeneration that is present in the stand. SILVAH Oak can be used as a tool to help quantify regeneration data and to help with possible prescriptions. This information will be used as a baseline for future monitoring of oak/hickory regeneration. Once data have been collected, a burn plan outlining (at a minimum) the purpose, site description, pre-burn preparations, burn parameters, firing techniques, contingencies, smoke management, resources, and post burn monitoring will be developed. These plans are developed at the local and district level and must be written by an Ohio Certified Prescribed Fire Manager (OCPFM). An OCPFM must also be in charge of the burn on the day it is conducted. Burns are conducted according to Department and Division policy as well as following all applicable laws and are lit only when conditions are favorable for burning with the appropriate resources in place.

Post fire monitoring for these areas is conducted in the season or two after the burn to evaluate the effectiveness of the prescribed burn. The post-fire monitoring can also be used to help develop plans for the land management staff regarding regeneration of shelterwood cuts that may be ready for the overstory removal cut.

The number of acres to be burned each year will vary based on previous management and will be dependent upon the size of the regeneration present. 1,000 acres per year may be an average burn year. Some years may be less and other times significantly more. As more shelterwood harvests approach the age where burning may be beneficial, the acreage may increase a bit.

d. Fire Prevention

The majority of wildfires in Ohio are human caused and the most common cause is from debris burning. In order to promote wildfire prevention and awareness, the local forest manager will work with the District Forest Manager and Columbus staff to coordinate fire prevention activities such as Smokey Bear events and handing out informational brochures.

e. Fire Program Training

Employees are encouraged to participate in Ohio's Interagency Fire Crew. This program gives the personnel and the Division additional experience and training opportunities that broaden their overall wildland fire suppression knowledge.

Classroom training will be offered to all Volunteer Fire Departments as requested. Staff training will be available through the Fire Management Program, and generally most training for Division staff is received at the Mid-Atlantic Wildland Fire Academy.

6. Division of Forestry Recreation

State forests offer visitors numerous outdoor recreation opportunities that require a large land base and are compatible with sustained forest management, including backcountry bridle trails, backpack trails, mountain bike trails, day-use hiking trails, camping, hunting, wildlife viewing, and gathering. More than 300 miles of backcountry bridle trails, 80 miles of hiking and backpacking trails, and 50 miles of mountain bike trails are found on Ohio's 21 state forests. The Division of Forestry is the sole provider of designated motorized trail riding areas on state lands for off-road APV's and motorcycle riding. (2013 SCORP)

a. Bridle Trails and Horse Camps

Horses may be ridden along forest roads or on designated bridle trails at the following state forests:

- Blue Rock: 26 miles
- Brush Creek: 15 miles
- Dean: 20 miles
- Harrison: 20 miles; Horse Camp with 20 camp sites
- Hocking: 40 miles; Horse Camp with 23 camp sites
- Maumee: 8 miles
- Mohican-Memorial: 22 miles; Horse Camp by permit only
- Perry: 8 miles
- Pike: 38 miles
- Scioto Trail: 21 miles
- Shawnee: 60 miles; Horse Camp with 58 camp sites

- Tar Hollow: 26 miles; Horse Camp with 46 camp sites
- Zaleski SF: 50 miles; Horse Camp with 16 camp sites

All horse camp sites are on a first come, first served basis, other than Mohican-Memorial which is by permit only. Non-potable water is available at all horse camps except Zaleski. Riders should bring water for drinking.

b. Camping

Camping is permitted only in areas provided for such use. There is no fee for camping in state forest camp sites.

- Family campgrounds are available at Fernwood and Harrison state forests
- Primitive horse camps are located at Hocking, Zaleski, Tar Hollow, Shawnee and Harrison state forests
- Remote "Park and Pack" campsites are available at Mohican-Memorial State Forest
- Primitive backpack campsites are available at Shawnee and Zaleski state forests
- Hunter's campground is available at Vinton Furnace and Zaleski state forests during deer and turkey hunting seasons
- Roadside camping is available by permit during deer and turkey seasons at some southern state forests

c. Hiking and Backpacking

Hiking is permitted on all trails in state forests, including bridle trails. Backpack trails are available at two state forests:

- Shawnee: 40 miles
- Zaleski: 23.5 miles

d. All-Purpose Vehicle (APV) and Snowmobile Trails

APV Trails are available on four state forests:

- Maumee: 7 miles
- Perry: 16 miles
- Pike: 10 miles
- Richland Furnace: 8 miles

When conditions permit, snowmobiles are permitted on designated trails at Maumee State Forest's APV area and at Mohican-Memorial State Forest.

e. Mountain Biking

Mountain bike riding is allowed on roads open to normal motorized traffic. In addition, mountain bikes are permitted on:

- Scioto Trail State Forest: bridle trails
- Mohican-Memorial State Forest: 24 miles (includes state park mileage)
- State forest APV areas

f. Hunting and Fishing

Hunting is permitted on most state forest lands as regulated by the Division of Wildlife. Non-hunting areas on state forests are posted. Fishing opportunities exist on numerous ponds and lakes located within the state forests.

g. Target Shooting

Target shooting is allowed only on designated target ranges located at Fernwood, Harrison and Zaleski state forests. Target range rules are posted at the range sites and must be strictly followed.

h. Maintenance and Inspections

Trail and limited access roads are inspected regularly by state forest staff for maintenance needs and hazard trees. In addition, campgrounds, picnic areas, trailheads, and other places where forest visitors congregate are monitored for hazard trees. Trees identified as being possible hazards to the public will be removed by state forest crews.

The Division maintains agreements with numerous volunteer groups on the state forests to assist with trail maintenance. Partnerships with volunteer groups are important for maintaining quality recreational experiences.

A complete list of recreational opportunities on each state forest is found in the following table.

State Forest Recreation

State Forest	Acres	Miles of Trails - Primary Use					Shooting Range	Campsites	Fire Tower	State Park w/in State Forest	Other Features
		Hiking	Bridle	APV	Backpack	Mtn. Bike					
Beaver Creek	1,122										Adjacent to Little Beaver Creek State & National Wild, Scenic River
Blue Rock	4,578		15						Y	Y	
Brush Creek	13,515	2.8	10.2								
Dean	2,745		7.8								Trail connects to Wayne National Forest
Fernwood	3,023	4.8					Y	F-22			Trap, pistol, rifle ranges; fishing ponds
Gifford	320										Experimental seed orchards, fishing pond, picnic area
Harrison	1,345		12.5				Y	H-20 & F-7			Fishing ponds
Hocking	9,817	7.3	31.3					H-23	Y	Y	Rock climbing, rapelling, Buckeye Trail
Maumee	3,299	1.9	8.3	6.2							Windbreak arboretum, tree improvement area, wet sedge meadows
Mohican-Memorial	4,541		19.7			18.1		P-10	Y	Y	Memorial Forest Shrine, Discovery Forest
Perry	4,706		6.2	19.7							
Pike	12,159	28.2	28.5	10.3						Y	Buckeye Trail
Richland Furnace	2,524			7.3							Historic iron ore area
Scioto Trail	9,600	4.5	25						Y	Y	Buckeye Trail
Shade River	2,859	2									Fishing pond
Shawnee	63,778	9.6	67.2		46.4			H-58	Y	Y	8,000 acre wilderness area, Buckeye Trail, fishing lakes
Sunfish Creek	637										Steep terrain along Ohio River
Tar Hollow	16,436	24.4	27.5					H-46	Y	Y	Buckeye Trail, Logan Trail, Grouse Mgmt Area
Vinton Furnace	12,086	14.1									Hunters Camp
West Blue Rock	698										
Yellow Creek	756										Adjacent to Highlandtown Wildlife Area
Zaleski	27,851	0.5	29.5		23.9		Y	H-16	Y	Y	Grouse Mgmt Area, Hunters Camp, Forest of Honor
								F-Family; H-Horse; P-Park & Pack			

7. Law Enforcement

a. History

In 1967, legislation established the Forest Officer position within the Division of Forestry. In 1974, rules and regulations governing state lands were adopted, and ODNR officers are largely responsible for enforcing them. In 1985, Ohio Peace Officer Training Academy certification became mandatory for all officers, and weapons were issued to those commissioned. In order to increase efficiency, the park and forest officer positions were combined in 2012. At this time, all remaining officers within the Division of Forestry were transferred into the park officer position. The responsibilities of all park officers, in proximity to state forests, now include enforcement and patrol on each of the two divisions' lands. District forest managers and Division of Parks law enforcement supervisors collaborate in order to have a safe and effective program.

b. Program Expectations

The purpose of the officer is to enforce the forest rules depicted in the Ohio Administrative Code as well as laws within the Ohio Revised Code. They are to conduct patrol and provide for public safety and assistance. One very important aspect of the program is resource protection. Officers protect property boundaries from encroachment, recreation resources from undesignated uses, and guard against timber theft. A select few officers have the opportunity to become wildfire warden investigators and are able to conduct wildfire investigations on both public and private property. This ability also provides a preventative and enforcement function pertaining to wildfires on state forest land. For more information on these functions, please refer to Chapter 5 of the Division of Forestry Fire Manual.

Responsibilities of officers include but are not limited to:

- Enforce all forest rules on state forests, Ohio Administrative Code.
- Enforce all relevant laws on state forests, Ohio Revised Code.
- Patrol in order to provide for public safety and assistance, as well as resource protection.
- Investigate wildfires within the Fire Protection Area, as assigned by the Division of Forestry.
- Issue warnings and citations according to the relevant wildfire and arson laws.
- Law enforcement officers and supervisors are also responsible for communicating and collaborating with the district forest manager regarding enforcement and patrol.
- Special projects are scheduled as needed. Potential projects may include holiday horse camp security and trail patrol, and illegal APV use details.
- Seek opportunities to increase public awareness and forest education through visitor assists and other information and education opportunities.
- Issue verbal warnings and citations, on state forests, when needed.
- Investigate problems on forest property including:
  -Dumping (trash, methlabs)
  -Encroachments (timber sales, boundary disputes)
  -Vandalism (state structures, state property)
  -Theft (forest signs, timber, state property)
  - Wildfire occurrence

8. Facility Maintenance and Infrastructure

a. Buildings and Facilities

Throughout the state forest system, there are a total 12 of staffed facilities. Each of these facilities has several buildings and associated infrastructure. Each is designed to support management, maintenance, and land management staff. Each facility also supports public visitation for assistance. These headquarter locations are as follows:

Dean	Shawnee
Scioto Trail	Pike
Blue Rock	Hocking
Zaleski	Maumee
Fernwood	Mohican
Southern District Office	Northern District Office

There are two locations within the system that are not staffed but support state forest operations. These locations are as follows:

Tar Hollow old headquarters	Tar Hollow Piney Creek outbuildings

b. State Residences

Several state forests also have residences that are utilized by ODNR employees. Priority is given to leasing to law enforcement staff, but Division of Forestry employees may also utilize the houses to provide for a more rapid response to wildfire occurrences on both public and private land. These tenants also provide a security presence. Tenants are largely required to maintain their leased areas; however, maintenance staff may be assigned to conduct approved projects involving maintenance and repair.

Residences are located in the following areas:

Shawnee, Headquarters	Tar Hollow, Piney Creek
Pike, Headquarters	Pike, APV area
Scioto Trail, Headquarters	Scioto Trail, Fire tower site
Zaleski, CCC Complex	Dean, Headquarters
Hocking, Cantwell Cliffs (vacant – to be demolished)	Hocking, Headquarters (vacant – to be demolished)
Hocking, State Route 374	

c. Fire Towers

There are several historic fire towers that still exist. They no longer function as active lookouts but are a reminder of the Division's history and current responsibilities in fire response and prevention within the state's Fire Protection Areas. Each tower has been renovated and is maintained by state forest staff. When weather conditions allow, the public has access for climbing the stairs up to the cab. Several fire tower sites include interpretive signage geared toward educating the public on wildfire, prescribed fire, and the Division's responsibilities. Following is a list of the state forests in which historic fire towers are located:

Shawnee	Scioto Trail
Tar Hollow	Hocking
Blue Rock	Mohican
Zaleski	

d. Signage

Throughout the state forests, many types of informational signs exist and are maintained by staff. This may include road signs, public safety signage, informational kiosks, educational signs relating to land management activities, and administrative postings. Signage will be maintained and replaced as needed. They will either be purchased or constructed by forestry staff. Evaluations will be made, as needed, pertaining to the state of degradation, need for maintenance or replacement, and locations of signage. Prescribed fire treatments and timber sales are always posted as closed for safety reasons, when active.

e. Dams

Lakes, dams, and spillway maintenance continues to be a priority for Division of Forestry staff. There are several small unclassified wildlife ponds that require minimal maintenance, but the Division also manages nine classified dams. These lakes and associated infrastructure are frequently inspected and the dam's Emergency Action Plan or Emergency Preparedness Plan is followed if concerning issues are developing. The Division of Forestry utilizes the Division of Engineering for technical expertise and the Division of Soil and Water regulates these classified structures. Maintenance items on these dams include mowing the earthen levees, minor repair to spillway and associated structures, vegetation clearing, spillway clearing, ice mitigation, and exercising the drain valves if present. Lake maintenance may include seasonal water level lowering, inlet maintenance, snag removal, perimeter vegetation clearing, and mowing.

Class	Dam Name	Location
II	ESSINGTON LAKE DAM	Perry State Forest
III	PERRY DAM NO. 2	Perry State Forest
III	RONSHEIM LAKE DAM	Harrison State Forest
I	PERRY DAM NO. 3	Perry State Forest
II	ZANESVILLE LAKE DAM	Zanesville Nursery
I	BEAR CREEK LAKE DAM	Shawnee State Forest
I	POND LICK LAKE DAM	Shawnee State Forest
I	WOLFDEN LAKE DAM	Shawnee State Forest
II	McBRIDE LAKE DAM	Shawnee State Forest
Not Classified	CHURN CREEK DAM (not classified but has a spillway)	Shawnee State Forest
Not Classified	ANDERSON LAKE DAM (not classified but has a spillway)	Pike State Forest
Not Classified	HARRISON RECLAMATION DAMS (not classified but have spillways)	Harrison State Forest

f. Roadway Maintenance

The state forest road system includes state highways, county and township roads, ODNR roadways, and service roads. Some of the township roads are actually unmaintained, but not classified as abandoned, and remain available for travel by legal vehicles. Depending on the specific forest, any combination of the listed road types may be present. ODNR roads on state forest land are referred to as "forest roads" and are numbered.

These forest roads are maintained by the forest crews. Funding and technical expertise may be provided by ODOT on larger projects. These projects include, but are not limited to; road and parking lot paving, large quantities of aggregate or culvert placement, bridge repairs or replacement, and large road slip repairs.

Within the state forest road system there over 200 miles of road, over 65 bridges, and several thousand culverts and headwall systems. There are numerous parking areas, pull-offs, scenic vistas, and service roads.

Forest crews and forest managers will be responsible for the following workload as well as other issues as they arise:

- Perform Ohio Department of Transportation (ODOT) Scope of Services Request once per fiscal year by inventorying road conditions as well as bridges, drain tiles, and header conditions. Participate in the planning and implementation of approved projects.
- Inspect forest roads and service roads according to planned rotation.
- Inspect culvert headwalls, clean and maintain as needed.
- Repair, maintain, and replace bridge components as needed.
- Repair, maintain, and replace road drainage components as needed.
- Utilize tractor with ditcher head to maintain ditches along roads as needed.
- Utilize road graders to grade gravel roads and maintain ditches as needed.
- Clear debris from roads as needed.
- Litter pick up as needed.
- Assist in Annual ODOT Inspections as requested.
- Patch potholes as needed.
- Repair slips as needed.

Roadside mowing on forest roads is utilized in order to increase visibility and public safety and will be conducted according to the forest manager's discretion. When roadsides are not mowed properly, forward visibility, ditch visibility, and road edge visibility may become a safety issue. Damage to ditch and drainage systems as well as road surfaces may also occur due to overgrown vegetation. Roadside mowing is extremely important in maintaining infrastructure and public safety.

Field mowing will occur as needed on several fields throughout the state forest system. There are occasions where additional area mowing may occur at the forest manager's discretion. Finish mowing occurs as needed depending on growth.

Service roads include access roads that are not open to public travel, but are kept in a condition that permits use by forest staff. These roads may also be utilized for land management activities. They are inventoried and inspected to ensure that they are maintained according to best management practices. Specific uses of these roads may or may not require improvement.

g. Boundary Maintenance

The property boundary surrounding each state forest will be maintained by painting on a four- or five-year rotation. All forest boundaries will be marked according to Division policy. Real estate transactions that result in a change in ownership will be evaluated for the most appropriate means of marking the property boundaries. Acquisitions and transfers may require survey prior to marking and the Division of Real Estate will be utilized for expertise if necessary.

9. Special Use

State forests may be utilized in various ways by the public, stakeholders, other government agencies, companies, etc. There are laws, rules, and policies that dictate how the Division evaluates and grants permission for these land-use requests.

One of the most common venues for allowing a special use is the issuance of a "special use permit." When relevant, an interested party would complete a special use permit application. It would then be evaluated by Division staff, and if approved, a permit for that use would be issued. These are commonly issued for short term events in which one or more of the "forest rules" would need to be waived in order for the event to take place. In some cases, the division may require an application fee, proof of insurance, and a surety bond. These events include, but are not limited to:

• Competitive trail races • Large groups utilizing recreation trails • Short term access to private land or utility lines across state forest property • Research	• Events such as weddings, group tours, group camp use • Hay production from state forest fields • Geocaches • Concessions taking place on state forests • Filming

A common instrument for issuing permission for long term use may come in the form of a license agreement. These are typically evaluated and issued for utility corridors,

communication tower sites, access by private landowners across state property, and use of state buildings by entities other than state government. In most of these cases, building use licenses are granted to township trustees for use of vacated forest headquarter facilities. On few occasions, facilities are leased to non-government organizations. This includes the Zanesville State Nursery, Green Springs State Nursery, and Mohican Youth Camp, Maumee Youth Camp, Maumee Migrant Rest Center, and Blue Rock gun range. When long term license agreements are recommended by the Division of Forestry, the Office of Real Estate assists with expertise and processing.

10. Monitoring

Monitoring is a critical component of our management of state forests. Monitoring activities are the responsibility of the state forest districts and units. There are several monitoring efforts incorporated into forest management activities which are summarized below.

Activity Inspections – Timber harvesting, precommercial activities, and other forest management activities are inspected on a recurring schedule. These inspections serve as not only a mechanism to assess compliance with legal contracts but also to assess effectiveness and environmental impacts. The benefit of activity inspections is that they serve to identify and mitigate potential issues before they become problems. Inspections help to protect soil and water impacts from disturbance related activities. Activity inspections also occur post-treatment. In the case of prescribed burning, monitoring occurs several seasons after a fire in order to quantify the plant community response to the fire.

Limited use road and trail inspections – Inspections occur on limited use roads and trails on a yearly basis. The purpose of these inspections is to identify potential soil and water impacts from inadequate BMP's. Once potential issues are identified from these inspections then maintenance can be scheduled.

Forest inventory – as mentioned earlier, the Division of Forestry monitors our timber inventory and removals to ensure that harvesting is sustainable and does not exceed growth. To better ensure sustainability, the Division's harvest limit is set at 40% of the annual growth over a five year cycle. All removals of harvested timber are controlled and tracked.

High Conservation Value Forests – An assessment of all state forests was completed to identify the presence of High Conservation Value Forests. In order to be classified as High Conservation Value Forest the area must meet a defined set of criteria. This process included consultation from stakeholders and the general public. As a result, nearly 16,000 acres were identified as HCVF. These areas are subsequently monitored for overall health and condition and the influence of external forest pests, littering, and other factors.

11. Plan Revision

This management plan is intended to guide forest management on Ohio's State Forests for five years or the period of November 1, 2015 to November 1, 2020. At the end of this five year period, this plan will be revised and updated incorporating the results of monitoring, new scientific information, stakeholder consultations, and other social or economic circumstances.