

Tuscarora State Forest Resource Management Plan



4455 Big Spring Road, Blain, PA 17006

717-536-3191

fd03@pa.gov

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Data Note: Unless otherwise noted in text or caption, all data summarized in this document were compiled between February 2017 and March 2018.

Preface

The state forest system of Pennsylvania, approximately 2.2 million acres of forest land, comprises thirteen percent of the forested area in the commonwealth. The Bureau of Forestry is the steward of this land; and the Bureau's mission includes managing state forests under sound ecosystem management, retaining the forest's wild character and maintaining biological diversity while providing pure water, opportunities for low-density recreation, habitats for forest plants and animals, sustained yields of quality timber, and environmentally sound utilization of mineral resources. Article 1, Section 27 of the Pennsylvania Constitution provides that, "Pennsylvania's public natural resources are the common property of all the people, including generations yet to come," and it sets forth that the Commonwealth has trustee responsibility for these resources. The bureau carries out this constitutional mandate by implementing it in both its long-term planning and every-day actions. To carry out its stewardship and trustee responsibilities for state forest lands, the bureau develops and implements planning documents that assure that the overarching goal of state forest management – ensuring sustainability – is achieved for the benefit of all the people. In 2016, the Bureau revised its State Forest Resource Management Plan (SFRMP), which is the primary instrument that the Bureau uses to plan, coordinate, and communicate its management of the state forest system. The SFRMP sets forth broad policies, as well as more focused goals and objectives about state forest resources and values.

State forest management is a coordinated effort involving central office program areas and field staff in twenty forest districts located throughout Pennsylvania. Each district is responsible for managing wildland fire, destructive insects and disease on all lands throughout the district – public and private. The district staff promote wild plant conservation and private forest land conservation and stewardship. The staff also provides for the protection, administration and management of state forest lands within the district.

Building upon the 2016 state-wide SFRMP, the bureau has developed District State Forest Resource Management Plans to provide district-level resource information and district- and landscape-level management priorities. This Tuscarora State Forest Resource Management Plan provides an overview of the district and its operations on state forest land and sets forth a framework for future management of Tuscarora State Forest. The planning horizon for this District SFRMP is approximately five to ten years, after which time it will be revised to reflect changing conditions and priorities.

The Bureau also creates District Activity Plans that describe the management activities that the Bureau will take within each district that may affect the public's use of state forest land. These are implementation plans that address how goals and objectives in the SFRMP and District SFRMPs are being achieved. The District Activity Plans are written at the start of each calendar year and revised mid-way through the year. They are posted on District webpages so that the public may review and comment upon them.

This Tuscarora SFRMP is comprised of a District Overview, a listing of District Priority Goals and a collection of landscape management unit (LMU) plans, which are described in more detail below.

Executive Summary

The Tuscarora State Forest Resource Management Plan provides an overview of the district and its operations on state forest land and sets forth priorities for future management of Tuscarora State Forest within the broad framework of the 2016 statewide State Forest Resource Management Plan (SFRMP). The statewide SFRMP is the primary instrument that the Bureau of Forestry uses to plan, coordinate, and communicate its management of the entire state forest system. This District-level SFRMP for Tuscarora State Forest focuses on local resources, opportunities, and areas of emphasis for management. The planning horizon for this District SFRMP is approximately 5-10 years, after which time it will be revised to reflect changing conditions and priorities.

The Tuscarora State Forest consists of 96,168 acres of state forest lands and 3 main Landscape Management Units (described below and on page 49). The Tuscarora Forest District covers most of Perry and Juniata Counties and parts of Cumberland, Franklin, Huntingdon and Mifflin counties in Central Pennsylvania, mostly in the Ridge and Valley ecoregion. This forest district is notable for: northern red oak and chestnut oak timber production, productive farmland in the broader valleys and narrow parallel forested ridges, rocky slopes and small clear streams. Generally, soils and growing conditions on state forest lands are of good quality in terms of biomass production, but they are generally steep and very rocky.

Major historic impacts to the forests here have included: timber harvesting, uncontrolled wildfires, charcoaling, chestnut blight, gypsy moth and other introduced pests and diseases. The forest continues to be stressed by damaging insects, plants, animals, and diseases. The forest in this district is of varied age class and structure because of periodic and varied intensity of past timber harvesting.

As part of a public trust, the Tuscarora Forest District is charged with ensuring the long-term health, viability, and productivity of the commonwealth's forests and conserving native wild plants. The overarching management goal on Tuscarora State Forest lands is to implement practices that enhance the sustainability of multiple ecosystem factors, including economic, environmental, and social dimensions.

Currently, most of the state forest is comprised of the Red Oak-Mixed Hardwood and Dry Oak-Heath plant communities. The district manages for the maintenance and regeneration of these communities through routine silvicultural practices and overall forest health promotion.

This district's average annual timber harvest goal is 587 acres. This goal is part of a long-term, systematic plan to provide benefit for the ecosystem and to bring a continuous supply of high-quality timber to Pennsylvania's economy. Control of less desirable trees and shrubs through cutting and herbicide treatments as well as prescribed fires, invasive insect treatments, deer exclosures, and invasive plant control are important land management tools in this district.

The Bureau of Forestry is the jurisdictional agency for the conservation of native wild plants, and this district bears custodial responsibility for managing some uncommon communities and/ or ecosystems, including old growth hemlock cove forest, ephemeral pool complexes and surface rock habitat as well as some specific plant populations of special concern.

Also, many wildlife species utilize the forest communities this district manages. By managing multiple forest communities for a diversity of age classes, the district routinely provides a suite of habitat factors that benefits a broad diversity of wildlife. However, the district also implements special management that targets specific wildlife especially those in the State Wildlife Action Plan, or with high recreational/

cultural value to people. This district practices targeted management for Allegheny woodrat, and brook trout and incorporates consideration for many other species such as deer, turkey, bear, woodcock, ruffed grouse, golden-winged warbler, etc. into multi-purpose management treatments.

Recreation is a major forest use on the state forest system and in this district. This State Forest provides a large block of public forest in proximity to populated areas. Visitors are attracted to the rugged terrain, large trees and forested streams and the wildlife that are found here. Popular recreational uses of this state forest include: hiking, camping, mountain bike riding, wild trout fishing, hunting, bird watching, and scenic driving.

Additionally, the district seeks to couple some recreation opportunities with education and interpretation. This district manages multiple educational features, including: Tuscarora Treasures web pages, a Facebook page, wayside exhibits, trailhead kiosks, forest demonstration site, and ecosystem management tours.

To facilitate land management objectives and meet public use demands, the district manages an array of infrastructure, including but not limited to: 113 miles of public use roads, 160 miles of administrative roads, and a list of parking lots, bridges, culverts, and trails. The district is divided into (2) maintenance divisions that serve as bases for work crews and equipment. Due to universal weathering, infrastructure is always in various stages of disrepair, so maintenance is an ongoing and important operation.

To facilitate integrated resource management and planning across large land units, state forest lands and adjoining lands are organized by *Landscape Management Unit (LMU)* (described in more detail starting on page 49). LMUs are the goal planning units of the Tuscarora State Forest Resource Management Plan, as targeted plans for each individual LMU comprise the bulk of the district plan. Each LMU plan contains an overview narrative of the LMU features, a profile that summarizes relevant data about the LMU, and a list of priority goals for which that LMU is well-suited. There are three LMUs in the Tuscarora State Forest Resource Management Plan (Figure i). LMU plans for this district begin on page 50.

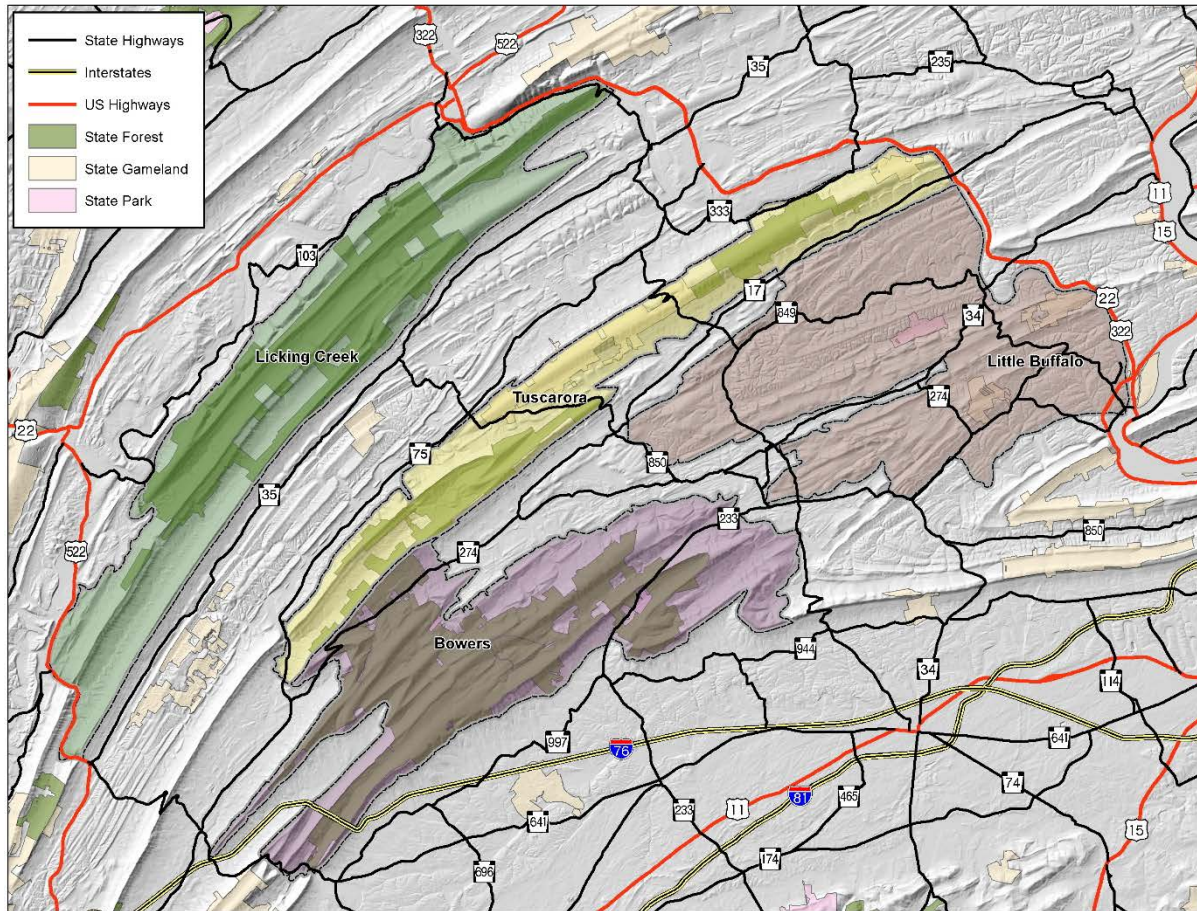


Figure i: LMUs for the Tuscarora Forest District

List of LMUs in Tuscarora State Forest

- Bowers Landscape Management Unit
- Tuscarora Landscape Management Unit
- Little Buffalo Landscape Management Unit
- Licking Creek Landscape Management Unit

District Priority Goals

Statewide State Forest Goals

The 2016 SFRMP set forth Principles, Goals and Objectives that focus on the variety of resources, uses and values of state forest land. These Principles, Goals and Objectives were organized around 12 Resource Chapters:

- Communications
- Timber and Forest Products
- Native Wild Plants
- Wildlife
- Water Resources
- Soils
- Geologic Resources
- Wildland Fire
- Forest Health
- Recreation
- Infrastructure
- Cultural Resources

The Principles, Goals and Objectives in the SFRMP apply universally across all of state forest land. Due to their broad application, they were written in relatively general terms. This District SFRMP provides an opportunity to prioritize goals that are more specifically applicable at the district level. The District Priority Goals that follow provide points of emphasis for state forest land management within Tuscarora State Forest over the next five- to ten-year planning horizon.

Tuscarora State Forest District Goals

- a) Create a mosaic of diverse forest types and age classes, especially maintain native oak forests of diverse age classes. The primary means of accomplishing this goal will be through timber harvesting following the harvest allocation plan.
- b) Conserve high-quality cold-water stream habitats.
- c) Provide habitat for species of special concern and high conservation responsibility by conserving, maintaining and increasing habitat quality. Key habitat types include:
 - i. Rock habitat with mast producing species especially on the main ridges as this is an important mammal area designated primarily for Allegheny woodrat.
 - ii. Hemlock and white pine in pure stands, mixed stands and scattered within hardwood stands.
 - iii. Wetlands, seeps and ephemeral pool ecosystems with special attention to maintaining the plant sanctuaries and federally endangered species.
- d) Maintain current level of wild character while providing opportunities for dispersed recreation.
 - i. Improve parking, trails, signs and facilities, while blending aesthetically into the surroundings. Balance infrastructure with the ability to maintain it.
 - ii. Maintain multi-use trail network, including snowmobile trails and improve access and parking without decreasing primitive, non-motorized areas.
- e) Provide interpretive information to forest visitors and virtual visitors through many means (including through tours, literature, auto tours, kiosks, interpretive panels and Facebook) especially about;
 - i. Forest management and ecology in the Ridge and Valley Region of central PA.

- ii. History & Culture including: two CCC camps, three railroads, early human occupation, European settlement, past industrial use of the land and forest recovery.
- f) Limit damage from pests including insects, disease and invasive plants. Especially gypsy moth, hemlock woolly adelgid and invasive shrubs.

District Overview

1) Location and Description

The Tuscarora State Forest is located in south-central Pennsylvania including parts of Cumberland, Franklin, Huntingdon, Juniata, Mifflin and Perry Counties. It consists of 96,168 acres divided into two main parts, the North Block and the South Block. The Tuscarora State Forest derives its name from the Tuscarora Mountain that lies at the center of the District.

Narrow valleys sandwiched between steep rocky ridges characterize the terrain of this forest. These fertile valleys are ideal for growing majestic oak and hemlock forests. Although not especially rich in species diversity, the streams and soils are generally quite fertile and produce abundant growth. There are healthy populations of most wildlife species native to this region.

The earliest timber harvesting included clearing for agriculture in the valleys and clearcutting for charcoal in West Licking Creek in the early 1800's. Tree cutting in most parts of the forest was light until the widespread use of portable steam sawmills and logging railroads came to this area from circa 1900 to 1930. Even with the railroad logging, because of the steep slopes and rocky terrain as well as the distance to markets, true clearcutting was uncommon. The Tuscarora may be unique in that most of the forest had a good stand of residual trees when the land was purchased by the State. This forest was also spared the worst of the repeated wildfires that occurred in other parts of the state. The original forest was predominately mixed chestnut, oaks and hemlock, with scattered white pine and tulip poplar.

Wildlife populations are stable and some less-common species native to this area are increasing. Many species that were once rare such as fisher, river otter, black bear, and bald eagle, have returned and are doing well, a sign of the health of the maturing forest. Deer populations are at a level that often negatively impact forest vegetation. The species group that is most in need of assistance is probably those that require early successional habitat such as woodcock, ruffed grouse, and golden-winged warbler. The Allegheny woodrat is one species found in the Tuscarora State Forest that deserves special attention.

The most common recreational uses include: hunting and fishing, scenic driving, hiking, horseback riding and mountain biking. There is one State Forest Hiking Trail, the Tuscarora Trail, with twenty-three miles in this forest. The Flat Rock Trail is about 2-1/2 miles in length and extends from Colonel Denning State Park to the Flat Rock Vista that overlooks the Cumberland Valley. This is probably the most used trail in the forest with visitors virtually every day and some very heavy use during the fall foliage season. Big Spring State Park is administered by the Forest District. Another State Forest Picnic Area, Karl Guss, is in East Licking Creek Valley.

Clear, cold, high quality streams flow from the forest. A few have suffered impairment from acid deposition but are showing signs of recovery. Water quality is generally very good in the forest with most streams meeting high-quality or exceptional value designations. Un-deeded islands in the Juniata River between Mount Union and Duncannon are also part of the Tuscarora State Forest. A few of these islands are used for camping and waterfowl hunting.

There is one Wild Area in the Tuscarora State Forest, the James C. Nelson Wild Area located on the border of Perry and Juniata County. This area spans both sides of Tuscarora Mountain and has limited public access from PA Route 333. This area was harvested in the early 1900's with a narrow-gauge railroad, and later ganister rock was quarried and used to manufacture fire brick at this site. There is very little development in this Wild Area.

There are three Natural Areas in the Tuscarora State Forest. The Hemlocks Natural Area is a tract of old growth hemlock in a rocky ravine along Patterson Run. The Hoverter & Scholl Box Huckleberry Natural Area is a small 10-acre tract near New Bloomfield that contains a colony of box huckleberry believed to be 1,300 years old. The Frank E. Masland Jr. Natural Area is a good example of old second growth forest along the North Branch of Laurel Run in Western Perry County.

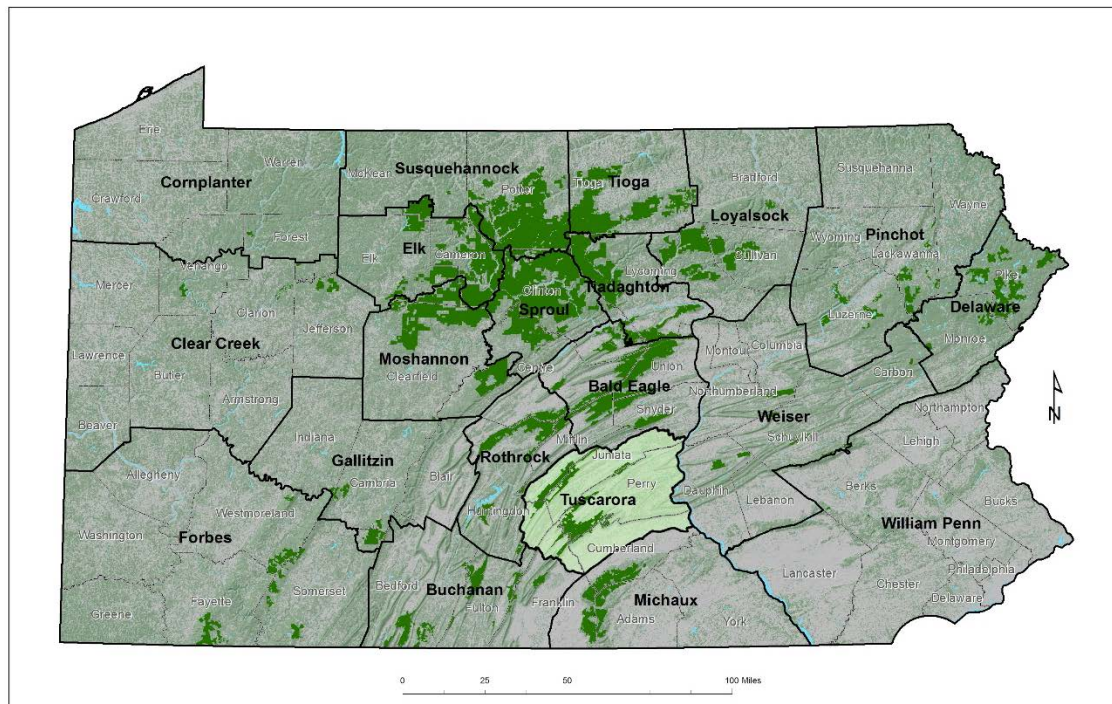


Figure 1-1. Location of Tuscarora Forest District with state forest land (dark green).

2) District Organization and Human Resources

The Tuscarora State Forest comprises about five percent of the 2.2 million-acre state forest system. Administrative responsibility of the Tuscarora State Forest is delegated to the District Forester, whose office is located at 4455 Big Spring Road, Blain, Pennsylvania 17006. There are two Forest Maintenance Divisions: the Bryner Maintenance Headquarters, located in close proximity to the District Office, and the East Licking Creek Maintenance Headquarters, located at the eastern end of the North Block. The Maintenance Divisions carry out road maintenance, maintain signs and picnic area facilities, maintain buildings and equipment, and also assist with vegetation management projects, fire protection and fire use. The Resource Management staff plan and administer vegetation and habitat management work including timber sales, recreation planning, pest suppression, vegetation monitoring, education and information, leases and contracts, fire suppression and fire use. Volunteers are an important part of our human resources needed to care for the Tuscarora State Forest. Conservation Volunteers and Fire Wardens are essential to fulfill our mission.

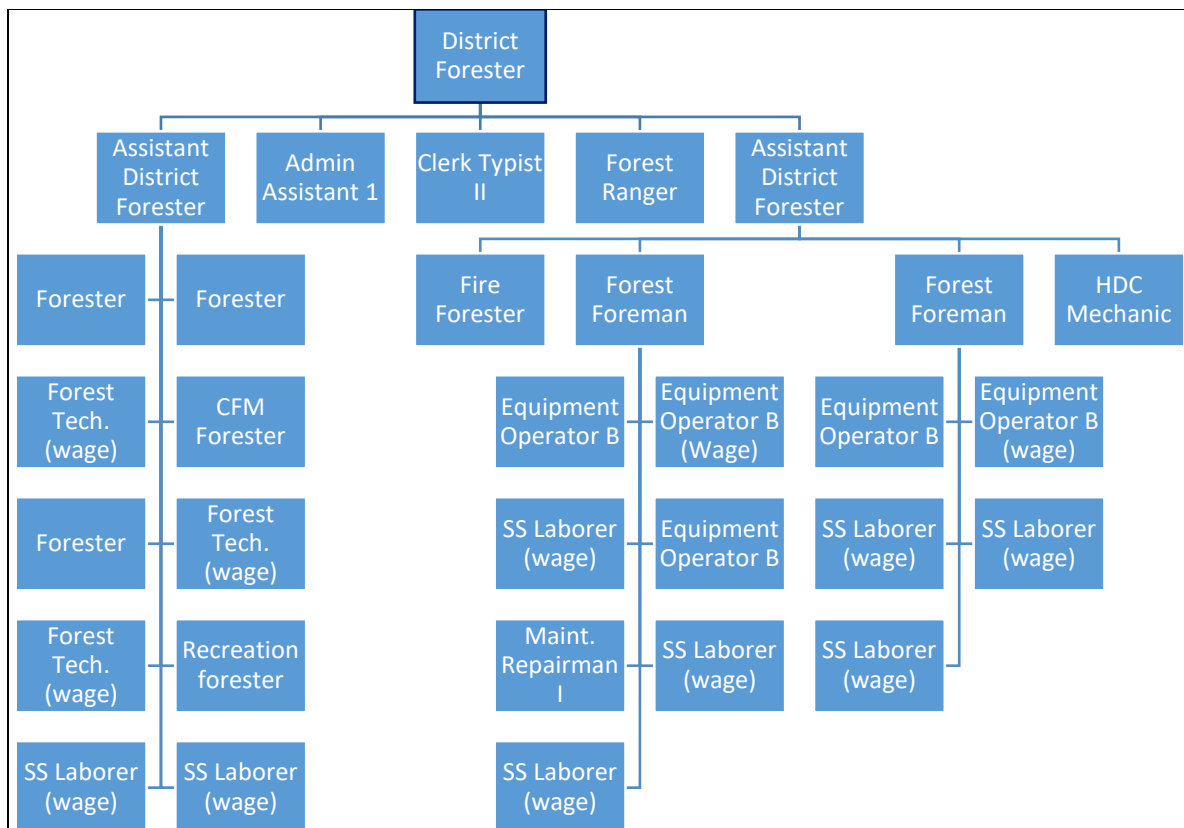


Figure 2-1. Organizational chart of the personnel of the Tuscarora Forest District. Admin = Administrative; CFM = Cooperative Forest Management, working with private forest landowners; HDC = Heavy-duty diesel construction; Tech. = technician; SS = Semi-skilled; Maint. = Maintenance; (wage) = seasonal for 9 months per year

3) Historical Land Use and Disturbance

The pre-settlement forest generally consisted of hemlock in the stream bottoms with American chestnut and oak on the slopes and mountaintops. Most of the original forest was cut between 1830 and 1903. The first tracts of the present Tuscarora State Forest were acquired in 1902, and by 1920, about fifty percent of the present forest had been purchased. Portions had been clear-cut, but much of the land was only partially cut, and even some stands of large trees remained. Forest fires here were not as frequent or severe as they were in many other parts of Pennsylvania, but they certainly shaped the species composition of the present forest. There was one iron furnace and four logging railroads located in the lands that are now the Tuscarora State Forest. Small farms with cleared fields were also a part of the past land use. The majority of those lands were located in the upper end of Shermans Valley and were part of the acquisition from the U. S. Department of Agriculture in 1955. That land had been purchased by the Federal Government during the economic depression of the 1930's. A few houses and a barn remain standing. Five CCC camps were located in the Tuscarora, with another just outside the forest, on private land.

The forest has been heavily and repeatedly impacted by insects and disease resulting in widespread tree mortality and altered forest structure. Just after the period of exploitation, the forests of this area were hit hard by the chestnut blight. Extensive stands of young American Chestnut mixed with various species of oak, which covered much of the forest at that time, suffered the elimination of chestnut. The next major impact came after World War II when the most accessible areas of the forest were treated with a

selection harvest that removed some over-mature timber and culls. Even-aged management began in 1965, and there were some early successes, but difficulties with adequate advance regeneration, due mostly to over-browsing by white-tailed deer, made regenerating oak stands very difficult. Gypsy moth hit hard in the late 1970's and through the 1980's prompting heavy salvage shelterwood and clear-cut treatments. The result from this period was extensive understories of less-desirable competing vegetation (red maple, black birch, striped maple and witch-hazel) and thick stands of nearly pure black birch. Deer populations declined in the late 1990's and successful regeneration of oak stands was again possible. Gypsy moth populations continued to cycle with severe outbreaks leaving large areas of dead oak trees in their wake. Although most silvicultural regeneration treatments since 1995 have been successful at regenerating mixed oak stands, there has been a significant shift toward much more black birch in the forest at the expense of oak.

Today, the forest has matured, and large trees of many species cover the mountains and hollows. Past disturbance has resulted in many multi-aged stands. Once fairly common in the Tuscarora, the oldest second growth trees and residuals from the early cutting are disappearing since many of those trees are now over one hundred and fifty years old. Approximately fifteen percent of the forest is currently in younger age classes regenerated by even-aged treatments since 1965. Approximately fifty percent of the forest is zoned as "Potential Old Growth" (Zones N, W, & L; N=natural Area; W=wild area; L=limited; see pg. 54 of the SFRMP).

4) Acquisition History

The first state purchase of land in what is now the Tuscarora State Forest was 7,608 acres bought in 1902 from J. Preston Thomas at \$1.72 per acre on the Juniata-Mifflin County Line in Licking Creek Valley. Originally called the Rothrock Forest Reserve, this tract was later merged with the Pennypacker and McClure Reserves to form the present Tuscarora State Forest. The Thomas tract was very familiar to Joseph Rothrock when he was a young boy. Timber in that valley had been harvested over a long time, beginning with John Winn in 1840.

The second purchase, also in Licking Creek, was for 6,738-acres from the Logan Iron and Steel Company in 1906. These lands included land previously owned by the Gifford family and the old Bell's iron furnace in West Licking Creek.

The first major acquisition in the Pennypacker Reserve, now the South Block of the Tuscarora State Forest, was in 1906 when 4,708-acres were bought from Harry W. Meetch. An additional 9,851-acres were acquired that same year from William B. Meetch. In 1907, 4,311-acres were acquired from the Perry Lumber Company of which William B. Meetch was president. Thus by 1908, over one third of the present Tuscarora State Forest had been acquired from willing sellers.

Table 4-1. Major acquisitions of what is today the Tuscarora State forest; does not include the many smaller purchases were made and added from 1902 to present.

<u>Purchased From</u>	<u>Acres</u>	<u>Price</u>	<u>Date</u>
J. Preston Thomas	7,608	\$13,114.62	9/30/1902
Logan Iron & Steel Co.	6,738	23,582.88	2/01/1906
H. W. Meetch	4,708	12,079.28	9/24/1906
W. B. Meetch	9,851	27,101.25	1/02/1907
Perry Lumber Co.	4,311	10,098.36	4/18/1907
D. S. McNitt	5,156	11,601.56	11/26/1910

Vincent Lumber Co.	3,570	10,677.00	9/09/1932
Max N. Manbeck et ux	2,806	11,224.00	5/12/1948
James M. Junk	1,589	9,540.48	7/27/1950
U.S. Dept. of Agriculture	4,150	Gift	5/26/1955
Kaiser Alum. & Chem. Co.	5,373	53,735.83	1/20/1964
Shippensburg Water Auth.	3,218	1,800,000.00	2/1/2004

5) Cultural and Historic Resources

As custodians of public land, DCNR is also custodian of the historical and cultural resources found within the forest. An important mission of the Bureau of Forestry is to educate the public by promoting the many values of forests. One way we do this is by explaining and showing the close connection that existed between the forest and people and communities in the past. Some of the historical resources in the Tuscarora State Forest most valued by the public are the CCC camps and the structures that the CCC worked on, such as the West Licking Creek Fountain and Pavilion #5 at Big Spring. Other resources of interest are the signs and ruins of the several railroads and industries found in the forest such as the unfinished tunnel and the Henry's Valley tannery as well as Edward Bell's Furnace. The remnants of farms and settlements in the form of houses, barns, spring houses, stone walls and cemeteries are further examples of our heritage. People are interested in the stories of these places and the people associated with them. Conserving these structures and places is a challenge. If a building is not used for recreation or administration, it is most often torn down when it becomes a hazard. The Department has an agreement with the Pennsylvania Historic and Museum Commission to screen sites for known historical values before earth disturbance activity to minimize the risk of accidental destruction. The District Office houses some artifacts and documents related to the history and culture of the area. There is a need for inventory, monitoring and protection of historical places, features and artifacts in the State Forest.

The Tuscarora Treasures, published on the District website and Facebook pages, is one means of sharing and conserving information about some of the special places in the forest. The District also houses records, photos and stories about the Department and its employees who lived and worked in the Tuscarora State Forest. Some of these documents are unique and should be preserved.

The O'Donel House is the only structure on Tuscarora State Forest land listed on the National Register of Historic Places. It is a well-preserved house and barn typical of the area.

6) Ecoregions, Physiography, and Land Cover

The Tuscarora State Forest lies almost entirely within the Ridge and Valley Eco-region, with a small portion in the Great Valley Eco-region. This region is distinguished by the parallel ridges and valleys formed by the erosion of folded layers of sedimentary rocks. The mountains are predominantly erosion resistant sandstone with shale layers in the foothills, side-slopes and narrow valleys. Some of the broader valleys contain limestone at the surface. This pattern leads to a predominance of acidic dry forest on the ridges, agriculture in the broader valleys with small pockets of rich forest, and a mix of forest and fields on the shale hills.

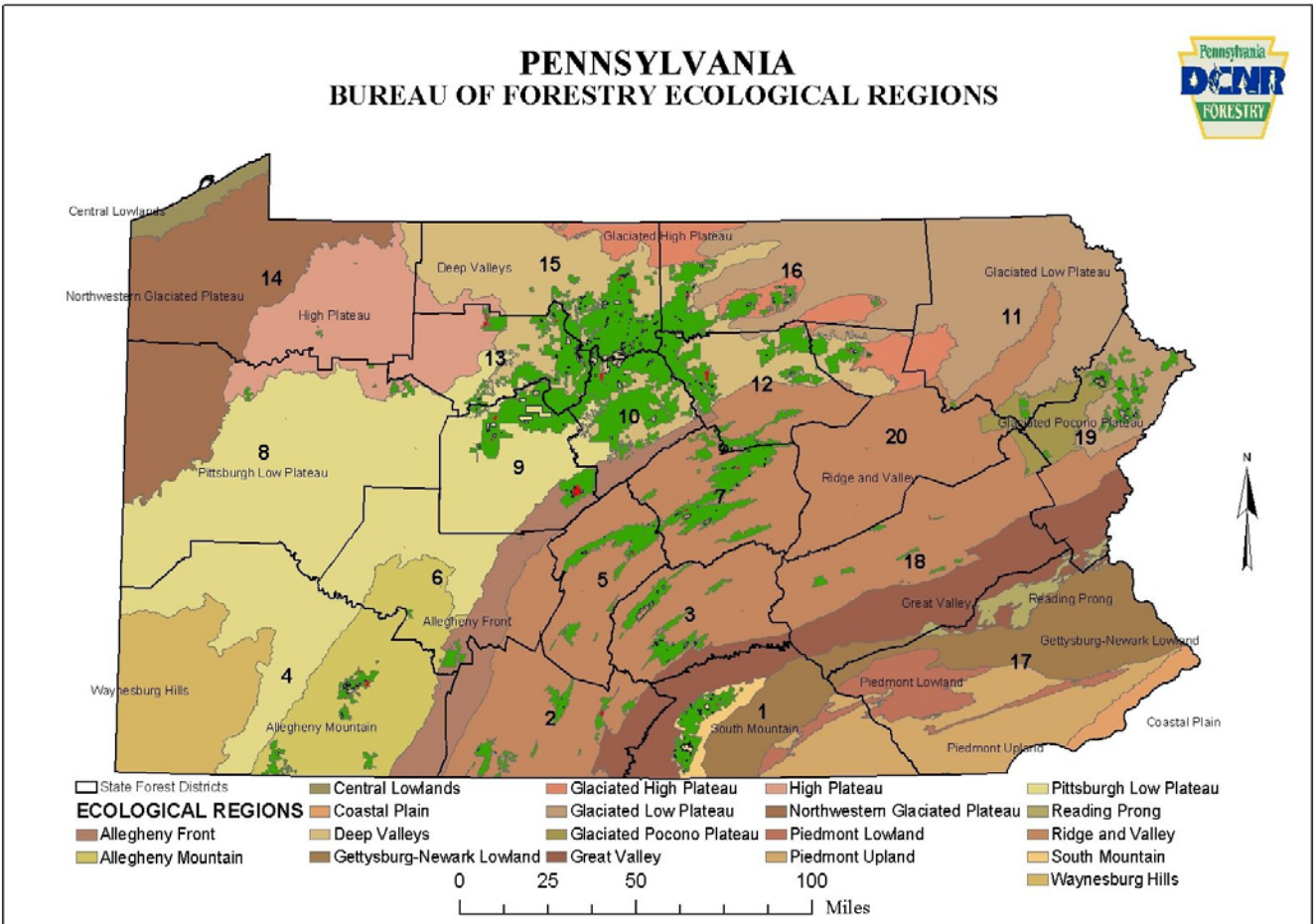


Figure 6-1. Map of Bureau of Forestry ecological regions with state forest land shown in green.

The Tuscarora State Forest lies almost entirely within the Ridge and Valley physiographic province. This area contains geologic strata of the Ordovician and Silurian Geologic Periods. The dominant Formations found on the Tuscarora State Forest from oldest to youngest are: Reedsville (shale), Juniata (shale and sandstone), Tuscarora (sandstone), Rose Hill (shale), Mifflintown (shale) and Bloomsburg (shale and limestone). These formations are bent, folded and twisted with a few significant faults. Generally, the ridges of this region are formed by the eroded anticlines of the Tuscarora formation. Typically, the Rose Hill formation forms the side slopes on one side of the ridge, and on the other side of the ridge the Juniata formation forms a bench with Reedsville shales forming the mid and lower slopes. With few exceptions, soils are capable of growing merchantable trees virtually everywhere, even on ridgetops and rocky slopes. The soils derived from the Tuscarora Formation are generally sandy and have low buffering capacity and low base saturation. Therefore, streams confined to the Tuscarora Formation are sensitive to acidification. Most of the other soils have good moisture holding capacity and nutrients needed for good tree growth. Calcium is generally lacking in the Juniata and Tuscarora Formations and the lower part of the Rose Hill Formation. Other formations supply enough calcium for calcifiles, such as sugar maple, to grow well. Calcium to aluminum ratios have been implicated in some plant growth relationships. The Tuscarora has low Ca and low Al so the ratio is high. For other geologies with low calcium the Ca: Al ratio is low, and this could indicate Al toxicity. Another nutrient status that may be significant is that the Rose Hill Formation has high amounts of manganese which can be toxic in some

conditions. Indian cucumber is known to be very sensitive to Mn, and this species is totally absent from the Rose Hill Formation soils.

Forests cover fifty eight percent of the land in the District with agricultural use on most of the remainder. Evergreen forest and wetlands are a very small percentage of the land cover. There are no cities or large towns, the largest being Lewistown, which is on the border of three Forest Districts. Seventeen percent of the forest land is publicly owned, and most of that is the Tuscarora State Forest. State Game Lands are the second largest public land owner in this District with around 50,000 acres in about ten tracts. Together, State Forest and Game Land tracts provide significant protection of forest connectivity along the ridges in this region. There are also several State Parks: Little Buffalo, Colonel Denning, Fowlers Hollow, and Big Spring. One large tract of private land that is managed by the Nature Conservancy is the Reinaman Wildlife Sanctuary. It is located just east of the Tuscarora on Blue Mountain.

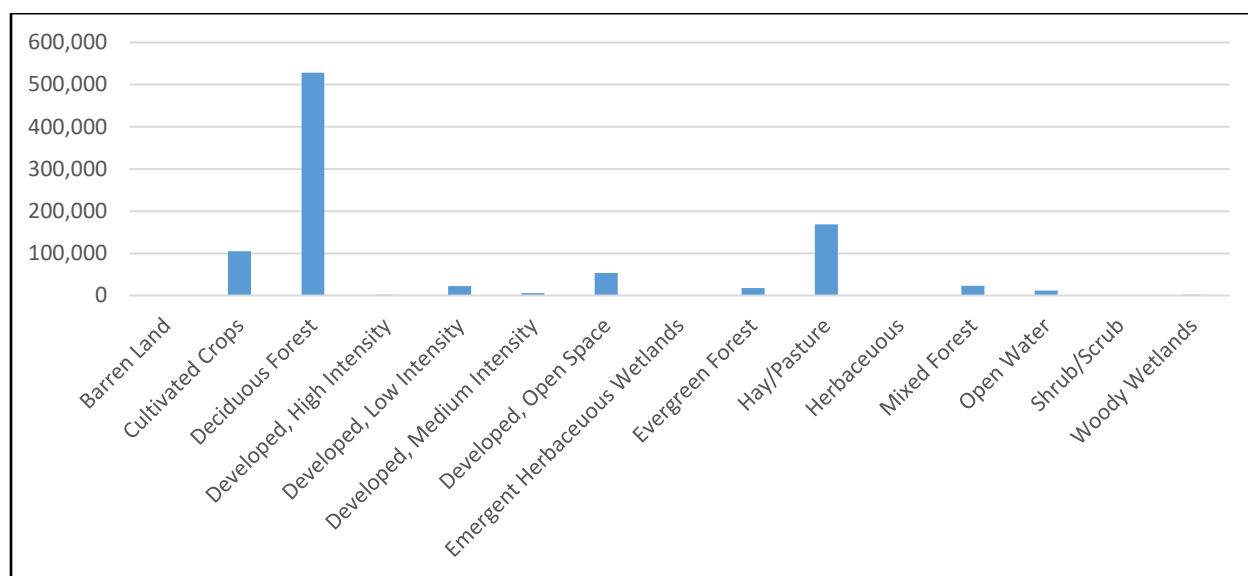


Figure 6-2. Acres of land cover types from National Land Cover Database for entire district.

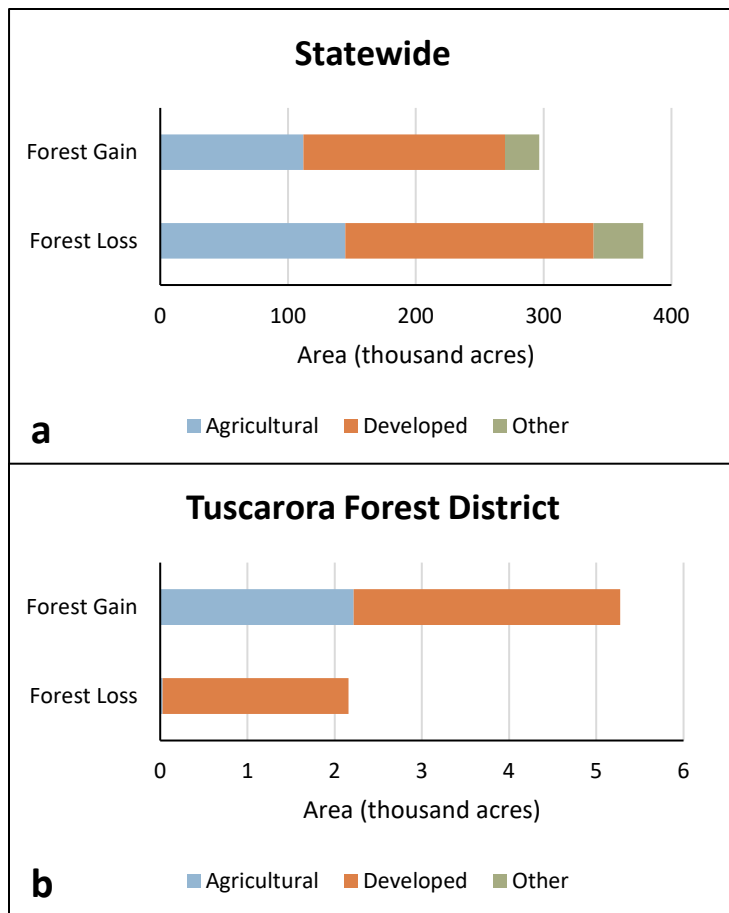


Figure 6-3. Gross forest loss and forest gain 2011-2016 (based on US Forest Service FIA plot data: <https://www.fia.fs.fed.us/>) by land-use categories for (a) the entire state; and (b) within the Tuscarora State Forest District. The colors in *forest gain* represent the type of land cover FROM WHICH the forestland came (e.g. agricultural could be an old farm field that gained enough tree cover in that period to now be classified as forest). Similarly, colors in *forest loss* represent the categories TO WHICH forestland was converted (e.g. agricultural could be a forest that was cut and converted to pasture).

Forest cover is increasing in the region due to ingrowth from area previously classed as developed and from fields, mostly on poor soils of hills and ridges. There is very little conversion of forest to agriculture, but it does occur. Most of the forest loss is due to development, especially low-density residential use, but gain from this same use category is greater than losses. The scale of net gain is in the 1 – 2% range for the 5- year period between inventories.

7) Vegetation Communities and Native Flora

On state forest land, more than 50 typed plant communities have been identified in accordance with the bureau's typing manual. The bureau recognizes seven aggregated forest types on state forest land, and each forest type includes one or several dominant plant communities (see Table 7-1). For definitions and characteristics of each plant community, see <http://www.naturalheritage.state.pa.us/communities.aspx>.

Table 7-1. Dominant plant communities of each aggregated forest type.

Aggregated Forest Type	Dominant Plant Communities
Allegheny hardwoods	Black cherry-northern hardwood forest
Northern hardwoods	Northern hardwood forest Sugar maple-basswood forest
Red oak	Red oak-mixed hardwood forest
Other oak	Mixed oak — mixed hardwood forest Dry oak — heath forest
Red maple	Red maple forest
Conifers	Dry white pine (hemlock) — oak forest Hemlock (white pine) — northern hardwood forest Hemlock (white pine) — red oak — mixed hardwood forest Red pine — mixed hardwood forest Spruce plantation
Other	Aspen-Grey (paper) birch forest Pitch pine-mixed oak forest Tuliptree-maple forest Black gum ridgetop forest

The forest stands of the Tuscarora are dominated by northern red oak and chestnut oak. Unless recently harvested, these stands are mature or nearly mature. Indeed, the Tuscarora has some of the oldest oak forests in Pennsylvania with trees over 150 years old not uncommon. Large portions of this forest were cut over before the railroad era or were not easily accessible; and this resulted in many residual trees left standing even in the railroad logging areas. Also, the period of frequent fire was less intense than in other parts of PA and this resulted in very pure stands of fine mixed oak. Gradually red maple and black birch filled in the understory, and now also dominate many areas regenerated between 1965 and 2010.

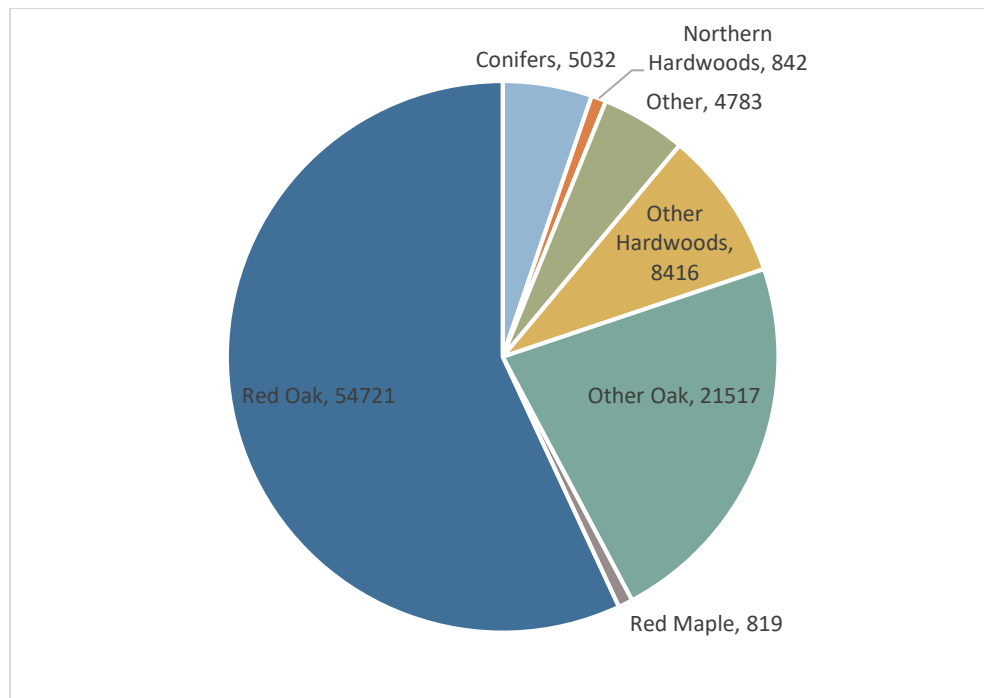


Figure 7-1. Acreage of state forest land in this district by aggregated forest type. The forest types are described on p. 108 of the 2016 SFRMP.

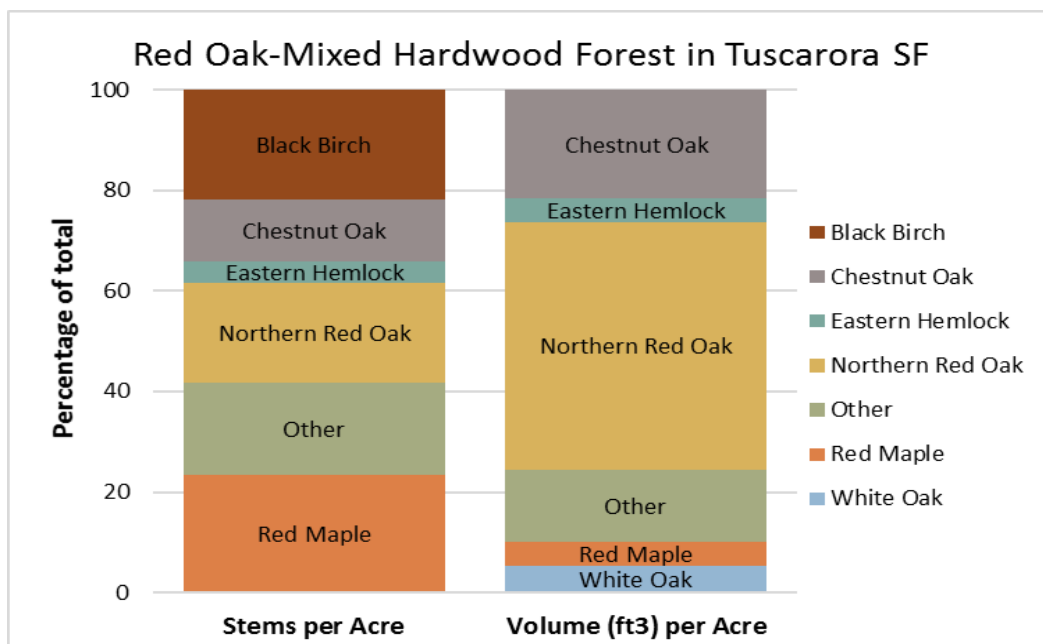


Figure 7-2: Species composition (top 5 species) of all stems over 4.5 inches dbh in the forest communities that have over 15 Continuous Forest Inventory (CFI) plots in a district. Tuscarora State Forest has over 54,000 acres of red oak-mixed hardwood forest, which comprises about 57% of total state forest acreage in this district. For more information and summaries of the Bureau's CFI data, see the online interactive tool here: https://pa-forestry.shinyapps.io/cfi_explorer/

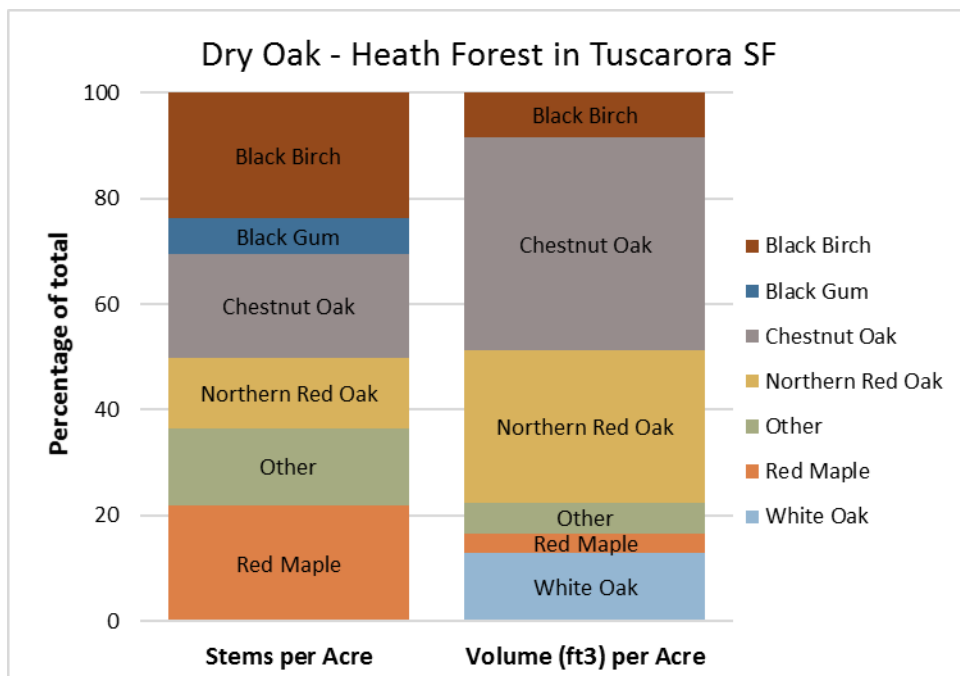


Figure 7-3: Species composition (top 5 species) of all stems over 4.5 inches dbh in the forest communities that have over 15 Continuous Forest Inventory (CFI) plots in a district. Tuscarora State Forest has over 20,000 acres of dry oak-heath forest, which comprises about 21% of total state forest

acreage in this district. For more information and summaries of the Bureau's CFI data, see the online interactive tool here: https://pa-forestry.shinyapps.io/cfi_explorer/

AR Red Oak - Mixed Hardwood Forest: This forest type is common in much of Pennsylvania. It occurs on fairly mesic sites and is quite variable in composition. northern red oak (*Quercus rubra*) is the dominant overstory species in these stands with greater than 40% of the total basal area. Associated tree species typically include red maple (*Acer rubrum*), Chestnut oak (*Quercus montana*), black oak (*Quercus velutina*), white oak (*Quercus alba*), mockernut hickory (*Carya tomentosa*), shagbark hickory (*Carya ovata*), sweet birch (*Betula lenta*), yellow birch (*Betula alleghaniensis*), white ash (*Fraxinus americana*), American beech (*Fagus grandifolia*), and/or tuliptree (*Liriodendron tulipifera*). The shrub layer often includes northern arrow-wood (*Viburnum recognitum*), maple-leaved viburnum (*Viburnum acerifolium*), smooth serviceberry (*Amelanchier laevis*), shadbush (*Amelanchier arborea*), striped maple (*Acer pensylvanica*), hornbeam (*Carpinus caroliniana*), hop-hornbeam (*Ostrya virginiana*), witch hazel (*Hamamelis virginiana*), and spicebush (*Lindera benzoin*). Ericaceous shrubs such as mountain laurel (*Kalmia latifolia*), low sweet blueberry (*Vaccinium angustifolium*) and lowbush blueberry (*Vaccinium pallidum*) may also be present but are not abundant. The herbaceous layer is highly variable. Representative species may include sessile-leaved bellwort (*Uvularia sessilifolia*), false Solomon's-seal (*Maianthemum racemosa*), may-apple (*Podophyllum peltatum*), pipissewa (*Chimaphila maculata*), teaberry (*Gaultheria procumbens*), partridge berry (*Mitchella repens*), white wood aster (*Eurybia divaricata*), Indian cucumber-root (*Medeola virginiana*), squaw-root (*Conopholis americana*), wood ferns (*Dryopteris* spp.), and hay-scented fern (*Dennstaedtia punctilobula*).

AH Dry Oak - Heath Forest:

These forests occur on xeric to moderately dry, acidic sites, often on shallow or sandy soils and/or steep slopes. In this oak dominant community, the determining factor for this type is the ericaceous shrub layer, which is typically greater than 30% relative cover. The most characteristic tree species for this type are chestnut oak (*Quercus montana*), usually occurring with a mix of black oak (*Quercus velutina*), scarlet oak (*Quercus coccinea*), and/or white oak (*Quercus alba*). Other tree species often include sassafras (*Sassafras albidum*), black-gum (*Nyssa sylvatica*), sweet birch (*Betula lenta*), red maple (*Acer rubrum*), pignut hickory (*Carya glabra*), pitch pine (*Pinus rigida*), Virginia pine (*Pinus virginiana*), and eastern white pine (*Pinus strobus*). Total cover by conifers does not exceed 25% of the overstory. American chestnut (*Castanea dentata*) stump sprouts are occasionally present.

The shrub layer is dominated by ericaceous species — common species typically include: mountain laurel (*Kalmia latifolia*), sheep laurel (*Kalmia angustifolia*), black huckleberry (*Gaylussacia baccata*), lowbush blueberry (*Vaccinium pallidum*), low sweet blueberry (*Vaccinium angustifolium*), and in more open areas, sweet fern (*Comptonia perigrina*).

Owing largely to the thick oak/ericaceous leaf litter, the herbaceous layer is generally sparse. Common constituents often include teaberry (*Gaultheria procumbens*), Pennsylvania sedge (*Carex pensylvanica*), fibrous-root sedge (*Carex communis*), trailing arbutus (*Epigaea repens*), wild sarsaparilla (*Aralia nudicaulis*), bracken fern (*Pteridium aquilinum*), Indian cucumber-root (*Medeola virginiana*), cow-wheat (*Melampyrum lineare*) and pink lady's-slipper (*Cypripedium acaule*).

Unique Plant Communities:

Ephemeral/fluctuating natural pools, also called vernal pools, are found in several locations in Tuscarora. These community complexes can contain numerous ponds, connected by surface hydrology, yet they are isolated on the landscape. They are habitat for a federally endangered plant species and offer important breeding locations for the surrounding amphibian community. Associated species often

include rattlesnake mannagrass, woolgrass, royal fern, and three-way sedge with surrounding woods of red maple, black tupelo, black birch, black locust, and various oak species. In other parts of the Tuscarora state forest, a plant species of concern purple bedstraw (*Galium latifolium*) is found on the loose, dry shale slopes and old logging roads.

Another unique plant community is the old growth northern conifer forest natural community found within The Hemlocks Natural Area, occurring along Patterson Run in a steep, north-facing ravine. The steep, rocky slopes are dominated by old hemlock trees, some over 150 feet tall. In some steep areas, the canopy is almost entirely hemlock, with a few yellow birches in the understory and an herb layer dominated by intermediate wood-fern and mosses. Further downstream more hardwoods occur beneath the taller hemlocks, including red oak, cucumber-tree, tulip-tree, black 00gum, red maple, and chestnut oak. The understory is densely shaded and sparse, with striped maple, witch-hazel, yellow birch, and hemlock. The herb layer contains downy rattlesnake plantain, partridgeberry, jack-in-the-pulpit, squawroot, solomon's seal, Indian cucumber, Canada mayflower, and hay-scented fern. Bird species observed at The Hemlocks include Acadian flycatcher, scarlet tanager, red-eyed vireo, eastern wood-pewee, hermit thrush, black-throated blue warbler, black-throated green warbler, and Louisiana water-thrush.

One of the most unique plant species in Pennsylvania, box huckleberry (*Gaylussacia brachyera*) can be found within the Tuscarora State Forest. Protected by designation as a State Forest Natural area, this colony of the rare native shrub is estimated to be about 1,300 years old. This population was first found in 1845 and spreads vegetatively across nine acres. The plants grow on a slope facing west and the loam soil of acid reaction is typical of a large portion of the oak forest region. The colony spreads by means of runners whose average growth is about six inches per year. This, coupled with the area occupied, is the means of determining the age of the plant. Only one other population is known to exist in Pennsylvania and only several are known throughout the eastern Appalachians.

There are four wild plant sanctuaries within Tuscarora state forest. The active management and treatments that occur in the wild plant sanctuaries vary depending on the species and habitat present. This ranges from additional clearing to mimic prairie habitat to targeted tree removal and invasive plant management within vernal pools harboring endangered plants.

8) Forest Health

The Tuscarora State Forest could be described as fairly healthy, but it is not pristine and has changed greatly since the beginning of European settlement in the area. Even prior to local European settlement the forest was changing but remained intact and in good condition until the development of logging railroad technology and chestnut blight arrived in the early 1900's. Except for the loss of American chestnut, the altered age structure and precipitously reduced conifer component, the forest recovered nicely by mid-century. Of course, wildlife populations were greatly altered, but they too gradually recovered to the point that nearly all the native wildlife species have returned, with a few exceptions. Sites that were once cultivated for agronomic crops have been the slowest to recover, and in many cases, they are the most impacted by pests such as invasive plants. As will be described below, the forest has suffered greatly from invasive pests especially in the last forty years. Managing these pests and mitigating their impacts has become a major part and central consideration for management of the forest.

a) Invasive Plants

“Invasive plant” describes a plant that grows aggressively, spreads and displaces other plants. Invasive plants tend to appear on disturbed ground, and the most aggressive can invade existing ecosystems. Invasive plants are generally undesirable because they are difficult to control, can escape from cultivation and can dominate large areas. In short, invasive plant infestations can be extremely expensive to control, as well as environmentally destructive.

Invasive plants can be trees, shrubs, vines, grasses or flowers, and they can reproduce by roots, shoots, seeds or all three. Invasive plants tend to:

- Not be native to North America;
- Spread easily, reproducing by roots or shoots;
- Mature quickly;
- If spread by seed, produce numerous seeds that disperse and sprout easily;
- Be generalists that can grow in many different conditions; and
- Be exploiters and colonizers of disturbed ground.

The species below are the most serious threat or worst offenders to our native forest ecosystems and are all common in the south-central region of the state, where the Tuscarora State Forest is located. These species are actively treated as time and funding allow, except Japanese angelica tree which has not yet been confirmed on the Tuscarora State Forest.

<u>Scientific name</u>	<u>Common Name</u>	<u>Plant Form</u>
<i>Alliaria petiolata</i>	Garlic Mustard	Flower
<i>Conium maculatum</i>	Poison hemlock	Flower
<i>Microstegium vimineum</i>	Japanese Stiltgrass	Grass
<i>Phalaris arundinacea</i>	Reed canary grass	Grass
<i>Eleaagnus umbellata</i>	Autumn olive	Shrub
<i>Beberis thunbergii</i>	Japanese barberry	Shrub
<i>Polygonum cuspidatum</i>	Japanese Knotweed	Shrub
<i>Ligustrum vulgare</i>	Common privet	Shrub
<i>Lonicera morrowii</i>	Morrow's honeysuckle	Shrub
<i>Lonicera tatarica</i>	Tatarian honeysuckle	Shrub
<i>Rosa multiflora</i>	Multiflora Rose	Shrub
<i>Spiraea japonica</i>	Japanese spirea	Shrub
<i>Ailanthus altissima</i>	Tree-of-heaven	Tree
<i>Aralia elata</i>	Japanese Angelica Tree	Tree
<i>Celastrus orbiculatus</i>	Oriental bittersweet	Vine
<i>Lonicera japonica</i>	Japanese honeysuckle	Vine
<i>Cynanchum louiseae</i>	Swallow-wort	Vine
<i>Polygonum perfoliatum</i>	Mile-a-minute	Vine

The following species are invasive plants that are known to invade native plant communities and are deserving of our vigilance, but at present are not known to be serious problems in the Tuscarora State Forest. They are all common in the south-central region of the state, where the Tuscarora State Forest is located.

<u>Scientific name</u>	<u>Common Name</u>	<u>Plant Form</u>
<i>Bromus tectorum</i>	Cheatgrass	Grass

<i>Carduus nutans</i>	Musk thistle	Flower
<i>Cirsium arvense</i>	Canada thistle	Flower
<i>Cirsium vulgare</i>	Bull thistle	Flower
<i>Datura stramonium</i>	Jimsonweed	Flower
<i>Hesperis matronalis</i>	Dame's rocket	Flower
<i>Ornithogallum nutans</i>	Star-of-Bethlehem	Flower
<i>Pastinaca sativa</i>	Wild parsnip	Flower
<i>Perilla frutescens</i>	Beefsteak plant	Flower
<i>Oplismenus undulatifolius</i>	Wavyleaf Basketgrass	Grass
<i>Arthraxon hispidus</i>	Carpetgrass	Grass
<i>Ligustrum obtusifolium</i>	Border privet	Shrub
<i>Rhamnus catharticus</i>	Common buckthorn	Shrub
<i>Rhodotypos scandens</i>	Jetbead	Shrub

For more information:

<http://www.dcnr.pa.gov/Conservation/WildPlants/InvasivePlants/Pages/default.aspx>

Honeysuckle, Japanese barberry and multiflora rose are prevalent in the Tuscarora Forest in areas that had been under cultivation. Larger infestations of these species have been and should continue to be targeted by contract herbicide treatments when funding is available. One oriental bittersweet site is continually monitored and receives herbicide treatments periodically. Tree-of-heaven is very common on the forest and has been for many decades. However, it has been observed that it is being negatively impacted by a naturally occurring *Verticillium* wilt (*V. albo-atrum*). Still, the natural spread of the *Verticillium* is slow; therefore, the plan to manage tree-of-heaven continues to be the eradication of existing stems in areas scheduled for timber harvesting to prevent root suckering. Seedlings of tree-of-heaven may become a problem within woven wire fences and should be monitored. Unfortunately, mile-a-minute is now somewhat common in the Tuscarora Forest despite attempts to reduce its spread with herbicide treatments since 2001. Herbicide treatments should still be used to control mile-a-minute in or near areas scheduled for timber harvesting to prevent larger infestations. In areas where large infestations of mile-a-minute already exist, weevils have been released as a biological control. The weevils don't eradicate infestations of mile-a-minute, but they do cause enough damage to reduce vigor and seed production. Japanese stiltgrass has also become extremely common on the Tuscarora, particularly along roads. The strategy for stiltgrass is similar to *Ailanthus* in that where a timber harvest is planned, herbicide treatments should be used to prevent or reduce its spread. The same strategy should be used for the other invasive plants listed above or any others that show up in the future.

b) Non-Native Insects and Disease

Gypsy moth (*Lymantra dispar*) has been the single greatest impact on the Tuscarora State forest since chestnut blight and the rapid harvesting of the early 20th century. This invasive insect, coupled with other stressors such as drought, has been responsible for the loss and degradation of timber worth millions of dollars. Defoliators like gypsy moth stress trees predisposing them to attack by other pathogens. When several stresses occur within a few years, tree mortality usually follows. Just when the gypsy moth reached this area, the deer herd was at its peak. Overstory mortality and high browsing pressure on the most palatable, browse-sensitive species caused a devastating and long-lasting shift in the composition of the forest. This species shift in the understory and overstory of the forest has resulted in decreased ecological function, the formation of recalcitrant

understories of competing vegetation, and a significant shift away from oak-dominated forests to forest types increasingly dominated by maple and birch.

From 1979 through 1994 gypsy moth was chronic at moderate impact, and much of the State Forest was treated with insecticide over those years. A population-limiting fungus brought an end to the chronic presence of gypsy moth but seems to have brought us into a new era of extreme population spikes with rapid build-up and sudden collapse. Those years of high populations require treatment with effective insecticides to save the forest from conversion to birch or red maple.

Hemlock woolly-adelgid also had a significant impact on the Tuscarora State Forest and surrounding area. Many hemlock trees have died, including in the old growth areas of the Hemlock Natural Area. Hemlock is still present but in greatly reduced proportion. In some stands all the hemlock has died. The District has undertaken insecticide treatment of strategically located stands across the district to keep remnant stands on the landscape. Since 2003, a concerted effort is being made to keep the remaining large old hemlocks alive in the Hemlock Natural Area by applying insecticide periodically. Until some natural controls are found these periodic treatments will be required to retain these majestic trees. Several predator insects have been released to provide some biocontrol for hemlock woolly adelgid. So far these have had limited impact, but they are the best long-term hope for managing this insect and we need more releases in this forest. The Bureau of Forestry will continue to suppress gypsy moth populations in oak stands in forest districts and state parks.

In some areas where hemlock has suffered the greatest mortality it may be beneficial to replant with other species, or resistant hemlock if they are ever released. Currently, other native tree species, especially black birch, are regenerating abundantly in areas of hemlock mortality in the Tuscarora State Forest. High value hemlock sites will be identified and protected using systemic insecticides and predatory beetle releases. Districts will work with the Division of Forest Health to conduct the suppression and biocontrol programs. Openings in the hemlock canopy will be examined to determine the amount of hemlock regeneration. If needed, hemlock will be planted to keep the site as hemlock habitat. Restoration research is being conducted by USDA Forest Service Research. In addition, silvicultural practices are also being studied by the USDA Forest Service. The Division of Forest Health will work with the Districts and USDA Forest Service Research to identify potential treatment sites.

Another insect pest on hemlock is the hemlock elongate scale which has had severe impacts to hemlocks in other parts of Pennsylvania particularly where it con-occurs with hemlock woolly adelgid. That scale insect has not been detected in the Tuscarora yet, but we must be alert for it.

Emerald ash borer was detected in the District in 2007. Ash seed was collected and submitted for long term storage. By 2010 we were salvaging infested trees, and now most of the ash trees in the district are gone except for seedlings and saplings. Because of the rapid spread of the insect and the difficulty of treatment, the Tuscarora has not done any insecticide treatment for the emerald ash borer. We are looking for lingering ash (ash that survived the initial wave of mortality) and studies are ongoing regarding the mechanisms of survival in these trees. Many young ash seedlings are still found in the forest. Districts will work with the Division of Forest Health to identify lingering ash. Locations will be georeferenced, and samples of the lingering ash will be collected by Division of Forest Health staff for study by the USDA Forest Service Northern Research Station. Districts will continue to treat selected ash with a systemic insecticide according to the Bureau's Ash Management Plan.

Chestnut blight was a devastating disease that was found in Pennsylvania in the early nineteen hundreds. Through the 1920's chestnut salvage was done as much as financially possible. American chestnut was found just about everywhere in the Tuscarora State Forest, and its desirable wood and important mast crops have been sorely missed.

Eastern white pine in the eastern United States, including Pennsylvania, is experiencing decline, mortality, and a complex of pathogens causing disease symptoms. A national working group is studying the problem and the Districts and Division of Forest Health will continue to monitor the health of white pine. White pine in the Tuscarora has been little affected so far.

Spotted lanternfly (*Lycorma delicatula*) is a new invasive insect in Pennsylvania with many hosts and a high economic impact to many agricultural crops. It is likely to appear in the Tuscarora District soon. When it does we plan to use the trap tree technique to suppress lanternfly by treating select *Ailanthus* trees with systemic insecticide.

Climate change is another impact to the forest. For example, after a drier climatic period during the 1980's and 90's, recent years have had above average precipitation. This is undoubtedly having an impact to the forest. For example, in recent years white pine has been affected by several foliage diseases leading to some areas of white pine decline. Oak anthracnose has been frequently observed. These pests need to be watched and monitored. Other impacts of climate change are possible and may include reduced oak seedling competitiveness. Adaptation for the future climate is desirable, if we knew for certain what it will be. Many models predict a warmer and dryer climate, although recent years have been wetter. Local forest types are resilient and have existed in Eastern North America for many thousands of years. One reasonable approach is to pay attention to changes in forest conditions and do what we can to minimize the negative consequences of pests and storms through increased diversity and ecosystem health.

9) Timber Management and Forest Regeneration

The bureau created a harvest allocation model that sets timber harvest schedules for state forest land in each district. The goals of the model are to promote and maintain desired landscape conditions, create a diversity of successional stages and native forest communities, balance the age class distribution and provide a sustained yield of quality timber. The model uses the bureau's forest inventory data, economic information, bureau policies and desired ending target forest conditions to develop timber harvest schedules that best meet the bureau's silvicultural and timber management goals. A detailed discussion of the harvest allocation model can be found in the 2016 SFRMP, beginning on page 93.

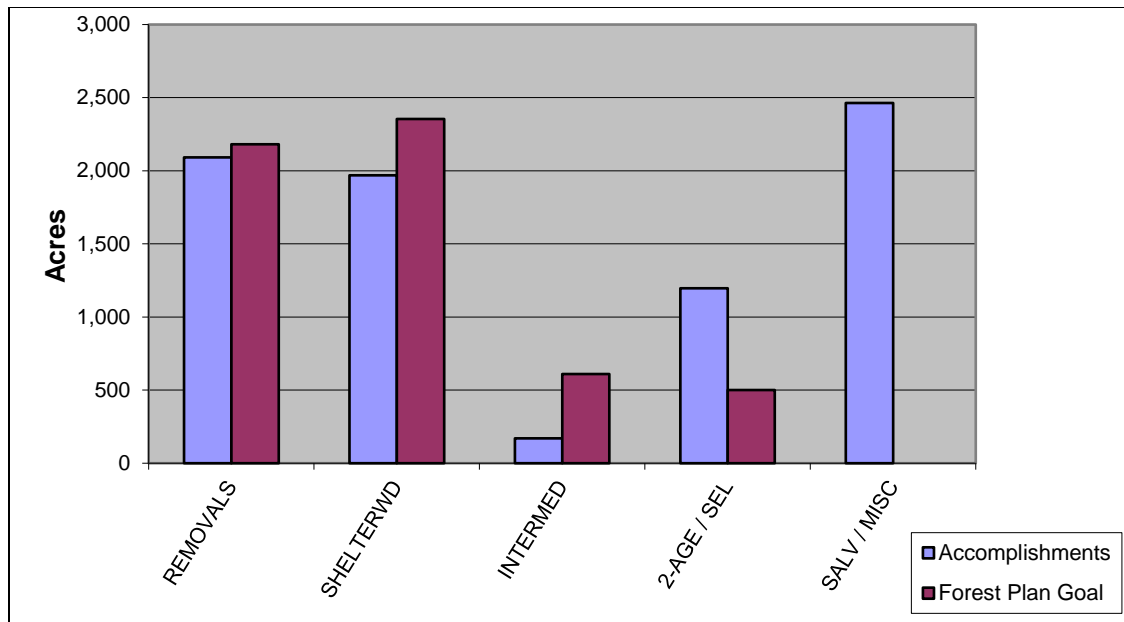


Figure 9-1. Chart of comparison between actual harvested acreage and harvest allocation model goals from the first decade of implementation of the harvest allocation model. From left to right, the treatment categories are: Overstory Removals (even-aged), Shelterwoods (even-aged), Intermediate Treatments (even-aged), Two-age and Uneven-age Buffer Treatments, and Salvage/Miscellaneous.

The bureau is presently in the second harvest allocation period of the model. The district's timber harvest goals for the second period are shown in the table below. Since most of the Tuscarora is classified as site 1 or site 2 red oak forest, most of the timber harvest is planned to come from that timber type. The ten-year overstory removal goal works out to be about five percent of the multiple resource area of the Tuscarora.

Table 9-1. Target shelterwood (Shelt), overstory removal (OR), intermediate (Int), and buffer treatment acreages for the second decade of the timber harvest schedule, aggregated by forest type, site class, and treatment. Additional shelterwood treatments for 3 or more stage shelterwoods are not represented in these targets.

Aggregated Forest Community Type	Site 1		Site 2		Site 3		Totals			
	Shelt	OR	Shelt	OR	Shelt	OR	Shelt	OR	Int	Buffer
Northern Hardwoods	0	0	0	0	0	0	0	0	610	500
Allegheny Hardwoods	0	0	0	0	0	0	0	0		
Red Oak	1,000	988	43	796	0	102	1,043	1,886		
Other Oaks	165	188	769	399	40	40	974	627		
Red Maple	0	0	0	0	0	0	0	0		
Other Hardwoods	0	0	0	0	0	0	0	0	610	500
Conifers	101	129	0	0	0	0	101	129		
Totals	1,267	1,305	812	1,195	40	142	2,119	2,642	610	500

10) Wildlife

Wildlife is an integral and valued part of the ecosystem that is found on the Tuscarora State Forest, from the elusive and threatened Allegheny woodrat to the popular and highly sought-after white-tailed deer. As a district, we strive to balance the habitat needs of native forest animals. This section highlights the most important habitat features as they relate to wildlife, our most imperiled species and lastly a brief look at the importance and history of the white-tailed deer as it relates to forest management.

Habitats

The dominant habitat type in the forest is mature mixed oak forest. Through timber harvesting the District staff are working toward balancing the age classes to maintain forest habitat in all stages of development. Other important habitat types include:

Scrub oak is occasionally found on certain xeric sites on the Tuscarora State Forest. Where possible, these areas will be maintained in the early stages of succession and enhanced to expand the current populations. Currently scrub oak is found on Dead End Road, Blue Mountain Road, Pine Ridge and on sections of the double powerline.

The hemlock stands growing along most of the streams in the district are valued as thermal cover for animals in the winter and to shade the streams in the summer to insure healthy stream temperatures for native brook trout. While some of these stands have suffered negative effects from hemlock woolly adelgid, the district, in coordination with the bureau's Forest Health Division, has been identifying and treating these stands to ensure minimum damage going forward.

Vernal pools have been identified at various locations throughout the forest. When these pools are located, district staff ensure a buffer is maintained around the pools during any management activity.

The district maintains 23 permanent herbaceous openings, also known by the abbreviation PHO, and by the term wildlife openings. These openings have been the site of various projects throughout the past. The limiting factor is and will continue to be available resources and staff time available to maintain them. The district has partnered with conservation groups, such as the National Wild Turkey Federation and Ruffed Grouse Society to complete habitat improvement projects.

District Wildlife Action Plan: <http://nrintraforestry/eco/WildlifeManagement/swap/Tuscaroraswap.pdf>

Species of special concern

Allegheny Woodrat (*Neotoma magister*)

Allegheny woodrats measure approximately 16 inches long, half of which is tail. The majority of its body is brownish-grey in color, while the undersides and feet are white. Woodrats have large eyes, naked ears and long vibrissae (whiskers), which when pulled back will reach the shoulder. The most visible characteristic, which sets the Allegheny woodrat apart from Old World rats, is its tail. The tails of European rats are naked or slightly hairy with the skin clearly visible beneath. The tail of the Allegheny woodrat is completely covered with hairs approximately one-third of an inch long and is prominently bicolored; nearly black above and white below.

Perhaps the mammal species for which the Tuscarora has greatest conservation responsibility, Allegheny woodrats are found across the Tuscarora State Forest on all the major mountain ridges. Several historical habitat sites are no longer utilized. Threats include parasitic roundworms, loss of American chestnut and oak, and direct impacts from pipeline and road construction. Recent conservation efforts in the Tuscarora include surveys and habitat improvement. Camera trapping has been very successful at documenting current use of many previously unknown sites on the Tuscarora. Pipelines have impacted some woodrat activity sites in the forest. Mitigation measures have been implemented but it remains to be seen how effective they are. For the first time Pitman Robertson funds have been utilized to enhance habitat for woodrats at four sites in the Tuscarora. Measures included control of less desirable woody species and planting mast producing trees and shrubs. One of the most important conservation measures is to conserve oak near woodrat habitat by suppressing defoliating insect outbreaks.

Appalachian Cottontail (*Sylvilagus obscurus*)

Appalachian cottontails are secretive, forest-dwelling rabbits that are not abundant over most of their range. The Appalachian cottontail occurs only within the Appalachian Mountain chain, almost exclusively in dense conifers and deciduous cover at high elevations. The Appalachian cottontail closely resembles the eastern cottontail. It differs only in its slightly smaller size, shorter ears and greater amount of black on the back.

Historically documented within the Tuscarora District, it has not been found for many years despite repeated surveys for it.

Timber Rattlesnake (*Crotalus horridus*)

The timber rattlesnake, which is a resident of Pennsylvania forests, is currently a candidate species of special concern in Pennsylvania that is regulated by the PA Fish & Boat Commission (PFBC) (PA Code, Title 58, Chapter 75). Rattlesnakes are also classified as being a reptile Species of Greatest Conservation Need in the PA Wildlife Action Plan (PGC-PFBC 2015). The district recognizes that its forest management program impacts the habitat for timber rattlesnakes and, as such, follows the guidance set forth in the Timber Rattlesnake Strategy plan can be found here:

<https://www.dcnr.pa.gov/Conservation/Biodiversity/BiodiversityManagement/OtherWildlife/Pages/default.aspx/>

Bats (*Myotis* spp.)

Forest management strategies and uses for these lands include forest management and timber harvesting which has the potential to impact the foraging, roosting, maternity colony, spring staging, fall swarming and migratory habitat for bat species that occur in Pennsylvania, including the federally endangered Indiana bat (*Myotis sodalis*) and federally threatened northern long-eared bat (*Myotis septentrionalis*). However, forest management and prescribed burns also help to create foraging habitat which is beneficial to bats. To avoid impacts to the greatest extent possible and mitigate them where they might occur, the Bureau of Forestry is working with the U.S. Fish and Wildlife Service (USFWS) in developing a Habitat Conservation Plan (HCP) for the Indiana bat and northern long-eared bat.

Golden-winged Warbler (*Vermivora chrysoptera*)

Golden-winged warblers are small grey birds with yellow cap and yellow wing bars that breed in open, early successional areas with scattered trees, thickets and herbaceous layer. They sometimes utilize recent overstory removal harvests as well as rights of ways and old fields. But their use is transient, and they require a steady supply of newly regenerating areas. They are mostly found at higher elevations, perhaps because of competition with blue-winged warblers at lower elevations and close to agricultural areas. This species has received a lot of attention, especially in the form of financial incentives to

private landowners through federal agriculture programs. The Service Forester has been very involved with improving habitat for golden-winged warblers on private lands in the District. Creating and maintaining early successional woodland and shrub land at higher elevations will likely aid this species. In addition, some portions of regenerating forest could be retarded through various treatments to prolong the effective use by this species.

Deer Management

Since European settlement of the land that currently makes up the Tuscarora State Forest, deer populations have gone through population cycles. By the early 1800s deer were almost expatriated from most of the district. An example of this can be found in “A Century of Wild Game Hunting in Penn’s Woods” by Earl Noll where he described the early years of only hunting small game in the head of Blacklog Valley and the rare occurrence of two deer being harvested in the same year. Following protective hunting regulations and reintroduction of deer from Michigan in the early 1900s, the deer population grew steadily. With limited doe hunting and access to abundant edge and early successional forest, conditions were ideal for deer population growth. Aldo Leopold described the negative effects of deer overpopulation in Game Management published in 1948 and even described seeing a similar situation earlier in the 20th century in the American southwest. This account is in the chapter of the Sand County Almanac called “Thinking Like a Mountain.” This trend of high deer numbers took place on the Tuscarora State Forest, most likely peaking in the late 1970s and following into the 1990s.

In the 1970s, scientific researchers started to consider the effects of very high deer populations on the forest ecosystem, especially impacts of browsing on regeneration of certain tree species. In the 1990’s the Bureau of Forestry also addressed the issue of overly abundant deer by making funds available for erecting fences to keep deer out of newly harvested areas. The funding for this was made possible through legislation that created the Regeneration Fund which came from timber sale revenue. The DMAP program was also initiated by the Game Commission in the 1990s and has been utilized by the Tuscarora State Forest as needed. DMAP offers additional harvest permits in certain areas in which deer populations are abundant and may impact forest regeneration. In 2000, the Pennsylvania Game Commission drastically altered the deer seasons in Pennsylvania in an effort to bring the deer population into balance with the natural ecosystem. This finally altered the status quo, widely reducing deer populations in Pennsylvania but upsetting many stake holders who previously enjoyed high deer populations. The tension continues to this day and there is constant pressure to increase deer numbers.

It appears that these efforts have achieved their stated goal. There is very little need for deer fencing on the Tuscarora State Forest as of 2018. Deer fences which have been up for over a decade are being removed as funding permits. DMAP, while still used, is now applied as more of a strategic tool and targets areas with expanding or high populations of deer. Most areas with high populations of deer are caused by a refuge effect from large tracts of adjacent privately-owned land. However, there has been a steady increase in deer populations and deer browsing pressure in the District, most notably in the North Block over the last few years. The district tries to balance the needs of hunters as an important user group with the mission of managing the forest ecosystem.

Chronic Wasting Disease on DCNR Lands

Chronic wasting disease (CWD) is an always fatal disease that affects the brain and nervous system of infected deer and elk.

It has been detected in Pennsylvania in both captive and free-ranging deer. Following these detections, the Pennsylvania Game Commission established Disease Management Areas (DMAs) to reduce the risk of spreading CWD to other parts of the state.

Three DMAs currently exist in Pennsylvania; however, newly confirmed cases can alter the boundaries. The current DMAs include: DMA 1 on a captive deer farm in Adams County in 2012 (DMA 1 has since been eliminated); DMA 2 includes multiple free-ranging deer in Bedford, Blair, Cambria, and Fulton counties, as well as captive deer farms in Bedford, Franklin, and Fulton counties; DMA 3 includes two captive deer farms in Jefferson County and a free-ranging deer in Clearfield County; and DMA 4 contain a captive deer at a facility in Lancaster County.

All or portions of the Michaux, Buchanan, Gallitzin, Tuscarora and Rothrock State Forests as well as several State Parks fall within DMA 2. A portion of Clear Creek State Forest is located within DMA 3 and William Penn State Forest is located within DMA 4.

Hunters who harvest deer within in a DMA should be aware that special [rules and regulations](#) apply and should have their deer tested for the disease. Additional information on Chronic Wasting Disease, testing, and [approved processors](#) can be found on the [Pennsylvania Game Commission website](#).

For the complete deer management plan please follow the link below.

<https://www.dcnr.pa.gov/Conservation/Biodiversity/BiodiversityManagement/DeerManagement/Pages/default.aspx>

The Tuscarora State Forest District is cooperating with the Game Commission by sharing information with forest visitors and the public. For 2019-20 four head bins for testing for CWD are located on the Tuscarora State Forest.

11) Water

a) Major Watersheds

The majority of the Tuscarora State Forest drains into the Chesapeake Bay through the Susquehanna River but a small portion drains to the same bay through the Potomac. The major sub-basins are Shermans Creek, Tuscarora Creek, Blacklog Creek and Juniata River. Within these watersheds Laurel Run and East Licking Creek are important streams in the Forest.

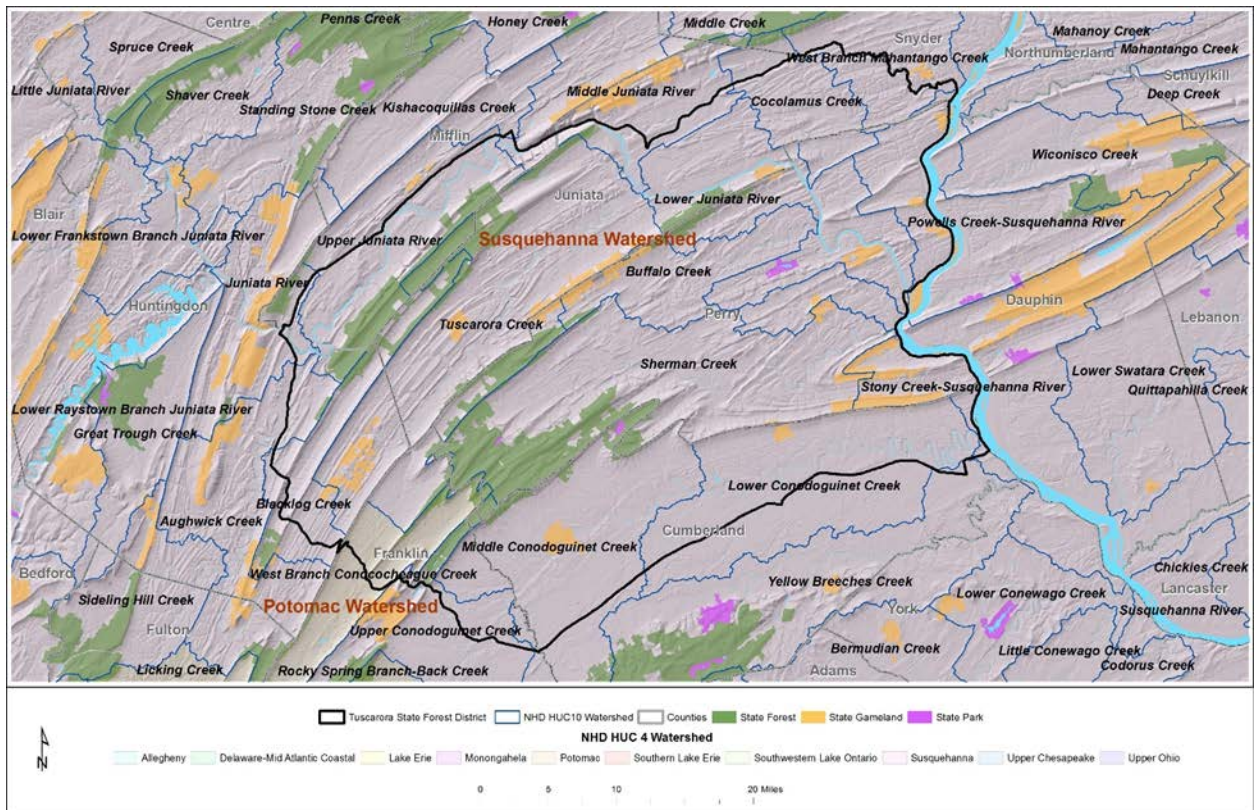


Figure 11-1. Map of major (Hydrologic Unit Code 4) and minor (Hydrologic Unit Code 8) watersheds within entire district.

b) Major Municipal Supplies

Previously there were several municipal water supplies on or near the Tuscarora State Forest but today there is only one, Mifflintown Water Authority. They have an impoundment on East Licking Creek less than one mile from State Forest Land.

c) Fish and Boat Commission Stream Habitat Prioritization

Wildlife and fish habitat work is most efficient if it is prioritized to get the most benefit for the effort. To help the Bureau of Forestry effectively manage for fish habitat, the Pennsylvania Fish and Boat Commission (PFBC) has shared their Stream Priorities for Habitat Improvement tool. Prioritization in this tool is based primarily on trout biomass, Class A designation, and high angler use. Priority 1 streams are highest priority for habitat projects. The PFBC prioritization tool includes spatial data for use in GIS along with a spreadsheet of priority streams within the districts. This tool assists the decision-making process when determining what streams to emphasize for improvement. The highest priority streams should be emphasized for habitat work within a district. Priority 1 streams should be addressed first, then priority 2 streams. This tool can also aid in prioritizing Dirt and Gravel Roads projects within districts to provide increased benefit to the aquatic resources.

The Fish and Boat Commission Biologists have prioritized Blacklog Creek, Kansas Valley and Shermans Creek for improvement efforts in the District. Almost all the other streams are ranked medium priority.

Table 11-1. Priority 1 streams in this district from the PA Fish and Boat Commission's Stream Priorities for Habitat Improvement tool. UNT stands for Unnamed Tributary.

Stream Name	County
Sherman Creek	Perry
Blacklog Creek	Juniata
Gifford Hollow Run	Huntingdon
Kansas Valley Run	Perry

Generally, water quality and aquatic habitat health are good in the State Forest. In this region the most common reasons for water quality impairment are agricultural nutrients and acidity. The former is not an issue on State Forest Land but some of the headwater streams that originate on the Tuscarora are sensitive to acidic atmospheric deposition and have little natural buffering capacity. Fortunately, most of these streams soon intersect geologic formations which add base cations and provide some natural buffering capacity before exiting the Forest. Most streams in the forest are classified as High Quality-cold water streams and have naturally reproducing populations of brook trout.

d) River Islands

The Tuscarora State Forest owns several river islands on the Juniata River between Mount Union and Duncannon. These are part of the Juniata River Water Trail. Currently six of these islands have designated primitive camping sites. Two of the islands are large enough that they have two campsites on them giving the Tuscarora State Forest a total of eight river island campsites. The islands with designated campsites are spaced fairly evenly throughout this section of river. These campsites are only accessible from the water and require no permit to camp at them.

12) Oil, Gas, and Mineral Resources

Most of the Tuscarora was purchased fee simple. The areas of severed mineral rights are mostly in the James C. Nelson Wild Area and the Land Use areas received from the federal government in 1955. The federal government retains an interest in the mineral rights on the land in the Tuscarora State Forest acquired from them. One mineral lease was issued in the past but has since expired with one dry well drilled and plugged.

Although not in the area of drilling for the Marcellus formation gas play, this area is impacted by several gas transportation pipelines that move petroleum products to market. Some of these lines were first built in the 1930's. In recent years four new lines, of larger diameter have been added to enable the moving of greater quantities of hydrocarbons, bringing the total to around 12 separate pipelines.

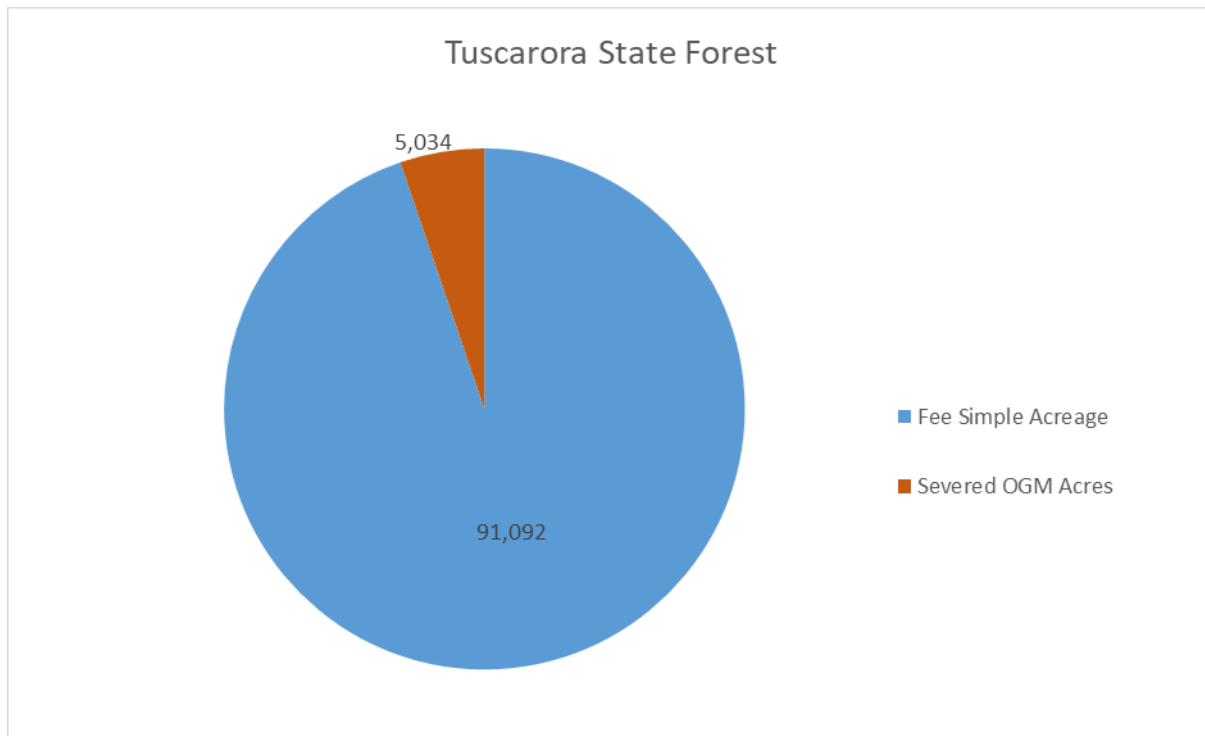


Figure 12-1. Acres of subsurface ownership/status on state forest land within the district. Acreage figures are derived from bureau GIS data, not acreages specified in lease or subsurface agreements. Severed Gas Rights Acres include only severed rights lands where the subsurface ownership has been verified. Partially severed areas that have been leased are counted as DCNR Issued Lease Acres, as opposed to Severed Gas Rights Acres.

13) Wildland Fire

a) Wildfire Suppression

Each forest district maintains a Fire Resource Plan, which provides the district with a standardized guide for wildfire response, readiness and staffing. The plan is continuously updated and adapted to meet current management objectives and standards.

All district staff play a critical role in wildland fire suppression. The district has one full time fire forester whose primary job functions involve wildfire suppression, training and prevention as well as coordinating training, equipment and suppression efforts for the other district staff members. All other district staff have wildland fire suppression as a collateral duty in various capacities. Most field staff meet the minimum national standard of a Firefighter Type 2 or above which makes them qualified to serve as firefighters on the fire line. Many of the district staff have advanced trainings and qualifications that allow them to perform various other crucial functions such as tree felling, dozer line construction, and other command and leadership capacities. Staff who do not meet the minimum national standards assist in administrative or logistical roles such as dispatching, fire billing, equipment maintenance, etc.

The district maintains two dedicated Type 6 Engines and one Type 2 Tactical Water Tender. These are the primary apparatus relied upon for wildland fire suppression and patrol. Engines are housed separately, one in the north block and one in the south block, to increase response time and

readiness. The engines are used as an initial response vehicle as well as a fire patrol vehicle during periods of elevated fire danger. The water tender is primarily housed in the south block and is used as a call-when-needed resource. Additionally, the district has a UTV with a 75-gallon fire suppression unit, two Type 3 dozers (north and south blocks), an enclosed command trailer equipped with radios and table tops for large incidents, and a command vehicle utilized by the fire forester.

The district has had very few large fires over the past ten years. The entirety of the district's wildfire suppression efforts in recent history have been on fires less than one hundred acres, the majority under twenty-five acres. From 2009 to 2018 there were 189 reported wildfires. The largest recent fire on the Tuscarora State Forest was the Three Square Hollow Fire that burned about seventy-six acres in the south block in the fall of 2016. Most suppression activity by district staff occurs on private land on wildland fires caused by people burning trash and debris.

b) Prescribed Fire

Prescribed fire is becoming an increasingly important management tool on the state forest. Increased available training for staff and more opportunities for gaining qualifications is improving the viability of a prescribed fire program. The majority prescribed fire plans involved reducing competing vegetation for oak management as a primary objective. Burning to improve low quality sites, maintaining herbaceous openings and promoting fire adapted species are also objectives that can be utilized on the state forest.

14) Infrastructure and Maintenance

Infrastructure refers to buildings, equipment, roads, and other capital assets, tools, and resources used to meet an organization's goals and objectives. Successful accomplishment of the bureau's mission cannot happen without proper inventory, planning, and administration of these assets. The bureau uses infrastructure to perform management activities and to provide for state forest use by others, including private industry and the general public. This requires accurate inventories, acquisitions, management, evaluation, maintenance, and retirement of infrastructure, as well as adequate funding to make all of these tasks possible.

Bureau staff manage the following infrastructure on Tuscarora State Forest. Ninety-nine miles of roads (class Z1) are maintained for public travel and administrative use. This requires regular grading, resurfacing with fresh stone and keeping the ditches and cross drains clear. There are 35 bridges that require regular safety and structural inspections. Many bridges have been rebuilt in the last several years and so our bridges are generally in very good shape. A few remain to be replaced.

Table 14-1. Mileage of roads by category within Tuscarora State Forest.

Road Class	Miles
Public Use	99
Drivable Trail	21
Gated Administrative	172

Table 14-2. Mileage of trails by category within Tuscarora State Forest.

Trail Type	Miles
Joint Use Road	88
Snowmobile Trail	49
ATV Trail	0
State Forest Hiking	26
Shared Use trail	271

Tuscarora State Forest District has an estimated 106 culverts determined from GIS data. The Bureau of Forestry conducts stream culvert assessments using the North Atlantic Aquatic Connectivity Collaborative (NAACC) protocol. Assessed culverts yield data on the condition of stream crossings on state forest land in regard to aquatic organism passage. The data is used to determine if the crossing is a barrier to organism passage, and if so, to what extent. This information assists the bureau prioritize culverts for replacement or repair.

There are 4 primary tower sites in the Tuscarora with 8 agreements; Big knob, Cumberland County Blue Mt, Reeds Gap, and Blue Mt. North.

15) Special Designations

a) Conservation Landscapes

Throughout Pennsylvania, seven large regions are working together to drive strategic investment and actions around sustainability, conservation, community revitalization, and recreational projects.

Known as conservation landscapes (Figure 15-1), these collaborations are found in regions where there are strong natural assets, local readiness and buy-in, and state-level investment and support.

Founded on the regions' sense of place and resource values, conservation landscapes motivate citizens and elected officials to take on the challenge of effective land use planning, investment, civic engagement, and revitalization.

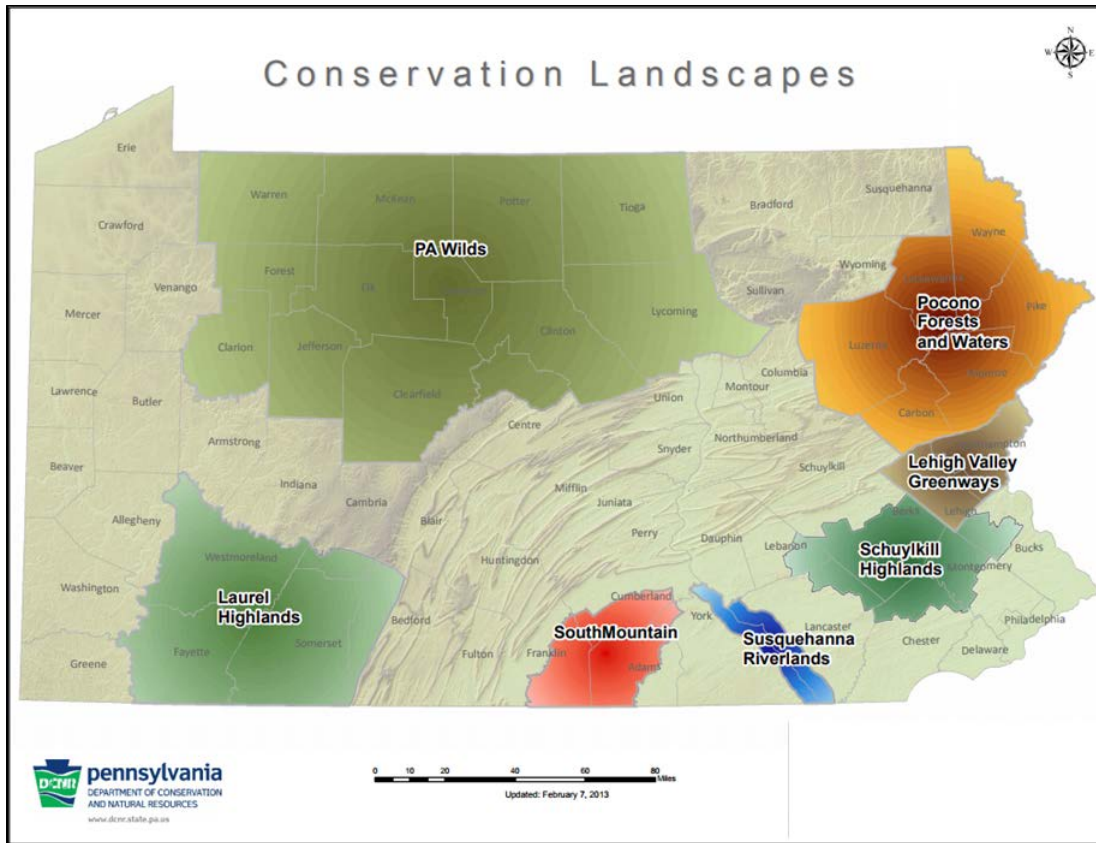


Figure 15-1: The seven Conservation Landscapes in Pennsylvania.

Although none occur within the Tuscarora State Forest District, the principles of collaboration are vital throughout public land management and these conservation landscapes are an important component in management of state forest land overall. To find out more, visit DCNR's Conservation Landscapes webpage:

<https://www.dcnr.pa.gov/Communities/ConservationLandscapes/Pages/default.aspx>

b) Wild and Natural Areas

The objective of a natural area is to protect areas of scenic, historic, geologic or ecological significance, which will remain in an undisturbed state, with development and maintenance being limited to that required for health and safety. Natural areas are set aside to provide locations for scientific observation of natural systems, to protect examples of typical and unique plant and animal communities, and to protect outstanding examples of natural interest and beauty. Natural areas are maintained in a natural condition by allowing physical and biological processes to operate, usually without direct human intervention. Any unique or unusual biologic, geologic or historic areas can be considered for designation as natural areas. In addition to the 'unique' or 'unusual,' representative examples of all major forest types occurring in this Commonwealth were also included in the proposed natural area system. The size of these areas is generally small but may be as large as several thousand acres.

The objective of wild areas is to set aside certain areas of land where development or disturbance of permanent nature will be prohibited, thereby preserving the wild character of the area. In

Pennsylvania's state forest system, certain areas that retain an undeveloped, wild character are designated as Wild Areas to assure that this primitive character is perpetuated. A wild area is defined as an extensive area which the general public will be permitted to see, use and enjoy for such activities as hiking, hunting, fishing, and the pursuit of peace and solitude. Development of a permanent nature will not be permitted so as to retain the undeveloped character of the area. Because of the restrictions imposed on wild areas, careful consideration must be given to alternative uses before additional areas are so designated. The size of the area should be no less than 3,000 acres and seldom more than 15,000 acres. They should be located where there are few public roads or other human-made developments such as campsites, rights-of-way, etc. Only areas where the department owns sufficient subsurface rights to preclude development will be considered.

There is one Wild Area in the Tuscarora State Forest, the James C. Nelson Wild Area located on the border of Perry and Juniata County. This area spans both sides of Tuscarora Mountain and has limited public access from PA Route 333. This area was harvested in the early 1900's with a narrow-gauge railroad, and later ganister rock was quarried and used to manufacture fire brick at this site. There is very little development in this Wild Area.

There are three Natural Areas in the Tuscarora State Forest. The Hemlocks Natural Area is a tract of old growth hemlock in a rocky ravine along Patterson Run. The Hoverter & Scholl Box Huckleberry Natural Area is a small 10-acre tract near New Bloomfield that contains a colony of box huckleberry believed to be 1,300 years old. The Frank E. Masland Jr. Natural Area is a good example of old second growth forest along the North Branch of Laurel Run in Western Perry County.

Table 15-2. Total acreage of Wild and Natural Areas on state forest land within Tuscarora State Forest.

Tuscarora	Name	Acreage
Natural Areas	Frank E. Masland Natural Area	1,257.0
	Hoverter and Sholl Box Huckleberry Natural Area	10.1
	The Hemlocks Natural Area	99.1
	Natural Area Total	1,366.1
Wild Areas	James C. Nelson Wild Area	5,345.1
	Wild Area Total	5,345.1
Total		6,711.2

c) High Conservation Value Forests

Pennsylvania state forests are certified under the Forest Stewardship Council (FSC) standards. FSC certification prioritizes the protection of particularly valuable forest characteristics by requiring certified landowners to identify high conservation value forests (HCVFs) on their land and plan for sustainable management and monitoring of these areas. FSC recognizes six types of HCVFs:

- HCV 1: HCV forest areas that contain globally, regionally, or nationally significant concentrations of biodiversity values (protected areas, rare or threatened species, endemic species, and seasonal concentrations of species)

- HCV 2: Globally, regionally, or nationally significant large landscape-level forests
- HCV 3: Forest areas that are in or contain rare, threatened, or endangered ecosystems
- HCV 4: Forest areas that provide basic services of nature in critical situations (protection of watersheds and protection against erosion and destructive fire)
- HCV 5: Forest areas fundamental to meeting basic needs of local communities
- HCV 6: Forest areas critical to local communities' traditional cultural identity

In 2011, the bureau followed FSC's HCVF guidance to identify, designate, and manage for areas of high conservation value. The areas which have been identified as HCVFs are managed in a manner that will maintain and/or enhance the values for which they have been designated and conversion of forest land to a "non-forested use" is prohibited.

Sub-categories of HCVFs occurring on state forest land are as follows:

- **1.1:** areas legally protected or managed primarily for concentrations of biodiversity values that are significant at the ecoregion or larger scale
- **1.2:** areas with significant concentrations of rare, threatened or endangered species or rare ecological communities, endemic
- **2.1:** significant large landscape-scale forest where viable populations of most if not all naturally occurring species exist in natural patterns of distribution and abundance
- **2.2:** areas significant to biodiversity conservation at the ecoregion scale because it contains landscape-scale biodiversity values that are not present on other forests due to landscape-scale habitat modifications on surrounding lands
- **3.1:** old growth stands
- **3.2:** roadless area >500 acres in size or that has unique roadless area characteristics
- **3.3:** rare, threatened, or endangered ecosystem
- **4.1:** areas providing a source of community drinking water
- **4.2:** areas protecting community drinking water supplies
- **4.3:** extensive floodplain or wetland forests that are critical to mediating flooding or in controlling stream flow regulation and water quality
- **6.2:** areas with cultural features created intentionally by humans

More information about HCVFs can be found in the LMU descriptions of this plan and in the SFRMP, p. 64.

The portions of the Tuscarora State Forest identified as high conservation value forests fall into two categories. First is the Hemlock Natural area with its old growth hemlock and cove forest. The other category includes several public wild plant sanctuaries.

Table 15-1. Acres of High Conservation Value Forest (HCVF) by category.

HCVF SubCategory	LMU Name	Acres
1.1	Bower	122
	Licking Creek	58
	Little Buffalo	10
	Tuscarora	8
1.1 Total		197
3.1	Bower	76
3.1 Total		76

d) [Core Forest Index](#)

As described in the 2016 State Forest Resource Management Plan, the purpose of Core Forest Focus Areas (i.e. LMUs within the top 20% of core forest index scores) is to assist in the inventory, management, maintenance, and monitoring of the most significant core forest tracts in the state forest system and to conserve the ecological values associated with interior forest conditions and unfragmented landscapes.

While the Bureau of Forestry manages for these values across the entire state forest system, Core Forest Focus Areas will serve as a means to ensure the appropriate balancing of these values in landscape-level forest management decisions. As such, special management guidelines will apply to these Core Forest Focus Areas. The following preliminary guidelines will guide the development of expanded management guidelines during the planning cycle.

Preliminary Guidelines

1. No permanent conversion of forest land will occur in these areas, including roads, pipelines, recreational parking lots, natural gas infrastructure pads, and other activities that permanently convert forest to non-forest.
2. The most restrictive, underlying Management Zones still apply in Core Forest Focus Areas. Wild and Natural Area guidelines apply in designated areas. Timber harvesting and other active management that does not involve permanent conversation is allowed per Management Zoning.
3. The temporary disturbances associated with timber harvesting and other forms of habitat management are allowed per state forest Management Zoning. Special consideration should be given in Core Forest Focus Areas to reducing the amount of haul roads, ensuring appropriate restoration, and maintaining closed canopy conditions in haul road corridors.
4. Where the Bureau of Forestry does not own mineral rights beneath Core Forest Focus Areas, it will work cooperatively with operators to avoid forest conversion.
5. When possible, the Bureau of Forestry will strategically purchase and/or exchange real estate interests to protect Core Forest Focus Areas where mineral rights are currently severed.
6. The Bureau of Forestry will consider, when available, acquiring key tracts that ensure connectivity of and expand and protect existing Core Forest Focus Areas.

7. The Bureau of Forestry will continually monitor the status of Core Forest Focus Areas. Deviation from these guidelines requires a State Forest Environmental Review and state forester approval.
8. The Bureau of Forestry will identify regionally important core forest Landscape Management Units. In these identified landscapes, long-term management goals and conditions will emphasize the promotion core forest conditions. When balancing uses and values in these landscapes, management decisions and plans will favor the promotion of these values.

The core forest analysis was based on the density of fragmenting features within a given area, which includes roads, pipelines, well pads, certain large rivers (large enough to show up on NLCD), etc. Based on fragmentation of an LMU, each LMU was given an index score between 0-100, representing the density of fragmenting features with a higher score representing a less fragmented area. As expected, all of state forest land across the state scored very high relative to more developed areas of the state. Because the scores were very similar, a rank/percentile was assigned to each LMU based on their Core Forest Index relative to all other LMUs.

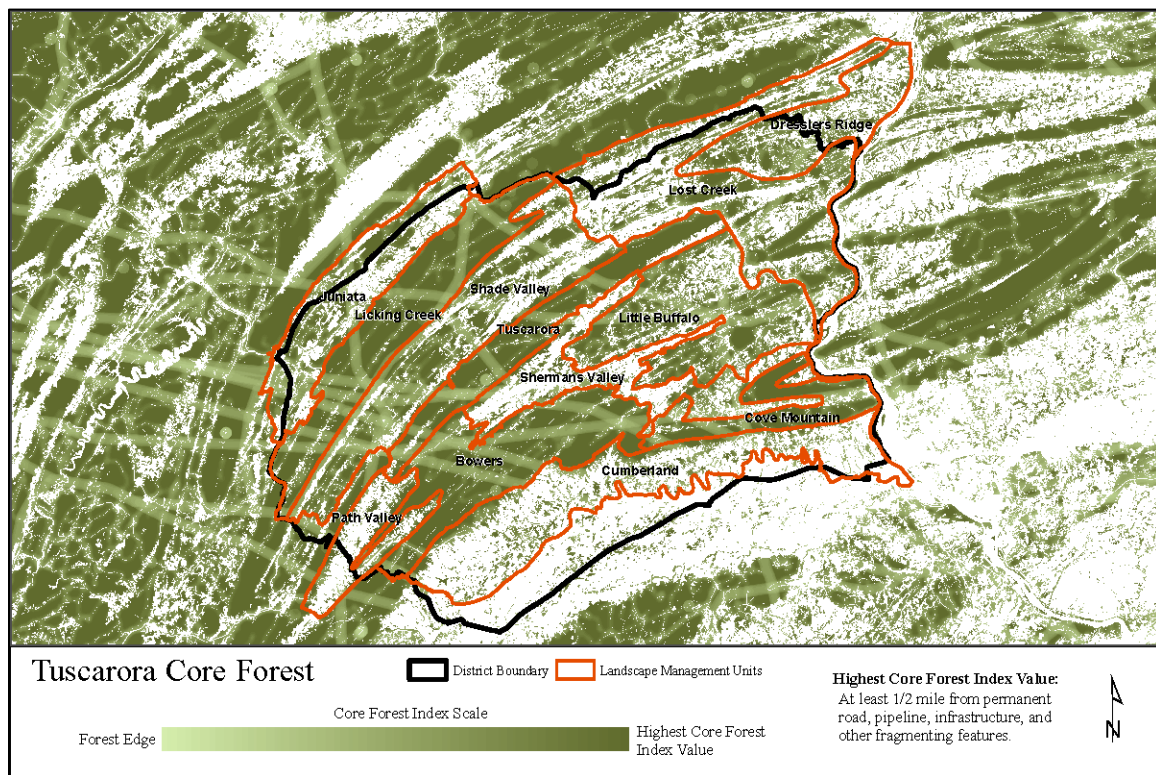


Figure 15-2. Map of core forest index in the region of Tuscarora Forest District.

Table 15-3. Core forest index value for state forest land in this forest district by LMU. The core forest index is a rating value out of 100 that expresses the proportion of the area within the LMU that is increasingly far away from dense areas of fragmenting features. **Core forest index was not calculated for the Little Buffalo LMU due to the extremely low percentage of state forest land in the LMU.

LMU Name	Statewide Percentile	Core Forest Index Value
Licking Creek	69%	96.40
Tuscarora	55%	95.36
Bowers	47%	94.84

In order to address Core Forest, Fragmentation, and Connectivity Objective 1.5 (pg. 38, SFRMP 2016), the top 20% of LMUs in terms of core forest index received the standard Core Forest Priority Goal as one of their LMU goals. Goals were kept intentionally broad so that they apply across SFL. Districts could further tailor the goal to address their specific plans for any Core Forest-related values in the LMU. For more discussion of Core Forest focus areas (LMUs) see the 2016 SFRMP, pgs. 34-38. No core forest focus area LMUs are found in Tuscarora State Forest.

e) Other Designations

There are two Important Mammal Areas (IMA) in the Tuscarora State Forest and an Important Bird Area (IBA). Both IMA's are designated primarily for the Allegheny woodrat habitat. The Tuscarora State forest and surrounding rocky ridges are very important for the sustainability of *Neotoma magister* in Pennsylvania. The IBA is primarily for the extensive blocks of forest as well as the Blue/Kittatinny Mountain migration route.

16) Ownership and Population Centers

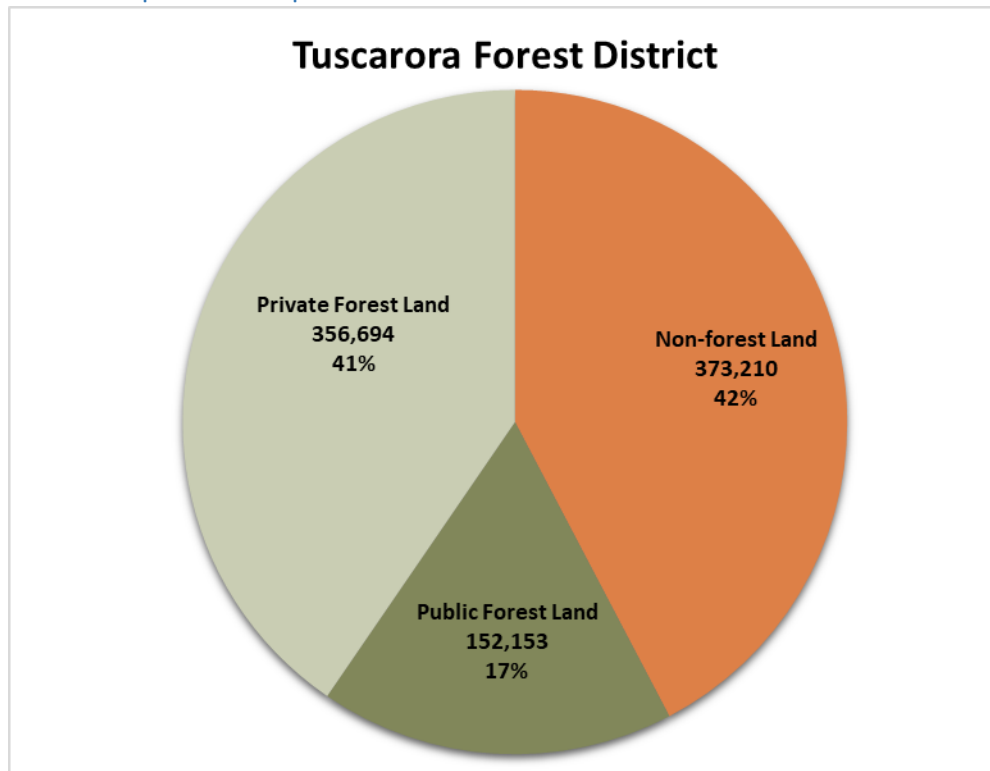


Figure 16-1. Percentage of total acreage within the Tuscarora State Forest District that is forested vs. non-forested and the ownership breakdown of the forestland (public vs. private), (based on US Forest Service FIA plot data: <https://www.fia.fs.fed.us/>).

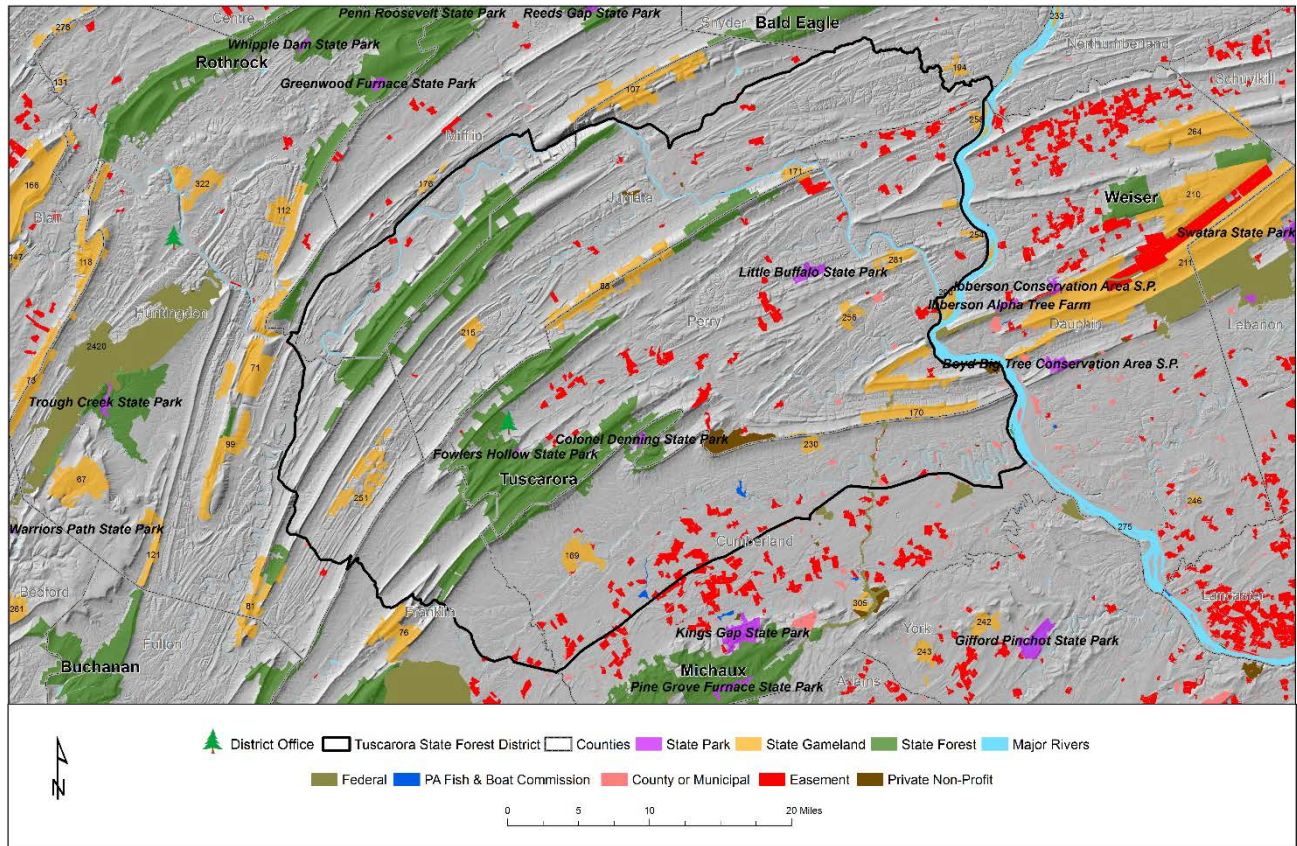


Figure 16-2. Public/conserved lands within entire district.

Table 16-1. Acreage of conserved lands by ownership type within the Tuscarora Forest District.

Tuscarora District	
Land Ownership Type	Acres
State Forest	96,123.79
State Parks	1,387.58
State Gamelands	30,618.48
Federal	687.09
Local/Municipal	3.59
Conservation Easements	18,620.66
Total Acres	147,441.19

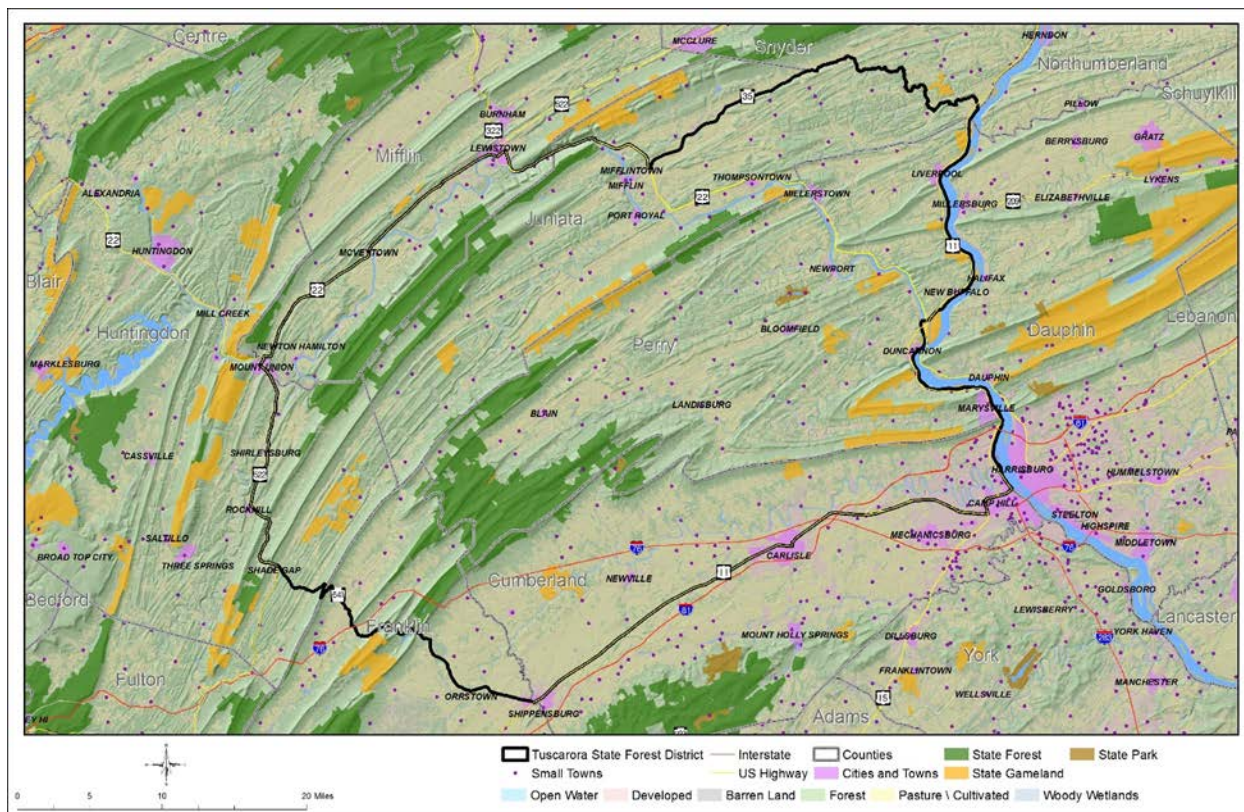


Figure 16-3. Map of public lands, population centers, and land use types (aggregated from National Land Cover Database).

The Tuscarora State Forest is located about twenty-five to fifty miles from the densely populated Harrisburg Area. Many visitors come from that area but less than visit the Michaux State Forest. The towns of Lewistown and Mount Union are also close to the Northern portion of the Tuscarora. The population is very dispersed closer to the Forest.

17) Economy and Forest Products

The economy of the area surrounding the Tuscarora State Forest is diverse, but a large part of the economy is agriculture based including wood products. Juniata County is second in Pennsylvania with twenty-two full time operation sawmills and almost as many secondary wood processing companies such as pallet shops, wood pellets, wood shavings, etc. Many primary and secondary producers of logs are located off PA state route 322 because of close proximity to the major highway and some of the state's best oak timber. Many of these businesses do not employ large numbers of people; consequently, a very large percentage of the District's residents, especially in Juniata and Perry Counties, commute to the metropolitan area of Harrisburg, Mechanicsburg and Carlisle for employment. Thus, this area provides a huge pool of workers for that metropolitan area.

Timber Products Industry:

The booming timber industry in the late 1800's and early 1900's greatly influenced the development of the current Tuscarora State Forest and its surrounding area. Some of the finest red oak stands in the Commonwealth can be found on the Tuscarora State Forest. A result of the large-scale clearcutting on most of the mountains, low deer numbers and the ensuing wildfires led to regeneration of the fire hardy oak.

Today, the timber industry is still a vital economic contributor to this District and the area. In Perry and Juniata Counties, there are 53 forestry and wood products establishments employing 1,356 people. These harvest almost \$8 million in timber each year and contribute over \$53 million to the economy of these two counties. In all the counties encompassing the Tuscarora State Forest, there are 176 forestry and wood product establishments employing 4,490 people. These harvest over \$34 million in timber each year and contribute \$279 million to the economy of the District. These figures are the latest available from Penn State Extension.

The Pennsylvania Department of Conservation and Natural Resources, Bureau of Forestry (BOF), along with its partners, led an effort to gain information that reflects the current characteristics of the wood products industry in the state. In 2013, the Bureau of Forestry conducted a Timber Product Output (TPO) survey among Pennsylvania's primary wood processing facilities, collecting information from the 2012 production year and again in 2017, to gather information on the 2016 production year. The survey was reinstituted in order to gain insight into volumes, species, uses, products and origins of the wood harvested and processed in PA, as well as information about the facilities operating in PA (employment, age, functions, etc.). The survey process also provided an opportunity for BOF foresters to interact directly with the private facilities located in their districts and enhance vital professional relationships. The survey information can be used by land owners, wood-processing businesses, and other interested parties to plan and adapt to the needs and current condition of the market. In addition, the data collected from such surveys contributes to broader datasets that could be used in long-term trend analysis and assessments of regional dynamics.

More information on the wood products industry in PA, as well as reports from the Pennsylvania Timber Products Output Surveys can be found at:

<https://www.dcnr.pa.gov/Business/ForestProducts/Pages/default.aspx>

The demand for this area's quality red oak, white oak, tulip poplar and other hardwoods continues to be very high. Responsible management of our forest, especially if it can be achieved on private land, will assure that the future demand can be met.

18) Recreation

Hunting, fishing, camping, hiking and sightseeing are several prominent recreational uses of the Tuscarora State Forest which bring a lot of people to this area. Other major forms of recreation that bring people here include snowmobiling, picnicking, horseback riding and mountain biking. The primary goal for recreation in the State Forest Resource Management Plan is to provide and maintain healthful low-density recreational opportunities and experiences across the landscape. The Forest District strives to provide many recreation opportunities that are compatible with ecosystem management while retaining as much wild character as we can.

Hunting, particularly for deer and turkey, is extremely popular here, and hunting season makes for one of the busiest times on the Tuscarora State Forest. The increase in the bear herd in this area has also caused a growing number of bear hunters in the District. Many gated administrative roads in the forest are opened in the fall to permit hunters and others increased access through the forest. One advantage of this for the forest is the hope of increased deer harvest to control high deer numbers. A disadvantage is the impact on earthen roads by vehicle traffic at this time of year. The public seems to be split on their preference with some desiring gates to be open and some desiring gates to be closed.

Fishing is another popular activity with 60 miles of trout stream in the Tuscarora State Forest where both native and stocked trout can be found. Fish habitat improvements have been installed in Sherman's Creek, Fowler Hollow Run and East Licking Creek. A four-mile section of East Licking Creek has been designated as a Delayed Harvest Artificial Lures Only trout fishing area. Shawmut Boat Access along Route 103 near Newton Hamilton in Huntingdon County serves those who enjoy boating and fishing on the Juniata River. Camping remains very popular with a total of 94 motorized campsites which see the bulk of the use. People can also camp at one of the four shelters in the District or primitive camp most areas of the state forest (see State Forest Rules & Regulations). Primitive camping is also available on marked islands in the Juniata River that are managed by DCNR.

Hiking is very popular in the Tuscarora. The Tuscarora Trail is a State Forest Hiking Trail that was originally created as a new route for the Appalachian Trail. It first departs the Appalachian Trail at the top of Blue Mountain in Deans Gap. It travels along ridge tops, southwesterly, towards Maryland, where it connects to the Big Blue Trail before joining the Appalachian Trail again in Shenandoah National Park. The trail is over 250 miles in length, with 110 miles in Pennsylvania and approximately 23 miles crossing the Tuscarora State Forest. There are two lean-tos located along the Tuscarora Trail in this District, one in Fowlers Hollow and one south of Colonel Denning State Park near the Wagon Wheel. Backpack camping is permitted along the state forest portion of the trail as well as in the two rustic open-faced shelters that are located along the trail. The Potomac Appalachian Trail Club maintains the Tuscarora Trail. The Tuscarora Trail is marked with rectangular blue blaze marks. One hundred and sixty-seven miles of short, district hiking trails are located throughout the Tuscarora State Forest. The majority of these trails have signs at the starting and terminal points. Volunteers do most of the trail maintenance on these trails. The most used district hiking trail is the Flat Rock Trail which is about 2½ miles in length and extends from Colonel Denning State Park to the Flat Rock Vista. It is a moderate to rugged hike to the top of the Blue Mountain. At the top of the mountain, Flat Rock Trail joins the Tuscarora Trail to the Flat Rock Vista. This vista is a natural rock outcrop that affords a view of the great Cumberland Valley. Many of the district trails and roads are also open for mountain bike use and horseback riding.

A large part of the public use of the forest is spent in driving forest roads. At almost any time of the year, and especially when the seasons change, many people drive these roads to enjoy the scenery, to look for wildlife or just to experience the relative quiet and solitude of the forest environment. A total of 157 miles of state forest roads provide some of the finest scenic views in Pennsylvania and ample wildlife observation opportunities. The public use roads are used heavily during the non-winter, weekend and evening hours as scenic drives. The Tuscarora State Forest also maintains several scenic vistas which allow enhanced viewing of the local landscape.

There are 157 leased campsites with buildings on the Tuscarora State Forest. A few of these, date back to 1913 when the first long term camping permits were issued. Camp lease holders are great supporters of the State Forests and are one of the few recreational users of the forest that pay a fee for their use. The leases require constant administration to make sure the program remains compatible with other uses.

Managing group activities is becoming increasingly important, even though we don't have a lot of them on our forest. These activities may at times conflict with other forest users who are looking for a more primitive experience. Group activities are an activity that requires a large land area or unique land formation, an activity that may impact or conflict with normal or traditional uses on state forest land, or an activity that may have a greater than normal impact on natural resources or the environment. These events can include orienteering, foot race, motorcycle race, group camping, stargazing, etc. We must continually evaluate and manage the effects of these activities and carefully consider requests for new

group activities. These activities may at times exceed the limits of what is considered low density or dispersed recreation, however they do serve an important purpose as they may be the user's first or only exposure to state forests or outdoor recreation. To administer these events the bureau uses a commercial activities agreement, special activities agreement or a letter of authorization.

Over the years funding from the National Park Service through the Land and Water Conservation Fund has been used for improving infrastructure, particularly roads, for recreation in the Tuscarora. When grants from this fund are received, the land affected is encumbered and must remain open for public recreation. For the Tuscarora SF 35,816 acres are affected by the LWCF, including nearly all of the Licking Creek/Blue Mountain area.

The bureau utilizes a Recreation Opportunity Spectrum (ROS) to make management decisions that are compatible with other state forest management goals. ROS is built on the premise that people expect certain types of recreational experiences on public land. It allows the district to provide recreational opportunities across a spectrum of five land-use classes so that the user may find satisfying recreational experiences in a variety of activities. The land-use classes range from "primitive" to "developed". ROS is a long-term planning tool to guide our management activities. Generally, we try to keep the conditions that define each ROS class and try not to increase the developed acreage. Instead we try to keep our state forest as primitive as conditions will allow.



Figure 18-1. Graphical depiction of ROS zones and their characteristics.

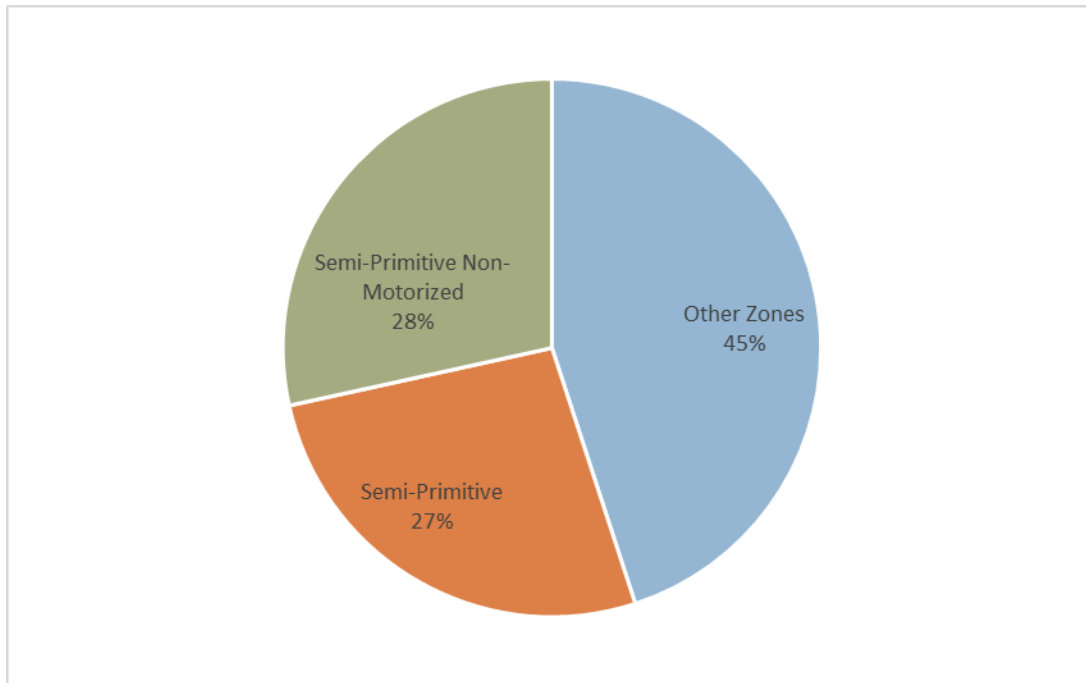


Figure 18-2. Acres of state forest land in this district by Recreation Opportunity Spectrum (ROS) classifications. ROS is an inventory system developed by the U.S. Forest Service, to characterize land by types of recreation experiences. ROS is described on p. 42 of the 2016 SFRMP. “Other Zones” refers to Semi-Developed and Developed zones.

An important aspect of recreation is providing information for forest visitors when and where they need it. This is accomplished through signs, information on the web site, Facebook, printed materials and physical infrastructure. Personal contact with the public is perhaps the best way to communicate with and guide visitors. Every employee has a role for public contact and information, but one position has that as their primary duty, the Forest Ranger. One year round and one seasonal Forest Ranger for the Tuscarora is on duty nearly every weekend and most holidays to meet and greet forest visitors, respond to emergencies and enforce the regulations of the Commonwealth on State Property.

Comment cards are distributed at various locations throughout the forest to gather input and feedback on visitor perspectives. The most common suggestions include better trail maintenance and more signs and maps. The most common positive comment is the natural beauty of the area.

The Bureau permits persons with mobility disabilities to use powered mobility devices for purposes of accessing state forest lands. In some instances, these areas are not otherwise open for motorized access by the general public. Permits can be obtained through District Offices by filling out a Mobility Device Permit Form. Each individual should make contact with the district where they wish to utilize their permit. It should be understood that the mobility device permit allows for only the individual to utilize the mobility device. However, someone may be with the permittee to assist in opening gates and collection of game. No other person should be hunting from the mobility device, unless it is a juvenile hunter(s), (up to three) that the permittee is mentoring. Passenger vehicles used as mobility device are only permitted on improved roads. A list of those roads on the Tuscarora State Forest are provided with the permit. Other mobility devices also have some restrictions which are explained when the permit is issued. Violations of the permit may result in the permit being terminated.

19) Communication, Education, and Interpretation

The bureau disseminates and receives information to and from various destinations via various channels. Recipients of bureau content include researchers, government agencies, the public, and various stakeholders. The bureau contributes articles for publications; it reports to government agencies and shares data with interested parties; and it develops educational content for broad use by the public. The bureau is also a source of unbiased, credible information on Pennsylvania forests and native wild plants, and it shares its data regularly.

Communication - Effective communication is vital to conservation agencies, where efforts are tied to resource stewardship on the parts of individuals and communities. The bureau employs effective communication and public outreach to foster stewardship and convey a message of environmental sustainability. Central to the bureau's communication strategy is to inform visitors and stakeholders about the timing and siting of management activities, the availability of various recreation opportunities, and the importance of forest resources. Bureau staff remain available to engage in thoughtful dialogue with stakeholders, to answer questions, field concerns, and provide information.

Education - Public education and outreach is an essential component of the bureau's mission. DCNR's enabling legislation mandates it to "promote forestry and the knowledge of forestry" throughout the commonwealth. The bureau's mission further states that it will accomplish this by "advising and assisting other government agencies, communities, landowners, forest industry, and the public in the wise stewardship and utilization of forest resources." This is especially important with youth. The bureau serves as the state sponsor for Project Learning Tree, an international forest education program. Most forest districts participate in numerous educational opportunities with stakeholders from Envirothon, to fire prevention and Smokey programs, to forest resource programming with schools.

Interpretation – Interpretation is as a mission-based communication process that forges emotional and intellectual connections between the interests of the audience and the meanings inherent in the resource. The bureau of forestry provides interpretive wayside panels located at various locations including trailhead parking areas, along trails, at district offices, and other areas of the high use by the public.

Each District has developed an Interpretive Plan to describe and direct how the District plans to fulfill its mission to promote forestry and provide information about forests. The District has six broad goals for interpretive communications with specific objectives and details described in the plan which is attached to this District Plan as Appendix B.

Tuscarora State Forest District Interpretive Goals

1. Foster an awareness and encourage sustainable use of resources by communicating, promoting and modeling good stewardship and best management practices.
2. Encourage exploration and participation in low impact recreation within the Tuscarora State Forest.
3. Support effective partnerships with local communities that benefit the community, the resource and the visitor.
4. Develop engaging experiences that promote intellectual and emotional connections between the resource and visitors.
5. Communicate the ongoing challenges of balancing natural resource use with society's needs, wants and desires.
6. Foster an appreciation and understanding of the history of Pennsylvania's forests and their role in our lives.

The Tuscarora Facebook page is a primary communication tool and reaches many thousands of people. This reach is effective because of the frequently updated photo images posted to the site of scenery and wildlife from the State Forest. It is also very effective as a forum for receiving feedback from the public.

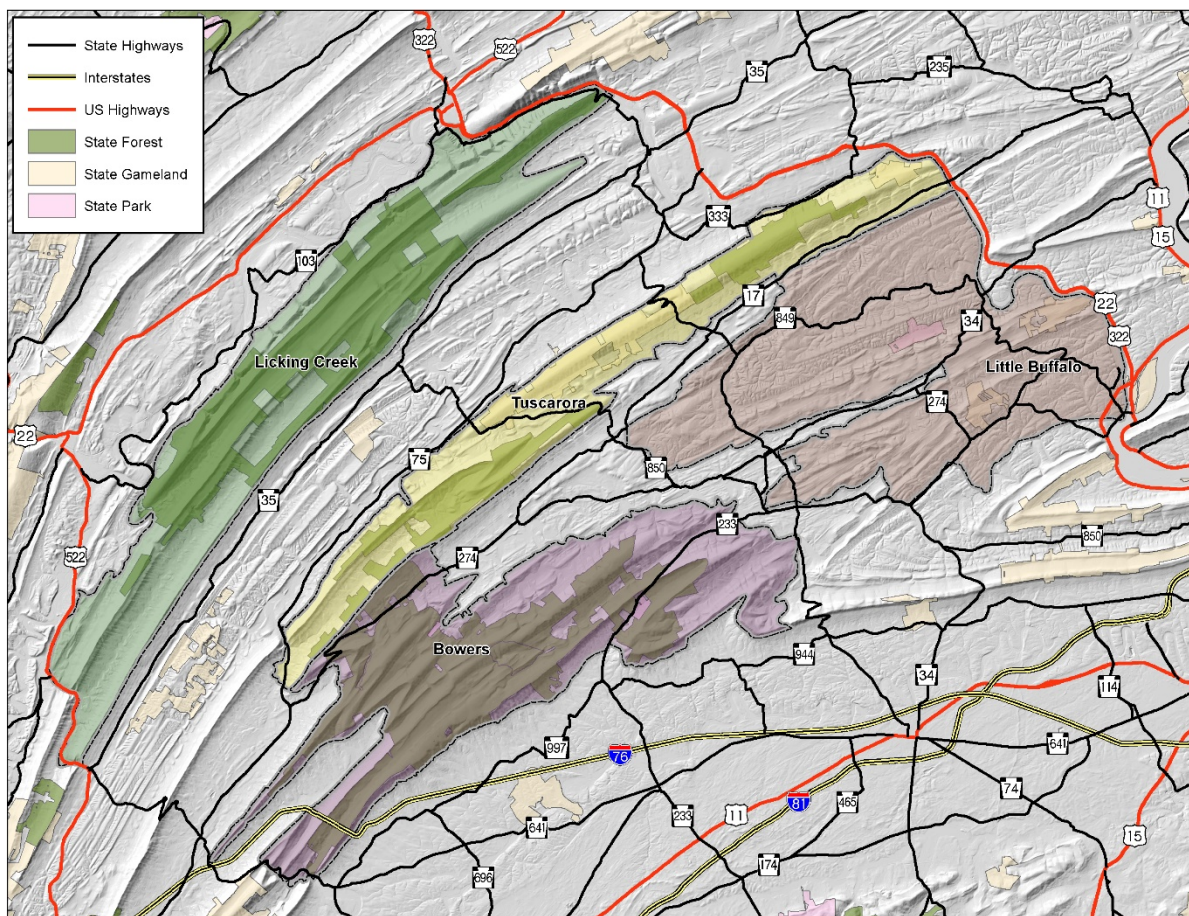
One unique aspect of interpretive work in the District is the “Tuscarora Treasures.” It is a listing with photos, locations and descriptions of some of the most interesting places in the Tuscarora State Forest. Working cooperatively with the Perry County Bicentennial Heritage Trail, these sites have been added to their web-based information as well as the Tuscarora Facebook page and web site. Cooperation with the Perry County Bicentennial Committee is on-going.

Landscape Management Unit Plans

With the 2016 revision of the SFRMP, the bureau introduced the LMU concept to facilitate consistent, structured and integrated resource management and planning across large landscape units on state forest and adjoining lands. LMUs were delineated for all state forest land in 2016-2017. The LMU, which complements other ecological delineations, now serves as the primary unit for landscape-level planning and management on state forest lands. LMUs help the bureau facilitate planning on a landscape scale that has ecological context, incorporate multiple forest uses and values and promote ecological analysis. The units also serve as a tool to facilitate cooperative management with adjoining forest districts, landowners and agencies. An explanation of how LMUs were delineated is found in the 2016 SFRMP on page 62.

The bureau has developed LMU Plans for every LMU containing state forest land. The LMU Plans for LMUs within the Tuscarora District are found below. Each LMU Plan contains three elements:

- Overview – a one to two-page narrative describing the LMU and its important features;
- LMU Priority Goals – a list of points of emphasis for state forest land management within the LMU, similar to the District Priority Goals, but at the LMU level; and
- Profile – tables, charts and accompanying text that more fully describe the LMU's characteristics.

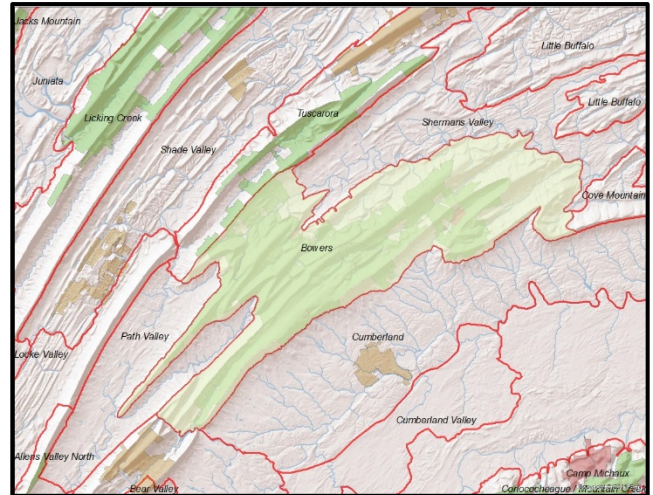


Bower

Landscape Management Unit

Overview

The Bower LMU is roughly 87,939 acres in size and is located predominately in Perry County. Fifty-one percent of the LMU consists of the Tuscarora State Forest in what is commonly called the “South Block”. Forty-Nine percent of the LMU is privately owned. Three State Parks (Big Spring, Col. Denning and Fowlers Hollow) comprise 377 acres of the LMU. The Bower LMU falls into the Ridge and Valley Eco-region of Pennsylvania. There are four major ridge systems in this LMU: Rising Mountain, Sherman’s Mountain, Blue Mountain and Bower Mountain. There are also various other small ridges and valleys. The LMU is primarily drained by Sherman Creek and Laurel Run, the entire LMU is in the Chesapeake Bay Watershed.



Most of the LMU was harvested between 1860 and 1910. Narrow gauge railways were used to transport the timber and timber products. Because of this the fire return interval most likely increased until fire suppression was instituted by the Civilian Conservation Corps which happened right after most of the large-scale logging was ending. This combination of large-scale timber harvest, lack of early fire suppression and a low to non-existent deer population contributed to the formation of the current even-aged oak dominated forest type that covers the LMU today. During the 1930's there were 2 CCC camps within the current LMU. These workers did much to construct the road and trail system still in use today. By 1907 the State had acquired ownership of 19,000 acres that today is the Tuscarora State Forest. Much of the land along Laurel Run in what is known as Henry's Valley and the land along the headwaters of Sherman Creek was in agricultural use prior to government ownership.

Today 87% of this LMU is covered by deciduous hardwood forest. On State Forest Land 71% is currently typed as an oak dominated forest with 6% typed as a conifer, mostly hemlock, forest and 23% falling into other forest types. Of these other forest types, most are dominated by black birch or red maple. This LMU has been subjected to continuous outbreaks of gypsy moth going back to the early 1980's. The gypsy moth outbreaks have resulted in large salvage timber sales and many unsalvageable dead trees across much of the LMU. The current management use of this LMU is predominately that of timber harvesting and other habitat related work with the overarching goal of reaching a balanced age class distribution and increasing diversity. A good portion of the better sites have already seen some type of timber harvest, thus shifting the harvest activity to less productive sites and sites that have been more difficult to regenerate.

The Tuscarora Trail, a State Forest hiking trail and an off shoot of the Appalachian Trail, runs east to west through this LMU mostly following the crest of the Blue Mountain. There are two natural areas in the LMU: the Masland Natural Area and the Hemlocks Natural Area, which is an old growth hemlock stand

which has had severe negative impact due to the hemlock woolly adelgid. Allegheny woodrat habitat sites are also very common in this LMU. This LMU also includes two State Forest Wild Plant Sanctuaries one of which harbors a federally endangered plant species.

Priority Goals & Objectives

- a) Create a mosaic of diverse forest types and age classes with the majority in oak types, but also with a significant amount in other forest community types such as northern hardwoods, conifer, tulip tree/maple, scrub oak woodland, hard pine, palustrine pin oak/swamp white oak and a variety of early successional types, including shrub types. Especially try to increase white pine component and conserve hemlock. Reduce birch stands through gradual conversion to more desirable types and increased species diversity within birch stands.
- b) Conserve high-quality cold-water stream habitats of Laurel Run (EV), Sheaffer Run, Bull Run, Shermans Creek, Fowlers Hollow Run and Trout Run (EV).
- c) Conserve ephemeral pool ecosystems and endangered plants as well as early successional habitats with special attention to the plant sanctuaries and federally endangered plant populations.
- d) Provide habitat for species of special concern and high conservation responsibility by conserving, maintaining and increasing habitat quality. Key habitat types include:
 - i. Rock habitat with mast producing species especially on the main ridges as this is an important mammal area designated primarily for Allegheny woodrat.
 - ii. Hemlock and white pine in pure stands, mixed stands and scattered within hardwood stands. Kansas Valley especially has both older and young hemlock and white pine.
- e) Maintain current level of wild character while providing opportunities for dispersed recreation.
 - i. Improve parking, trails, signs and facilities, while blending aesthetically into the surroundings. Balance infrastructure with the ability to maintain it.
 - ii. Maintain multi-use trail network, including snowmobile trail and improve access and parking without decreasing primitive, non-motorized areas.
 - iii. Prioritize the maintenance of wild character and promote opportunities for primitive recreation experiences.
- f) Provide interpretive information to forest visitors and virtual visitors through many means (including through tours, literature, auto tours, kiosks, interpretive panels and Facebook) especially about;
 - i. Forest management and ecology in the Ridge and Valley Region of central PA.
 - ii. History & Culture including two CCC camps and three railroads, as well as early human European settlement, past industrial use of the land and forest recovery.
- g) Limit damage from pests including insects, disease and invasive plants, especially gypsy moth, hemlock woolly adelgid and invasive shrubs. Continue experimentation on limiting stiltgrass spread along roadsides.

Profile

Table 1. LMU acreage: total and state forest land only.

	Acres
State Forest Land	45,043
LMU Total	87,939

Ecoregion: Ridge and Valley

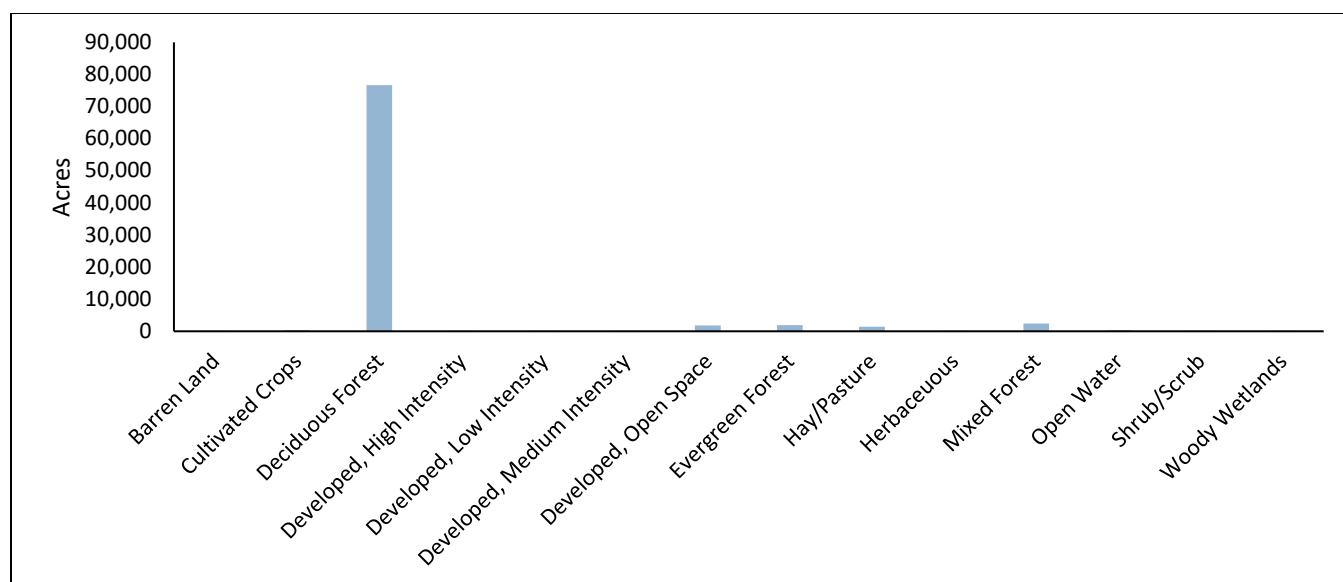


Figure 1. LMU acreage by land cover categories from the National Land Cover Dataset for the entire LMU.

The majority land use is “deciduous forest” which means there is a large contiguous expanse of one cover type, but there are opportunities to increase some less-common types such as evergreen forest, mixed forest, shrub/scrub and herbaceous without weakening that value. In fact, it is important to conserve land cover types that are less common in this LMU such as shrub /scrub, woody wetlands, and herbaceous. Some pressure exists on private land for low density residential development around the edges of the State Forest.

Table 2. Miles of roads by category on state forest land in this LMU. There are three basic types of State Forest Roads: public use roads (Z1) are roads open to the public for driving through most of the year, drivable trails (Z2) are rough dirt roads which may not be suitable for passenger vehicles but are open to the public, and administrative roads (Z3) are gated and usually closed to public travel by motorized vehicle.

Road Category	Total Miles
Z1 - Public Use Road	60
Z2 - Drivable Trail	8
Z3 – Administrative (gated) Road	88
Total	156

Laurel Run road is the primary public use road through the forest in this LMU. Route 274 and a few township roads also provide access. Gated administrative roads are generally in good shape and provide the access needed but are a challenge to maintain with current staffing. A connection in Gunter Valley would be desirable and an extension of the road system is needed in the Doubling Gap area.

Table 3. Miles of trails on state forest land in this LMU open to various types of recreational use. Note that miles are not additive, and a single trail may be open to multiple use types. Shared-use trails, which make up the majority of trails on state forest land, are open to hiking, biking, horseback riding, and cross-country skiing.

Trail Category	Total Miles
Hiking	191
Biking	163
Equestrian	163
X-Skiing	167
ATV I	0
ATV II	0
Snowmobile / Joint Use Road	78

An important hiking trail in this LMU is the Tuscarora Trail, especially the section from Col. Denning State park to Flat Rock which is heavily used for day hiking. The Tuscarora Trail is mostly closed to biking and horseback riding, most of the other trails are shared use. Four Adirondack type shelters are located in the LMU and are used by through hikers and small groups. Horseback riding is more frequent in this area than in other parts of the forest. Although the snowmobile trail system is scenic, snow conditions are typically only excellent for a few days each year. Cross country skiing is not very common but most trails are open for this use.

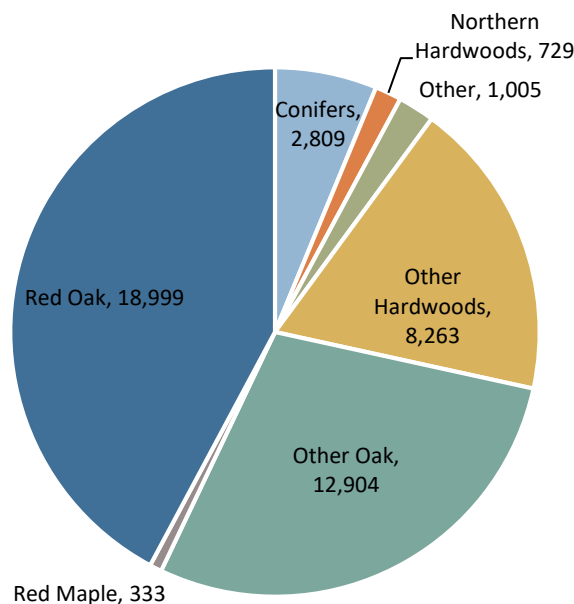


Figure 2. Acreage of state forest land in this LMU by aggregated forest type. The forest types are described on p. 108 of the 2016 SFRMP.

Red oak, white oak and chestnut oak grow very well in this LMU but have suffered from mortality due to repeated gypsy moth defoliation. Regeneration, especially of red oak, is challenging through most of this LMU and is very poor on private land. The “other hardwoods” type is mostly black birch which has replaced red oak and other oak stands following oak mortality over the last 40 years. There is very little white pine, and hemlock has suffered widespread mortality from hemlock woolly adelgid. Young sugar maple and yellow poplar are regenerating well on appropriate soils, and those vegetation types associated with them may increase in the future. Because of the ecological and economic value of the oaks and their fitness for the sites, oaks are worth working for to retain and regenerate in the next rotation.

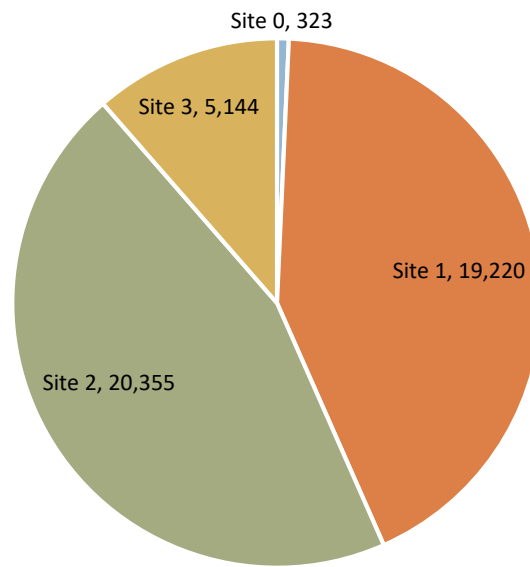


Figure 3. Acreage of state forest land in this LMU by site class. Site classes denote the potential quality of the growing site. “Site 0” indicates non-forested lands or forested lands where the vegetation has not yet been typed. Other site classes are described on p. 53 of 2016 SFRMP.

The soils in this state forest are very productive for trees. Even the site 3 stands have commercial sawtimber. Oak is the dominant species on all three site classes.

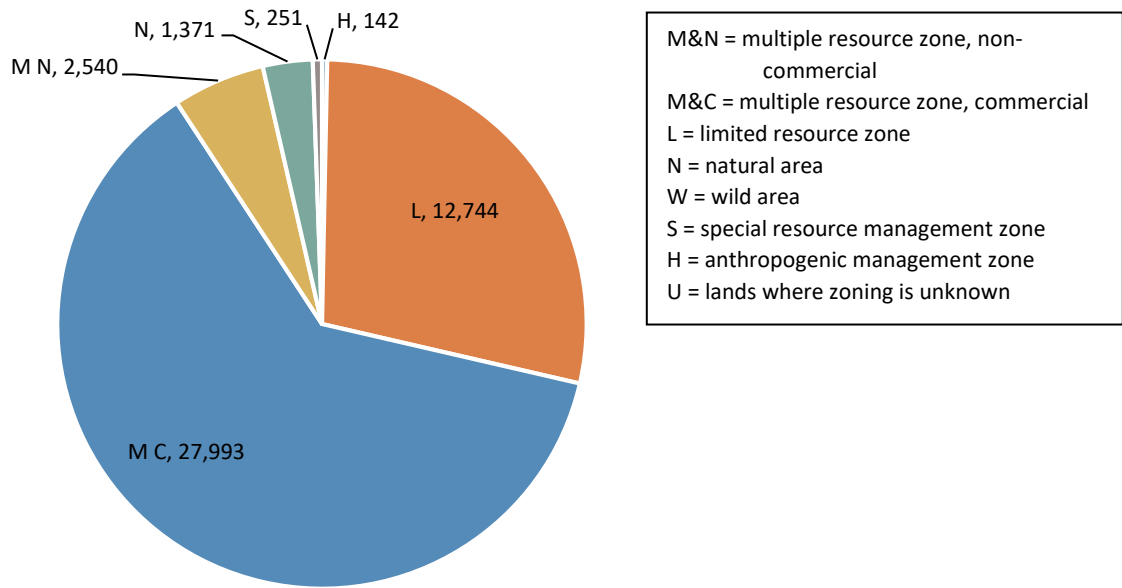


Figure 4. Acreage of state forest land in this LMU by management zone. Management zone is dictated by primary land use and land capability. Further descriptions of commerciality and zoning are found on p. 54 of the 2016 SFRMP.

There are two Natural Areas in this LMU. Commercial productivity is limited primarily by the combination of steep slope and rockiness on the upper mountain sides. A few places have limited accessibility across private land. Several important pipelines cross through the LMU and are the primary use in the anthropogenic zone.

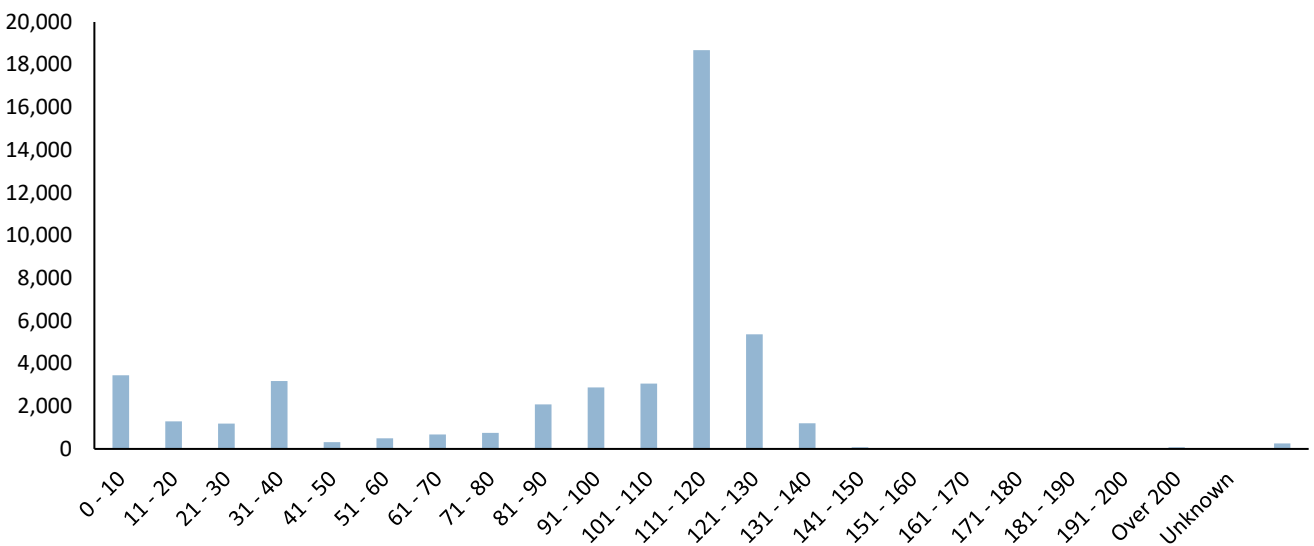


Figure 5. Acres of state forest land in this LMU by forest age classes.

The Tuscarora State Forest has a relatively more balanced age distribution than most of Pennsylvania for several reasons. Timber harvesting began around 1820 but had relatively low

impact on stand age until the latter half of the 1800's with heavier harvesting for bark and the railroads were built. A portion of this LMU was clear-cut around the start of the 20th century but by no means all of it. In fact, evidence indicates that only the most accessible sites, close to the Perry Lumber Company tracks were actually cut clean. After 1890 small tanneries closed and farm fields were gradually abandoned. Some lands purchased more recently for State Forest had been clear-cut in the mid to later 20th century. The peaks around age 10 and 40 are due primarily to gypsy moth mortality in addition to planned regeneration harvests. Unfortunately, much of that is black birch. Large portions of the Tuscarora had a two-age structure with old remnants from mid-19th century cutting, (often 125+ years old) a major age class of oak from the chestnut blight years (~100yrs old), and then a mid-story of red maple (around 50 years old). Most of the oldest age class within stands is dying out.

Table 4. Miles of stream by classification within entire LMU. Department of Environmental Protection stream classifications are described in Chapter 93 Water Quality Standards of Title 25 in the Pennsylvania Code.

Class	Total (miles)
Exceptional Value Waters	22
High Quality Waters	129
Perennial Cold-Water Streams	32
Undesignated	28
Warm Water Streams	2
Total	213

The North Fork of Laurel Run is classified as exceptional value waters, Trout Run above the old reservoir is Wilderness Trout. Upper Shermans Creek, Sheaffer Run, and Fowlers Hollow Run are High Quality. Some stream reaches are impacted by acidic deposition, including the South Fork of Laurel Run (according to the EPA Temporally Integrated Monitoring of Ecosystems project) which is being treated with limestone sand. The acidity problem is slowly decreasing, probably due to the Clean Air Act regulations. At one time most of the streams in the LMU were stocked with trout, but now few sections are. Naturally reproducing brook and some brown trout are found in streams throughout the LMU.

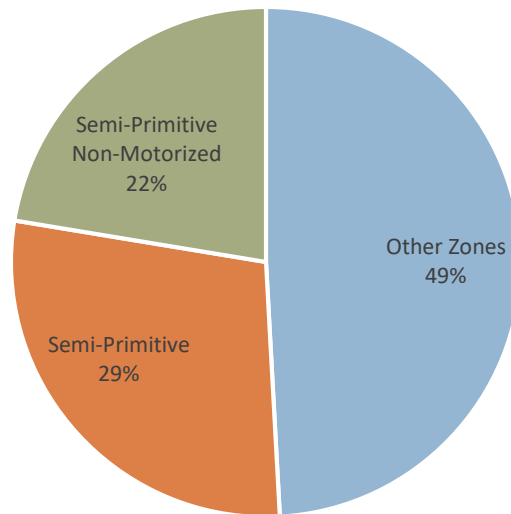
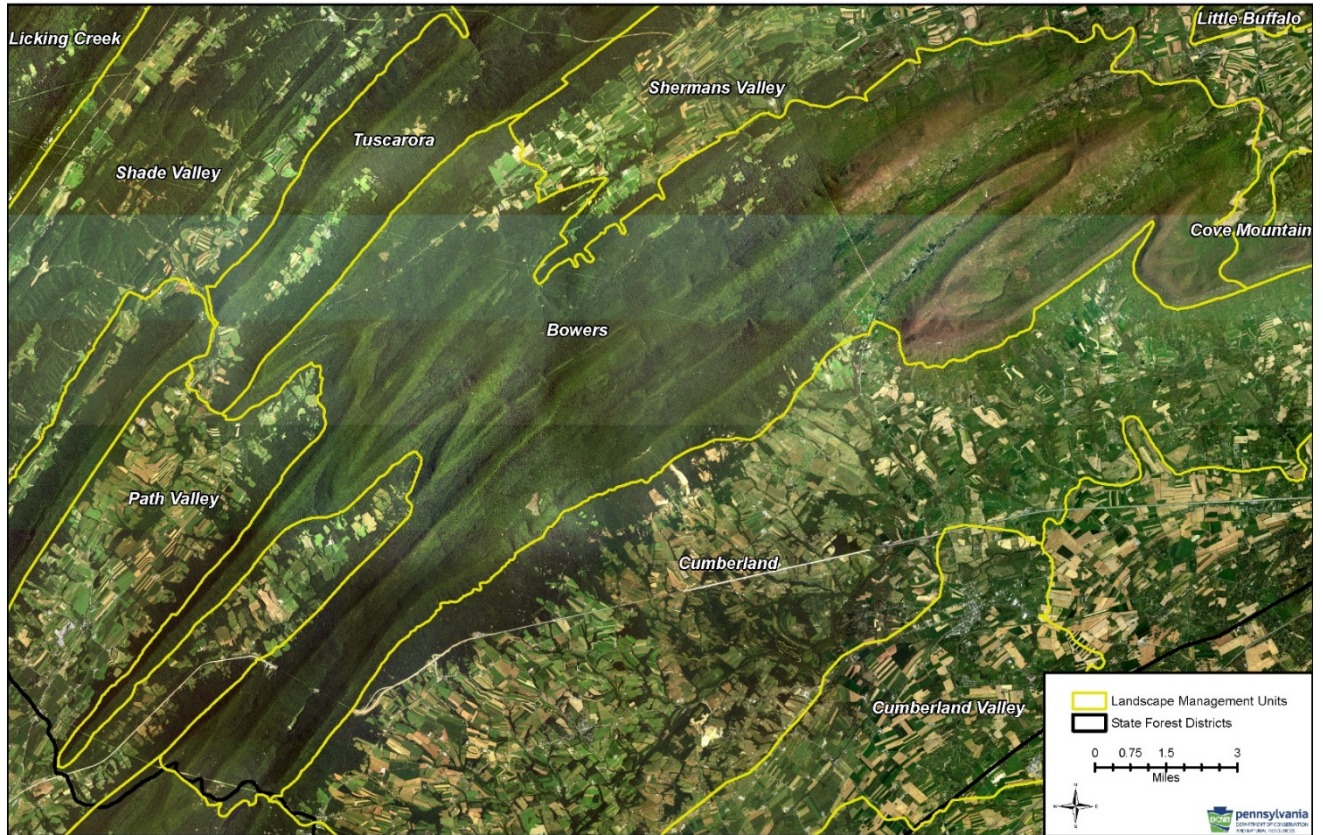


Figure 6. Acres of state forest land in this LMU by Recreation Opportunity Spectrum (ROS, 2012) classifications. ROS is an inventory system developed by the U.S. Forest Service, to characterize land by types of recreation experiences. ROS is described on p. 42 of the 2016 SFRMP. “Other Zones” refers to

Semi-Developed and Developed zones. A large part of this LMU is zoned “Other” due to its accessibility and proximity to roads. Whenever possible the Semi-Primitive and Semi-Primitive Non-Motorized areas will be maintained as they are and not opened to access by vehicles.

Bowers LMU

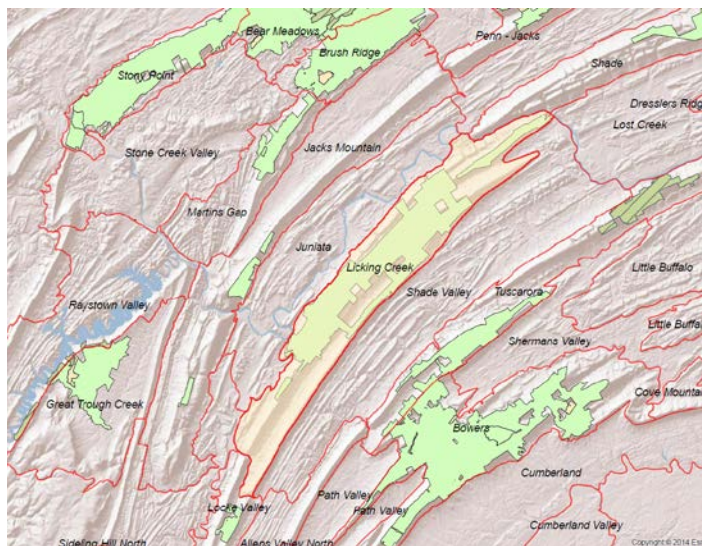


Licking Creek

Landscape Management Unit

Overview

The Licking Creek LMU is 85,209 acres and is located in Juniata, Mifflin and Huntington Counties. Forty two percent of this LMU is comprised of state forest land. The vast majority of the remaining land is privately owned forest land. The Shade Mountain to the south, Blue Mountain to the north and Blacklog Mountain in the middle traverse the length of this LMU.



Much of the area was logged between about 1840 and 1910 in the western end and central part of the LMU, first for charcoal and then for props and saw logs. There are over 130 known charcoal hearth sites in this area. Farther east, the majority was logged between about 1900 and 1930, much of it by the Vincent Lumber Company. A smaller portion of the area had been cleared for farmland during the 1800's. The CCC played an important role in developing sections of this LMU and there were two camps located here. Much of the area had burned over because of fires caused by early settlers and railroads. By the mid-twentieth century, the land that had been logged or cleared for farming had reverted back to primarily an oak forest with some pine and hemlock intermixed.

Logging is currently still a common practice on private lands within the LMU; however, it generally consists of "high grading" or "diameter limit cutting". Timber management on state forest lands within the LMU usually entails salvage cutting of dead timber or shelterwood cutting followed by overstory removal cutting after regeneration is sufficient to replace the existing forest stand. This LMU has twelve known vernal pools and includes a State Forest Wild Plant Sanctuary.

Priority Goals & Objectives

- a) Create a mosaic of diverse forest types and age classes. Regenerate and maintain a majority of the landscape in healthy red oak stands of various age classes. Conserve and increase less common forest types such as northern hardwoods, Allegheny hardwoods, tulip tree/maple, white pine/red oak, white oak, white pine/hemlock, hard pine/scrub oak woodland; and maintain in several age classes. Regenerate to type approximately 1,000 acres per decade.
- b) Conserve important water resources including:

- i. High-quality cold-water streams (East Licking Creek, West Licking Creek, Blacklog Creek)
- ii. Wetlands including: vernal pool complexes, bogs, fern and sedge wetlands, young forest and shrub wetlands, high canopy forested wetlands of various types.
- c) Provide habitat for species of special concern and high conservation responsibility by conserving, maintaining and increasing habitat quality. Key habitat types include: rock habitat with mast producing species nearby, mature oak hickory forest, conifer forest, pitch pine and scrub oak.
- d) Maintain current level of wild character while providing opportunities for dispersed recreation:
 - i. Preserve low trail density with limited new connections of old or existing trails.
 - ii. Improve parking, trails, signs and facilities, while blending aesthetically into the surroundings.
 - iii. Provide high quality horse, mountain bike and hiking trails.
 - iv. Lengthen snowmobile trails and improve access and parking.
 - v. Prioritize the maintenance of wild character and promote opportunities for primitive recreation experiences.
- e) Provide interpretive information to forest visitors and virtual visitors, especially about forest management, ecology and history including: railroads, two CCC camps, Edwards or Bells iron furnace and charcoaling, early forestry history, Joseph Rothrock, etc.
- f) Prioritize the maintenance of wild character and promote opportunities for primitive recreation experiences.

Profile

Table 1. LMU acreage: total and state forest land only.

	Acres
State Forest Land	35,802
LMU Total	85,209

Ecoregion: Ridge and Valley

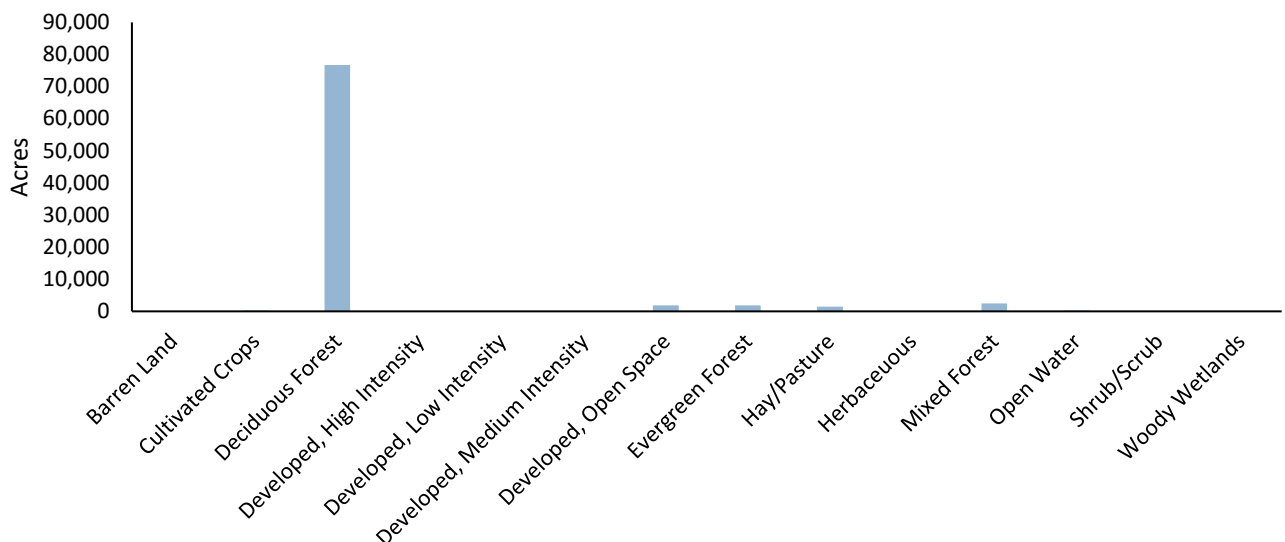


Figure 1. LMU acreage by land cover categories from the National Land Cover Dataset for the entire LMU.

The majority land use is “deciduous forest” which means there is a large contiguous expanse of one cover type, but there are opportunities to increase some less common types such as evergreen forest, mixed forest, shrub/scrub and herbaceous without weakening that value. This LMU has more white pine than any of the others in the Tuscarora State Forest, and there are opportunities to increase the evergreen forest cover and mixed forest cover by releasing understory white pine.

Table 2. Miles of roads by category on state forest land in this LMU. Road categories are described on p. 199 of the 2016 SFRMP.

Road Category	Total Miles
Z1 - Public Use Road	34
Z2 - Drivable Trail	10
Z3 – Administrative (gated) Road	54
Total	98

Licking Creek Drive runs through the middle of this LMU. The public roads of Black Log Valley, Black Log Mountain Road, Wynn Gap and McVeytown Roads are also important public access roads. A few of the more important gated administrative roads are Black Log Bench, Shade Bench, Gifford and Steltzer/Spruce Gap Roads. Most of the administrative roads are dead end roads. The road system is pretty well built out with only a few places requiring extensions of existing roads.

Table 3. Miles of trails on state forest land in this LMU open to various types of recreational use. Note that miles are not additive, and a single trail may be open to multiple use types. Shared-use trails, which make up the majority of trails on state forest land, are open to hiking, biking, horseback riding, and cross-country skiing.

Trail Category	Total Miles
Hiking	94
Biking	94
Equestrian	94
X-Skiing	94
ATV I	0
ATV II	0
Snowmobile / Joint Use Road	37

Most of the trails in this LMU were once wagon roads, charcoal trails or fire trails. These tend to go up and down the mountain ridges and frequently dead end. There is some mountain biking and horseback riding in this LMU, mostly in the West End of Licking Creek.

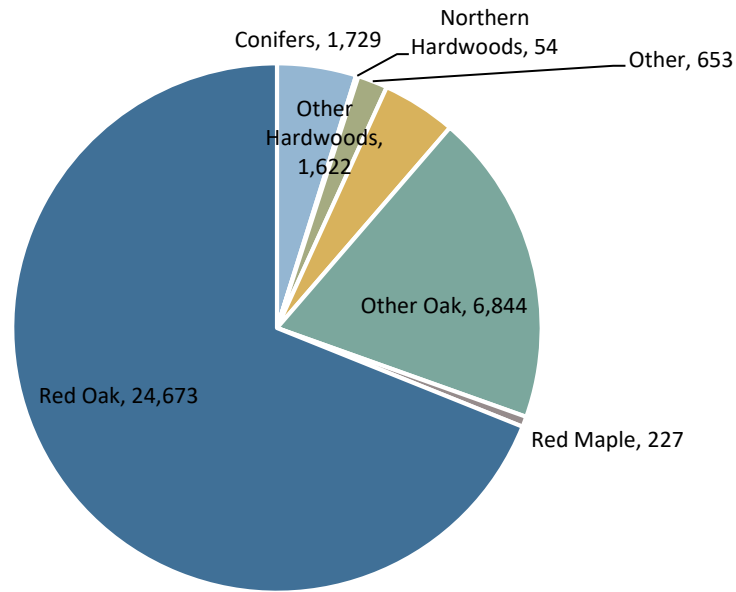


Figure 2. Acreage of state forest land in this LMU by aggregated forest type. The forest types are described on p. 108 of the 2016 SFRMP.

Red oak grows very well here and is the dominant vegetation type, even on steep rocky slopes. Other oaks include chestnut oak/heath, white oak and some scarlet and black oaks in Licking Creek. There was a moratorium on clearcutting from the late 1970's until the mid- 1980's due to lack of desirable regeneration. Some of the early clear-cuts did regenerate well, but others converted to birch and *Ailanthus*. Tulip poplar is increasing in the east and west ends of Licking Creek, and white pine is increasing in the middle.

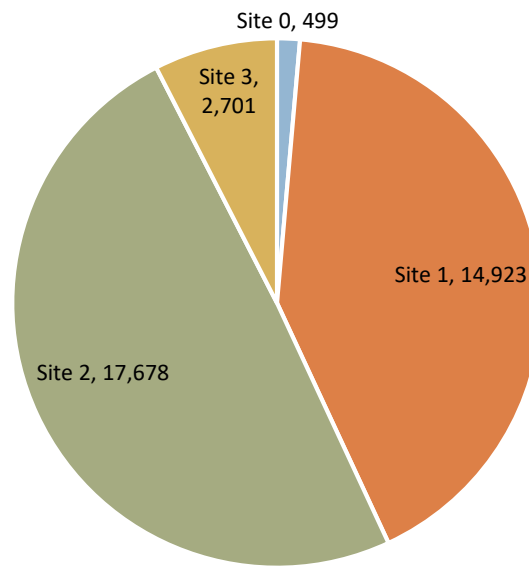


Figure 3. Acreage of state forest land in this LMU by site class. Site classes denote the potential quality of the growing site. “Site 0” indicates non-forested lands or forested lands where the vegetation has not yet been typed. Other site classes are described on p. 53 of 2016 SFRMP.

Most of the State Forest land in this LMU are site 1 or 2. There is relatively little site 3 and much of that is limited zone. Even much of the limited zone has large trees. Soils are good for growing trees and this becomes a challenge because of competing vegetation with desirable trees. Much of the silviculture revolves around controlling or managing competing vegetation.

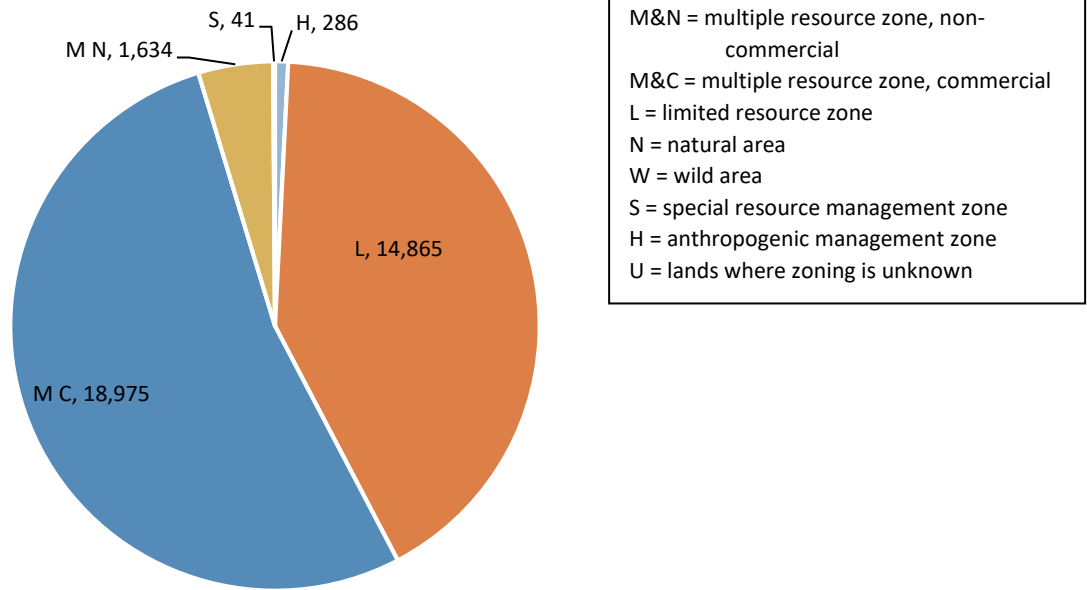


Figure 4. Acreage of state forest land in this LMU by management zone. Management zone is dictated by primary land use and land capability. Further descriptions of commerciality and zoning are found on p. 54 of the 2016 SFRMP.

Slightly more than half the State Forest in this LMU is in the multiple resource zone and available/accessible. The non-commercial and multiple resource areas are mostly ridgetops and benches cut off by surrounding limited terrain.

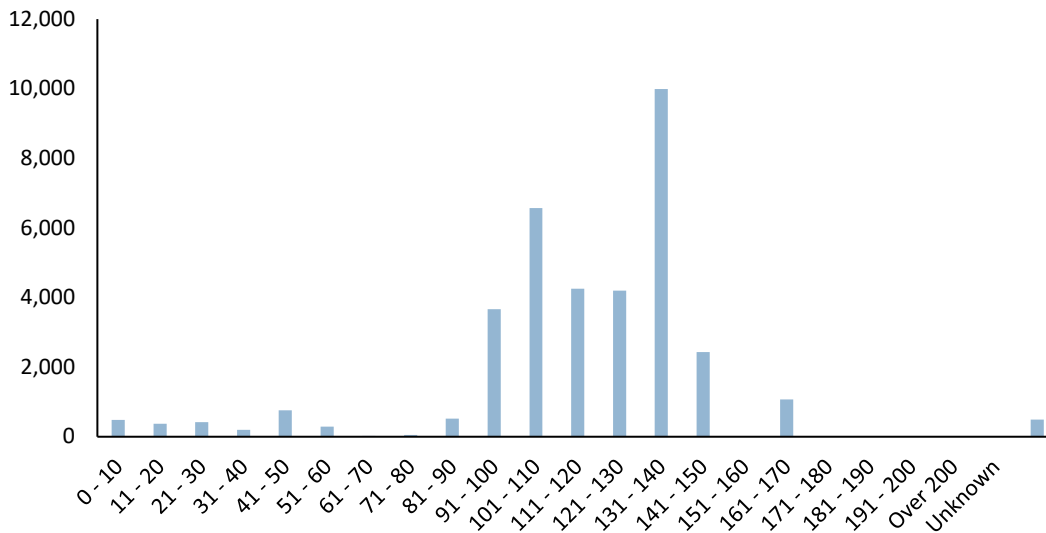


Figure 5. Acres of state forest land in this LMU by forest age classes.

Some tracts in this part of the forest were heavily harvested prior to acquisition by the Commonwealth around 1900 – 1910. Other portions were cut for charcoal for the iron furnace in the early 1800's. A few tracts in the headwaters and upper slopes were only partially harvested and many old trees have gradually died or been harvested over the years. This leads to a rather flatter age distribution than most State Forest.

Table 4. Miles of stream by classification within entire LMU. Department of Environmental Protection stream classifications are described in Chapter 93 Water Quality Standards of Title 25 in the Pennsylvania Code.

Class	Total (miles)
High Quality Waters	127
Human-made Impoundment/ Pond	1
Perennial Cold-Water Streams	4
Undesignated	22
Total	153

Major streams are East Licking Creek which has a delayed harvest special regulation for fishing, West Licking Creek and Blacklog Creek. All three are productive trout fisheries.

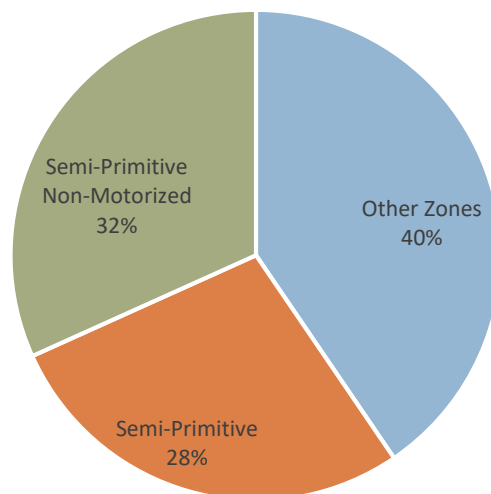
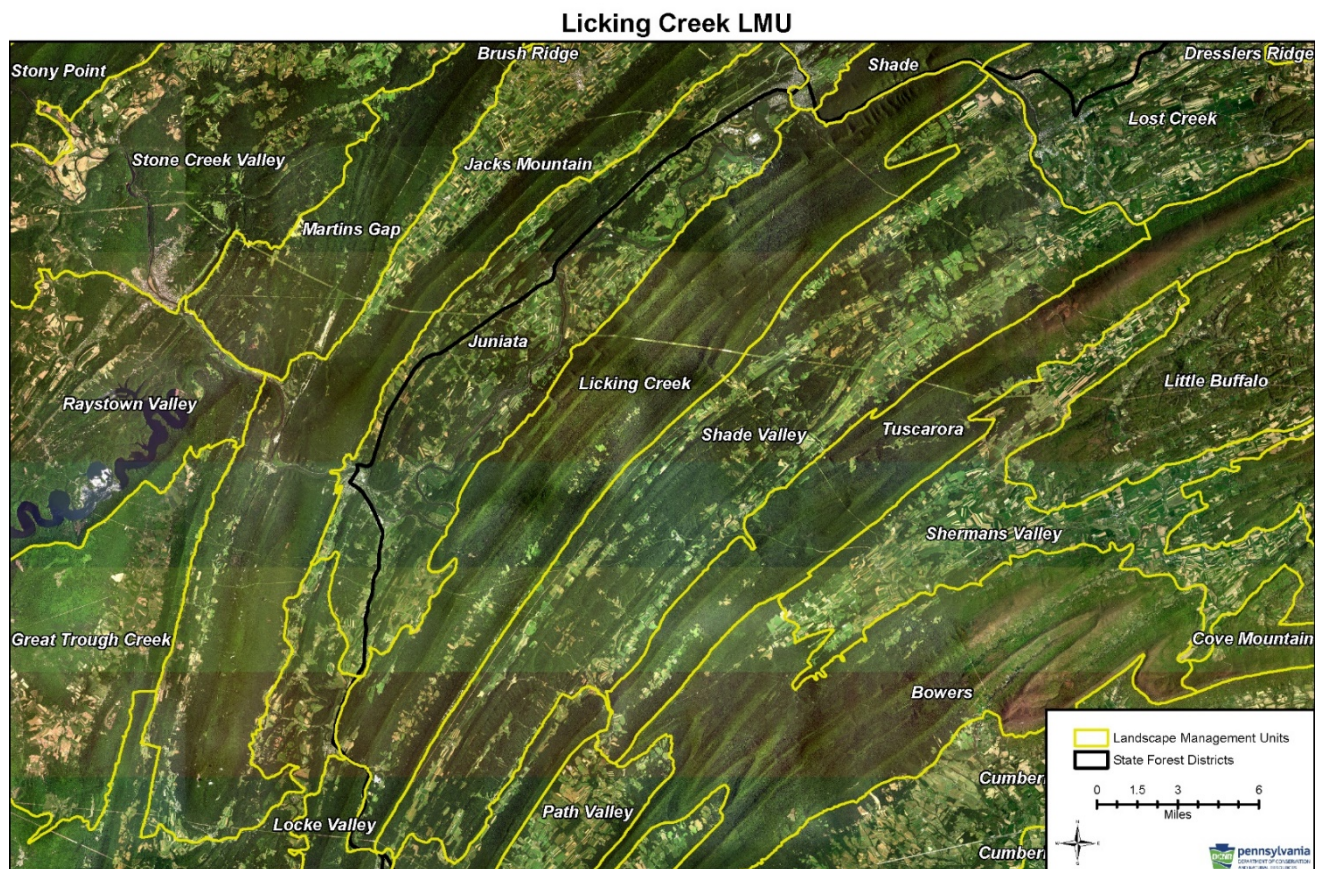


Figure 6. Acres of state forest land in this LMU by Recreation Opportunity Spectrum (ROS, 2012) classifications. ROS is an inventory system developed by the U.S. Forest Service, to characterize land by types of recreation experiences. ROS is described on p. 42 of the 2016 SFRMP. "Other Zones" refers to Semi-Developed and Developed zones.

Other than not having a primitive zone, this LMU has a nice blend of the different ROS zones allowing most users to be able to find a type of recreation suitable to their expectations. It's "Other Zone" is due primarily to much of the land base being long and narrow with a road running down the center.



Little Buffalo

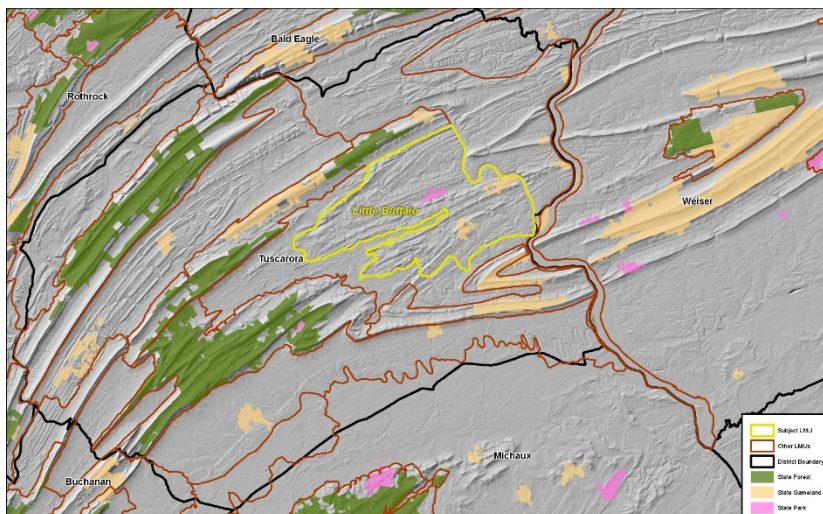
Landscape Management Unit

Overview

The Little Buffalo LMU is a landscape in the eastern part of Perry County. It consists of only ten acres of state forest land which is the Hoverter & Scholl Box Huckleberry Natural Area. This Natural Area is designated for the box huckleberry colony which is one of three locations where it is found in

Pennsylvania. 989 acres of the unit is the Little Buffalo State Park and 2,844 acres of the unit

consists of State Game Lands 290, 256, and 281 which makes up the primary public opportunity for recreation. Two-thirds of the unit is covered with forest land, mostly privately-owned. These woodlots and ridgetop forests between farm fields are for the most part not actively managed. The service forester attempts to work with landowners and promote sustainable forest management. However, most of these woodlots are subject to “high-grading” or “diameter limit cutting”. Parent material for the soils in the unit is made up of shale, siltstone, and mudstone. The unit is located in the Chesapeake Bay Watershed.



Priority Goals

- Ensure the continued survival of the box huckleberry at this location.
- Monitor for invasive plants or other pests in the Natural Area at least twice a year and evaluate control options as necessary.
- Manage recreation in the natural area in a way that protects the viability of the colony, while also promoting education of forests and wild plants.

Profile

Table 1. LMU acreage: total and state forest land only.

	Acres
State Forest Land	10
LMU Total	97,612

Ecoregion: Ridge and Valley

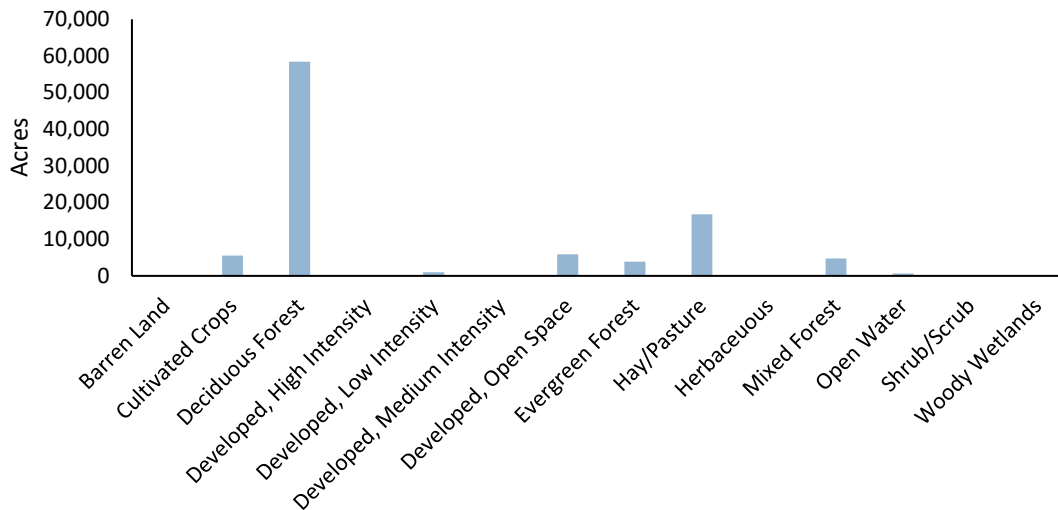


Figure 1. LMU acreage by land cover categories from the National Land Cover Dataset for the entire LMU.

This LMU is characterized by rolling hills of farmland, large residential lots, small villages and forested hillsides and ridges. The major natural cover type is deciduous forest with a lot of oak forest, but much of the forest is reverting to farm fields.

Table 2. Miles of roads by category on state forest land in this LMU. Road categories are described on p. 199 of the 2016 SFRMP.

Road Category	Total Miles
Z1 - Public Use Road	0
Z2 - Drivable Trail	0
Z3 – Administrative (gated) Road	0
Total	0

There are no State Forest roads or motorized trails in this LMU. Access to the Natural Area is via Huckleberry road, a township road.

Table 3. Miles of trails on state forest land in this LMU open to various types of recreational use. Note that miles are not additive, and a single trail may be open to multiple use types. Shared-use trails, which make up the majority of trails on state forest land, are open to hiking, biking, horseback riding, and cross-country skiing.

Trail Category	Total Miles
Hiking	0.4
Biking	0
Equestrian	0
X-Skiing	0
ATV I	0
ATV II	0
Snowmobile / Joint Use Road	0

A short hiking trail is located in the Natural Area.

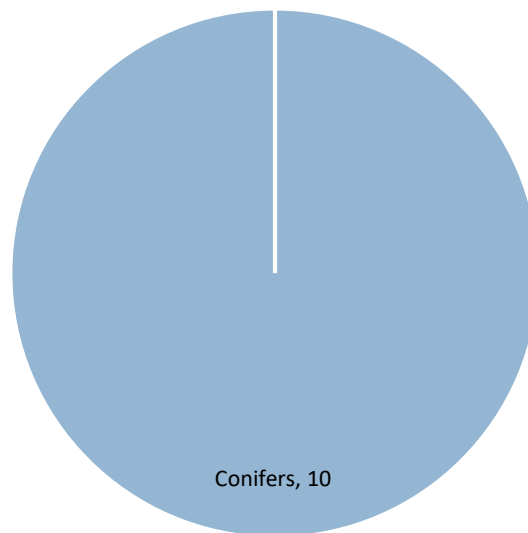


Figure 2. Acreage of state forest land in this LMU by aggregated forest type. The forest types are described on p. 108 of the 2016 SFRMP.

The forest of the Natural Area is dominated by a multi-aged stand of white pine, oak and with some understory hemlock. There is a small portion of old field with black cherry and red maple trees.

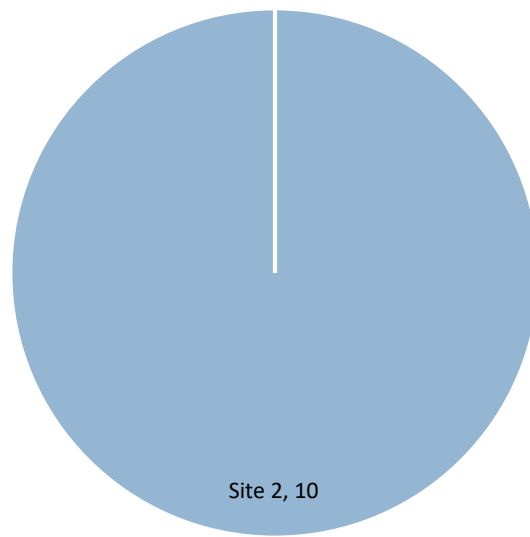
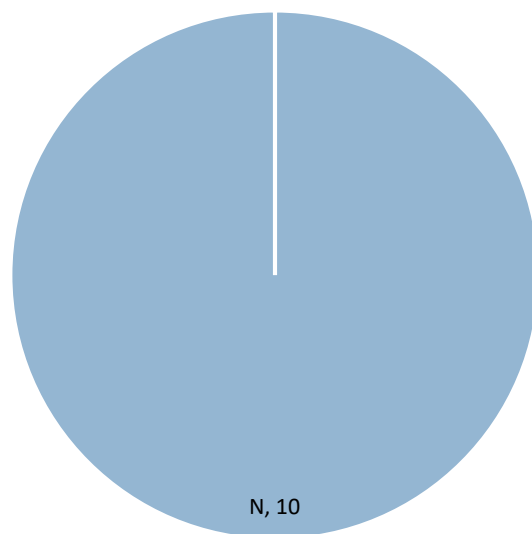


Figure 3. Acreage of state forest land in this LMU by site class. Site classes denote the potential quality of the growing site. “Site 0” indicates non-forested lands or forested lands where the vegetation has not yet been typed. Other site classes are described on p. 53 of 2016 SFRMP. The stand is typed as site 2; a small portion could arguably be site 1.



M&N = multiple resource zone, non-commercial
M&C = multiple resource zone, commercial
L = limited resource zone
N = natural area
W = wild area
S = special resource management zone
H = anthropogenic management zone
U = lands where zoning is unknown

Figure 4. Acreage of state forest land in this LMU by management zone. Management zone is dictated by primary land use and land capability. Further descriptions of commerciality and zoning are found on p. 54 of the 2016 SFRMP.

All the State Forest in the LMU is in the Natural Area.

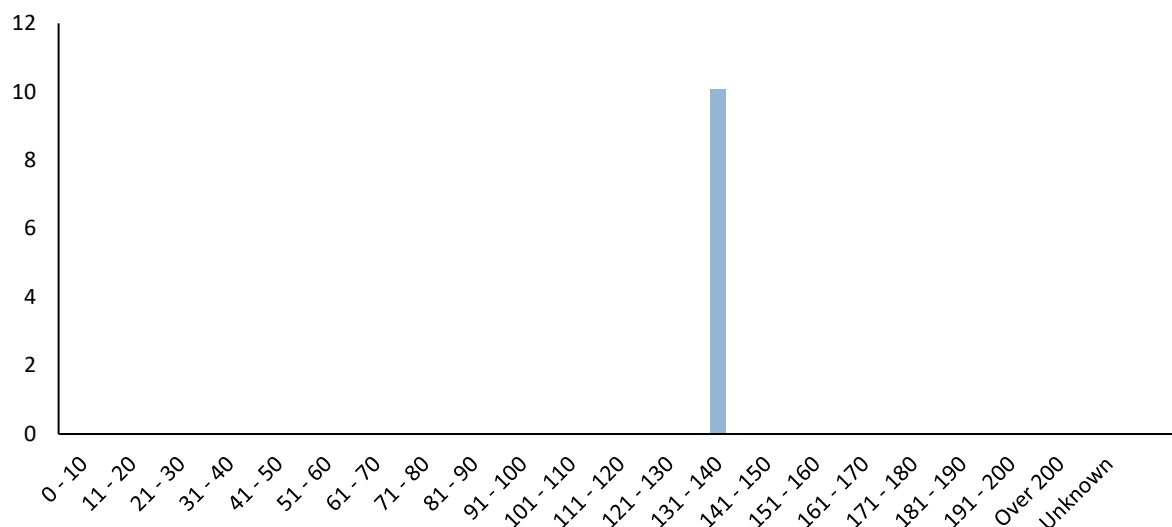


Figure 5. Acres of state forest land in this LMU by forest age classes.

The mature trees in the stand are around 140 years old. Younger age classes are initiating in the understory and in openings. There is a distinct age class around 80 – 100 years old and another around 30 years old.

Table 4. Miles of stream by classification within entire LMU. Department of Environmental Protection stream classifications are described in Chapter 93 Water Quality Standards of Title 25 in the Pennsylvania Code.

Class	Total (miles)
High Quality Waters	128
Perennial Cold-Water Streams	8
Undesignated	149
Total	285

The major streams in the LMU are Shermans Creek, Buffalo Creek and Little Buffalo Creek. Water quality is generally good, with agriculture being the greatest impairment to water quality.

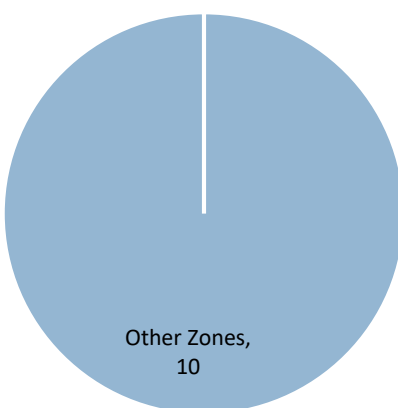
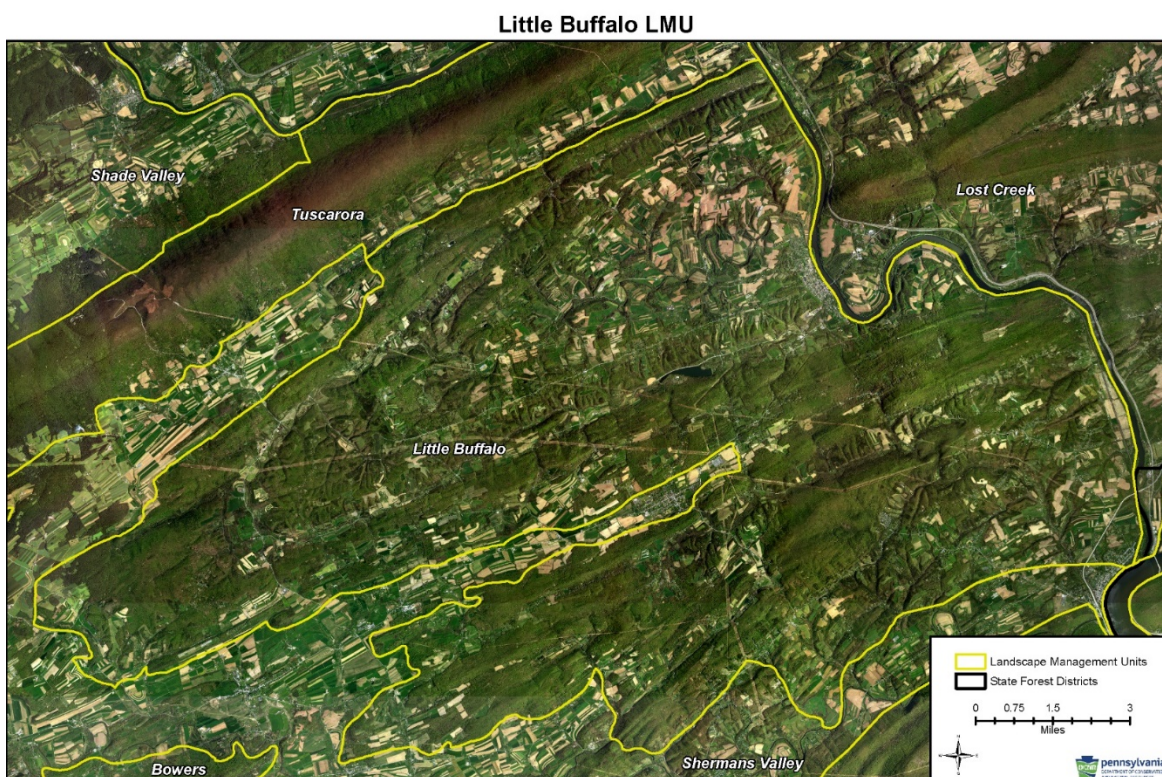


Figure 6. Acres of state forest land in this LMU by Recreation Opportunity Spectrum (ROS) classifications. ROS is an inventory system developed by the U.S. Forest Service, to characterize land by types of recreation experiences. ROS is described on p. 42 of the 2016 SFRMP. “Other Zones” refers to Semi-Developed and Developed zones.

The Natural area is small and surrounded by low density residential areas. It serves as a small community park frequented by some locals for a nice walk and some visitors from far away interested in the very old plant.

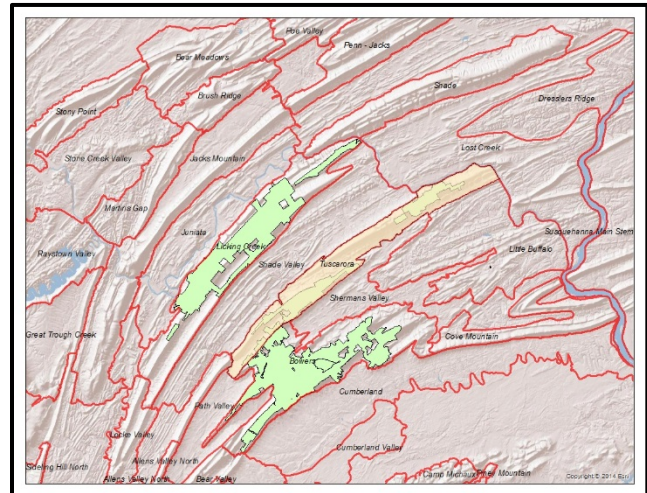


Tuscarora

Landscape Management Unit

Overview

The Tuscarora LMU is 56,231 acres in size and is located predominantly in northwestern Perry County and southern Juniata County, with a small section in northeastern Franklin County. Twenty-seven percent (15,182 acres) of this LMU consists of state forest land. Thirty-five percent (5,345 acres) of the state forest land is in the James C. Nelson Wild Area where logging is generally prohibited. The other seventy-three percent (41,048 acres) is privately owned forest or farm land. Tuscarora LMU falls into the Ridge and Valley Eco-region of Pennsylvania. The Tuscarora and Conococheague mountains traverse the length of the LMU. There are also various other small ridges and valleys.



Much of this LMU was heavily logged between 1860 and 1920 by the East Waterford Lumber Company, Pine Creek Lumber and Timber Company, Tuscarora Lumber Company and W.P. Zartman, among others. The James C. Nelson Wild Area saw a narrow-gauge railway used to transport the timber and timber products. The James C. Nelson Wild Area also had a narrow-gauge rail system to move sandstone from the side of Tuscarora mountain to the brick plant just outside of Thompsontown. The company operated from 1921 until 1950. The commonwealth purchased the land in 1964. Because of this the fire return interval most likely increased until fire suppression was instituted by the Civilian Conservation Corps or (CCC) which happened right after most of the large-scale logging was ending. This LMU had one CCC, located just south of East Waterford in Kansas Valley. Numerous projects and activities were associated with the CCC in this area, such as road construction, fire suppression, trail building and tree planting. The combination of large-scale timber harvest, lack of early fire suppression and a low to non-existent deer population contributed to the formation of the current even-aged oak dominated forest type that covers the LMU today.

The Tuscarora LMU consist mostly of mixed oak (86%) forest. This LMU has several disturbance events over the years, everything from timber harvesting, fire, native and non-native insects and weather events, like drought and early or late frost. Logging is currently still a common practice on private lands within the LMU however it generally consists of “high grading” or “diameter limit cutting”. Timber management on state forest lands (excluding the Wild Area) within the LMU usually entails salvage cutting of dead timber or shelterwood cutting followed by overstory removal cutting after regeneration is sufficient to replace the existing forest stand. The current management use of this LMU is predominately that of timber harvesting and other habitat related work with the overarching goal of reaching a balanced age class distribution and increasing diversity. This LMU also includes a State Forest Wild Plant Sanctuary.

Priority Goals & Objectives

- a) Create a mosaic of diverse forest types and age classes with the majority in red oak, oak heath, white oak or mixed white oak hemlock stands of various age classes. These should be regenerated to type. Only 6,284 acres of the total LMU are zoned State Forest Multiple Resource and Commercial. Make sure it remains healthy (control gypsy moth), and that young and middle-aged stands are continuously represented across the LMU. Community types to increase in the LMU are white pine and early succession wetlands.
- b) Conserve high-quality cold-water stream habitats of Kansas Valley Run and Horse Valley Run.
- c) Provide habitat for species of special concern and high conservation responsibility by conserving, maintaining and increasing habitat quality. Key habitat types include:
 - i. Rock habitat with mast producing species especially on Conococheague Mountain and Tuscarora Mountain west of Route 850, an important Mammal Area.
 - ii. Hemlock and white pine in pure stands, mixed stands and scattered within hardwood stands. Kansas Valley especially has both older and young hemlock and white pine.
- d) Maintain a high level of connectivity within this LMU and with the adjacent Bower LMU especially of ridgetop and rocky areas as it is mostly surrounded by agriculture and residential areas.
- e) Maintain current level of wild character while providing opportunities for dispersed recreation.
 - i. Making some connections of trails in Kansas Valley and with the Bower LMU will improve recreation values.
 - ii. Improve parking, trails, signs and facilities, while blending aesthetically into the surroundings. Balance infrastructure with the ability to maintain it.
 - iii. Maintain snowmobile trail and improve access and parking without decreasing primitive, non-motorized areas.
 - iv. Keep wild character as a high priority in this LMU due to the James C. Nelson Wild Area, other public lands, important connectivity and relatively high “wild character” score. Promote opportunities for primitive recreation experiences.
- f) Provide interpretive information to forest visitors and virtual visitors especially about:
 - i. Forest management and ecology in the Ridge and Valley Region of central PA.
 - ii. History & Culture including one CCC camp and two logging railroads, as well as past industrial use of the land and forest recovery.

Profile

Table 1. LMU acreage: total and state forest land only.

	Acres
State Forest Land	15,197
LMU Total	56,231

Ecoregion: Ridge and Valley

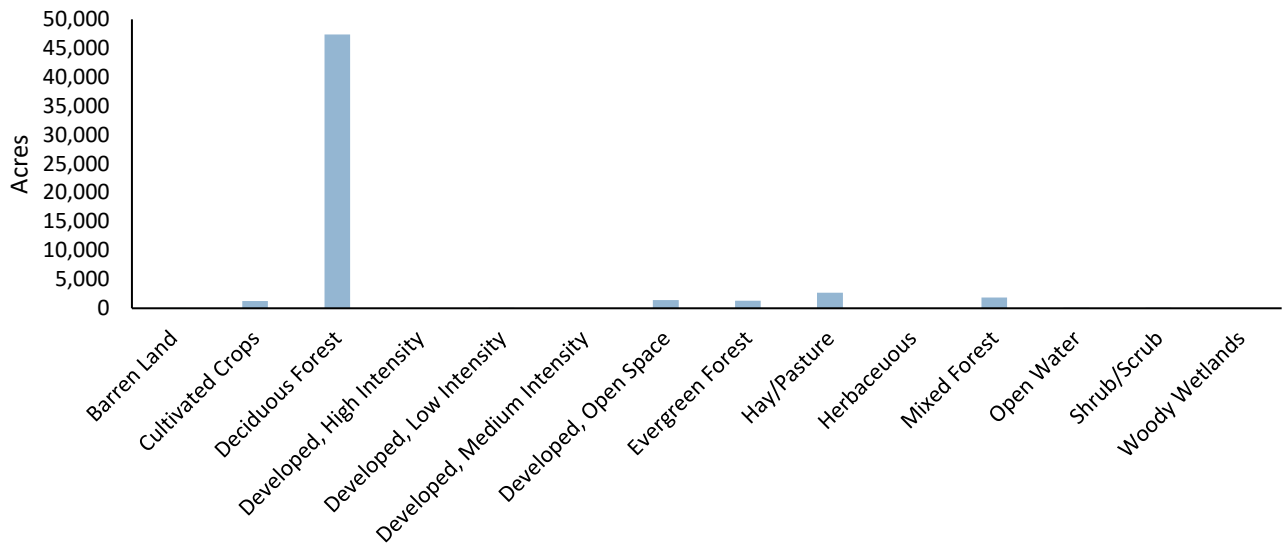


Figure 1. LMU acreage by land cover categories from the National Land Cover Dataset for the entire LMU.

This LMU is a nearly continuous linear mountain ridge broken in only a few places by gaps and narrow coves or valleys. The mountain soils are well suited to mixed oak forest with hemlock in the gaps and riparian areas. Very little of this soil is suited to intensive agriculture, or residential or commercial development. Streams and wetlands are small. Evergreen forest, especially white pine, could be increased, but hemlock woolly adelgid has taken a heavy toll on the hemlock. The best scrub oak sites are on Game Lands 88.

Table 2. Miles of roads by category on state forest land in this LMU. Road categories are described on p. 199 of the 2016 SFRMP.

Road Category	Total Miles
Z1 - Public Use Road	19
Z2 - Drivable Trail	2
Z3 – Administrative (gated) Road	18
Total	38

Kansas Valley and Little Valley roads are the primary public use roads. They provide good access though the multiple resource stands in the LMU. These roads are in good shape. Loop Road and Concord road are the main Z3 roads and are solid, but rough in places. Recent utility work has improved both of these important roads. Access is also provided by state highways. The only access for the public to the James Nelson Wild area is near VanDyke. A right of way exists to the south side, but it has never been developed.

Table 3. Miles of trails on state forest land in this LMU open to various types of recreational use. Note that miles are not additive, and a single trail may be open to multiple use types. Shared-use trails, which make up the majority of trails on state forest land, are open to hiking, biking, horseback riding, and cross-country skiing.

Trail Category	Total Miles
Hiking	30
Biking	30
Equestrian	30
X-Skiing	30
ATV I	0
ATV II	0
Snowmobile / Joint Use Road	21

In the winter Kansas Valley and Little Valley, along with Loop Rd and Little Knob Rd, make a nice snowmobile trail (joint use). The remainder of the trails in this LMU are short old fire trails but are open to most non-motorized uses. There are no trails open to ATVs in the Tuscarora SF.

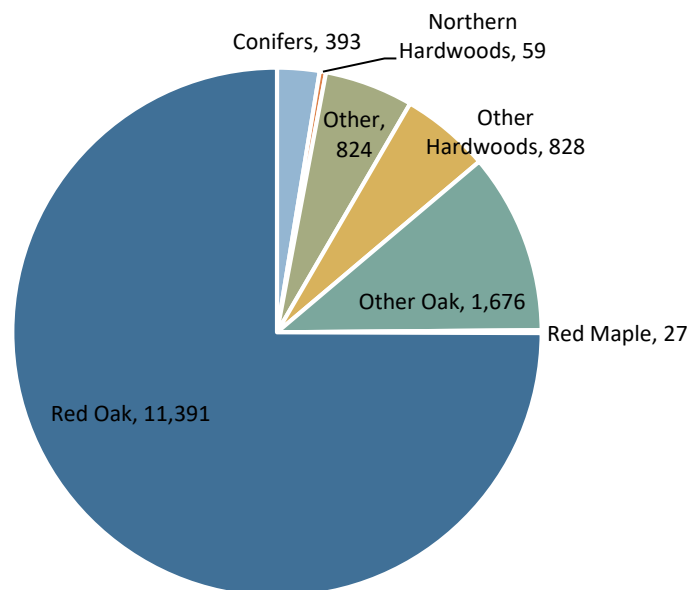


Figure 2. Acreage of state forest land in this LMU by aggregated forest type. The forest types are described on p. 108 of the 2016 SFRMP.

Red oak grows very well on the mid and lower slopes in this LMU. Growth of mature trees is good although there have been repeated cycles of mortality, mostly as a result of gypsy moth defoliation. Some concerns include undesirable competing vegetation, gypsy moth, hemlock woolly adelgid and perhaps other pests. Regenerating red oak is a challenge. Chestnut oak,

white oak and black oak are common associates in the red oak type, as well as red maple and black birch. Regeneration of mixed oak stands in parts of this LMU has been good; however, a few problem areas remain. The “other hardwoods” component is mostly black birch and is likely to increase as more oak dies without more desirable regeneration. Hemlock is also declining. There are some areas of conifer plantation. White pine seems to do well in Kansas Valley and should be increased there. A block of hemlock in Kansas Valley is treated regularly with insecticide to maintain that hemlock stand.

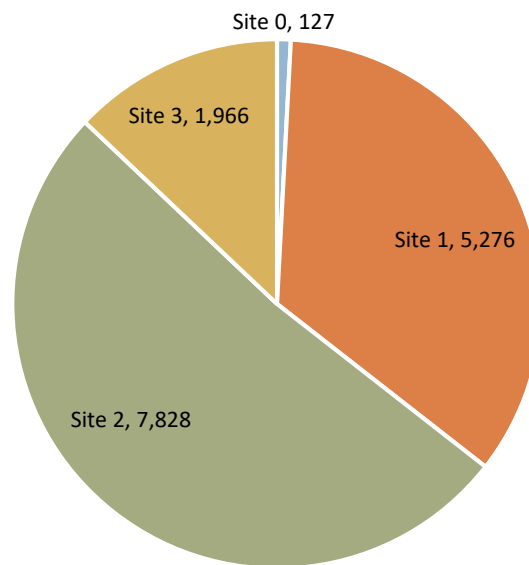


Figure 3. Acreage of state forest land in this LMU by site class. Site classes denote the potential quality of the growing site. “Site 0” indicates non-forested lands or forested lands where the vegetation has not yet been typed. Other site classes are described on p. 53 of 2016 SFRMP.

Soils in this LMU are generally very good for growing trees, even on steep rocky slopes. The site 3 areas are very rocky and still produce commercial size trees, but harvesting is difficult because of the rock.

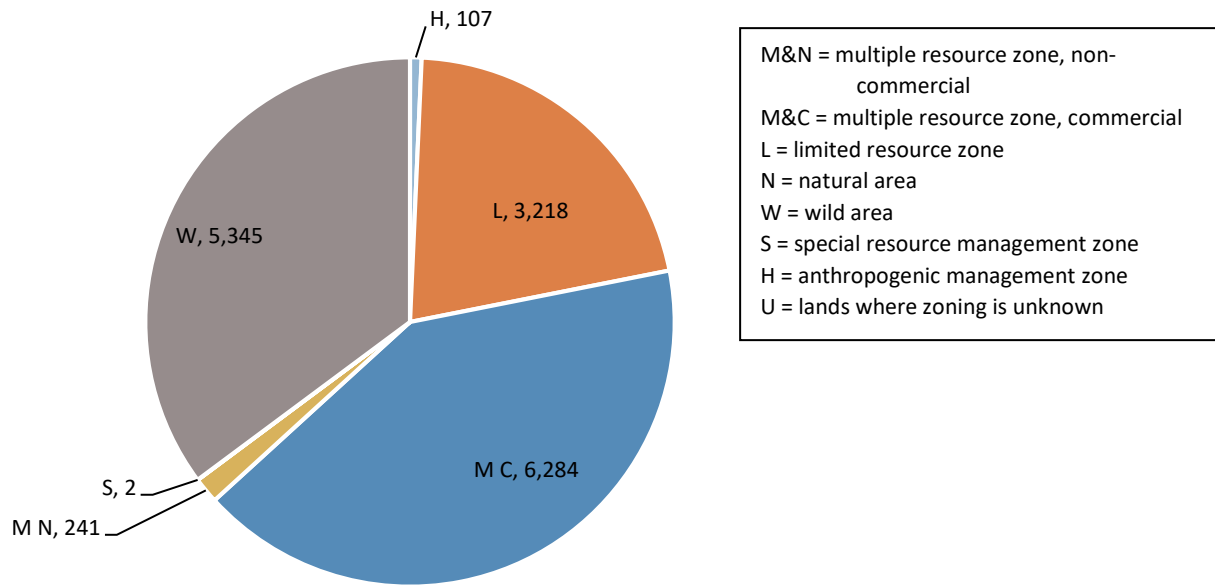


Figure 4. Acreage of state forest land in this LMU by management zone. Management zone is dictated by primary land use and land capability. Further descriptions of commerciality and zoning are found on p. 54 of the 2016 SFRMP.

A large portion of the State Forest in this LMU is in the James Nelson Wild Area. The Limited Resource Zone is especially found on the upper, south facing sides of Conococheague and Tuscarora Mountains. Anthropogenic zone is mostly utility rights of way and the Big Knob Tower site. The two acres of special resource zone are maintained in permanent herbaceous openings.

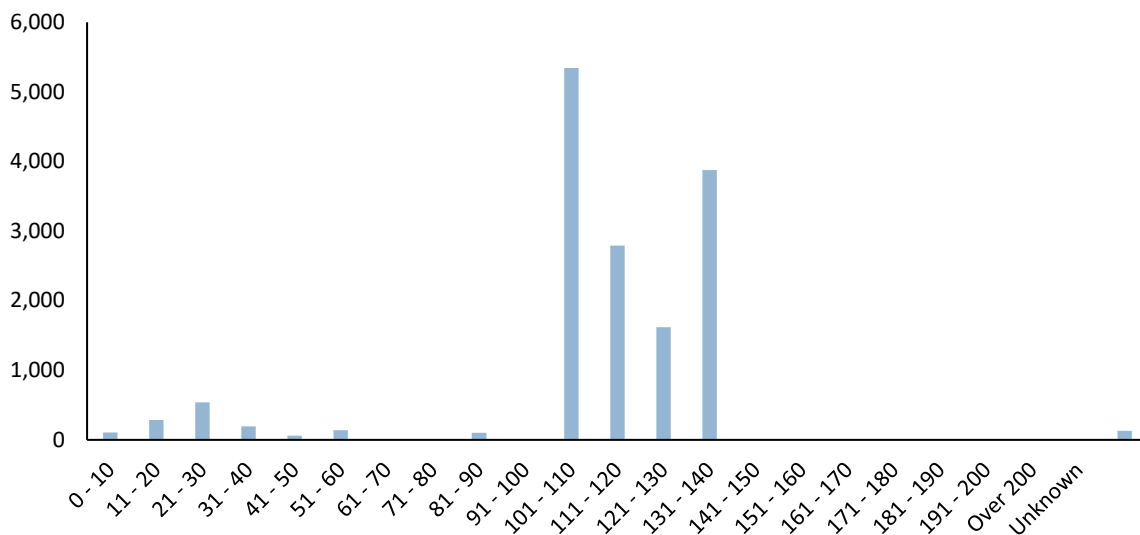


Figure 5. Acres of state forest land in this LMU by forest age classes.

Timber harvesting began in this LMU back in the early 1800's but did not stimulate much area of new age classes until the logging railroad era, which began around 1890. This era ended in this area around 1920. Therefore, most of the stands are between 100 and 130 years of age. The small peak of stands originating around the 1980's was due to salvage clear-cuts and salvage shelterwood treatments following gypsy moth defoliation.

Table 4. Miles of stream by classification within entire LMU. Department of Environmental Protection stream classifications are described in Chapter 93 Water Quality Standards of Title 25 in the Pennsylvania Code.

Class	Total (miles)
High Quality Waters	62
Perennial Cold-Water Streams	28
Undesignated	38
Total	129

Kansas Valley Run is a high-quality cold-water stream with naturally reproducing trout. Horse Valley Run is stocked with trout. Laurel Run is impaired by acidity.

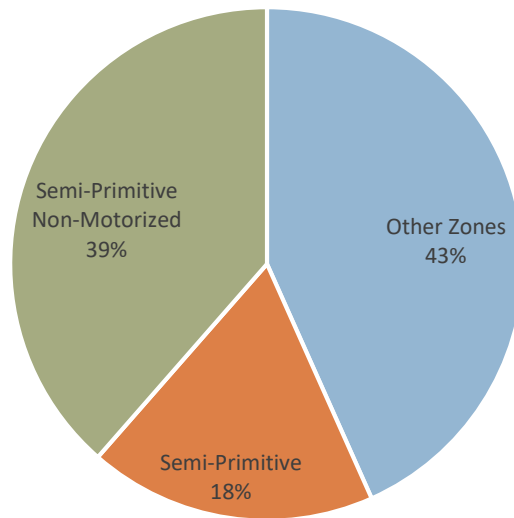
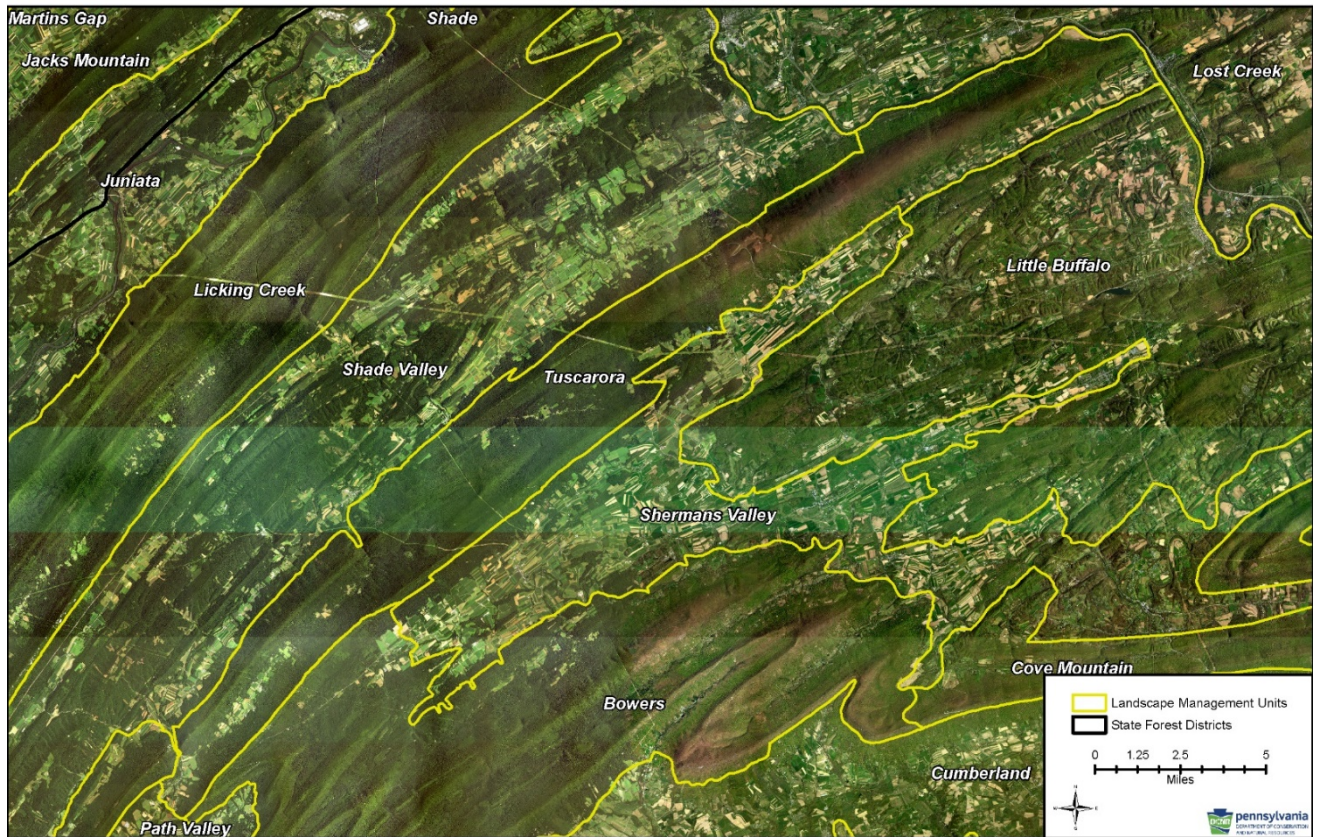


Figure 6. Acres of state forest land in this LMU by Recreation Opportunity Spectrum (ROS, 2012) classifications. ROS is an inventory system developed by the U.S. Forest Service, to characterize land by types of recreation experiences. ROS is described on p. 42 of the 2016 SFRMP. “Other Zones” refers to Semi-Developed and Developed zones. A large part of this LMU is zoned “Other” due to its accessibility and proximity to roads. Whenever possible the Semi-Primitive and Semi-Primitive Non-Motorized areas will be maintained as they are and not opened to access by vehicles

Tuscarora LMU



Glossary of Terms and Acronyms

Acceptable Regeneration – Seedlings or saplings of specific tree species deemed appropriate by forest manager to replace larger trees removed by timber harvesting on an individual stand basis. Appropriate species often include species that currently exist in the overstory, species of desirable trees for the area/region, or native species that can thrive in the ecosystem of the site.

Acid Deposition — Acid deposition occurs when acid-forming substances are transferred from the atmosphere to the surface of the earth (into the soil), often through precipitation. The deposited materials include ions, gases, and particles typically resulting from power generation and heavy manufacturing. Research has shown that acid deposition can cause slower growth, injury, or death of trees, particularly sugar maple and red spruce. Acid deposition generally causes stress to trees by interfering with calcium and magnesium nutrition and the physiological processes that depend on these elements.

Age Class — An interval into which the age range of trees or forest stands is divided for classification or use (e.g., 0–10 years, 10–20 years).

Basal Area — The area of the cross section of a tree stem, including the bark, generally at breast height (4.5 feet above the ground).

Buffer Treatment (harvesting) – A management activity that happens with in a vegetated strip or management zone of varying length and width maintained along a road, stream, wetland, lake, or other special feature. Buffer areas are managed differently than other zones of state forest land for many reasons, including aesthetics, water quality, or ecological resource protection or enhancement. Some buffers are no-management (i.e. tree cutting) zones, and others require at least a partial canopy be maintained. In general, timber harvesting within buffers is more limited than in other zones and the width of the buffer depends on the feature which is being surrounded.

Charcoal Hearth - Excavated area where wood fuel was stacked, covered with soil, and lit on fire to produce charcoal.

Clear-cut — The removal of the overstory in the absence of advance regeneration. Regeneration may be dependent on natural seed, root suckers, stump sprouts or from artificial plantings. The differentiating factor that sets this cut apart from an overstory removal is that less than 50% of the site is stocked with adequate advanced regeneration and relies on seedlings or sprouts that will become established after the cut. For clear-cuts, as with overstory removals on State Forest Lands, 10-20 square feet per acre of basal area must be reserved per acre. Clear-cuts on State Forest Lands can be referred to as “clear-cuts with residuals.”

Climate Change — The long-term fluctuations in trends in temperature, precipitation, wind, and all other aspects of the earth’s climate.

Core Forest Index - The core forest analysis was based on the density of fragmenting features within a given area, which includes roads, pipelines, well pads, certain large rivers (large enough to show up on NLCD), etc. Based on fragmentation of an LMU, each LMU was given an index score between 0-100, representing the density of fragmenting features with a higher score representing a less fragmented area.

Crop Tree Thinning — Crop tree thinning is done for many of the same reasons as improvement cuts but at a much younger, pre-commercial age. The primary reason for entering a stand in the pre-

commercial stage versus waiting until merchantable volume can be extracted is to alter the species composition of the stand prior to the most desirable stems losing positions of competitive advantage. No more than 50 crop trees should be selected per acre and a crown-touch release should be used, cutting all trees that touch the crown on a crop tree on three out of four sides. Co-dominant and intermediate trees should be the focus of crown-touch release treatments. Trees in the dominant stage will most likely be in the stand at the time of commercial thinning and most likely already enjoys dominance over its closest competitors.

Cultural/ Historic Resources — A site, structure, object, natural feature, or social account that is or was of significance to a group of people traditionally associated with it. A significant cultural resource is defined as one which is listed or eligible for listing in the National Register of Historic Places. Archaeological sites are important in elucidating information about past cultural behavior.

Damage-causing Agents - Something that negatively effects ecosystems such as, non-natural or exotic pests, disease and invasive plants, climate change, inadequate forest regeneration, acid mine drainage, acid deposition, waste and littering, habitat fragmentation, overabundant deer populations and wildfire.

Deer Management Assistance Program (DMAP) — DMAP is a Pennsylvania Game Commission program that provides additional means for landowners to meet land-use goals by allocating additional antlerless deer tags to reduce deer populations in specific areas.

Defoliation — the destruction or causation of widespread loss of leaves usually by insects or disease.

Early Successional Habitat — The period in forest development, soon after establishment, in which the growing forest is not yet dominated by tree canopies. This stage is characterized by high productivity, high structural and spatial complexity and provides habitat with vigorously growing grasses, forbs, shrubs and trees that usually require full sun exposure. Early successional habitat provides excellent food and cover for wildlife but needs disturbance to arrest forest succession and prevent the site from progressing to a more mature stage of stand development.

Ecoregion — A contiguous geographic area having a relatively uniform macroclimate, possibly with several vegetation types, and used as an ecological basis for management or planning.

Ecosystem — A conceptual unit comprised of abiotic factors and biotic organisms interacting with each other and their environment, having the major attributes of structure, function, complexity, interaction and interdependency, temporal change, and no inherent definition of spatial dimension.

Ericaceous Plants — Plants in the heath family, such as mountain laurel, rhododendron, and blueberry, that do not grow well in alkaline or basic soils (soils that have a high pH).

Even-aged Stand - is a given area of a forest in which the trees are within 20 percent of a given age, relative to the rotation length. Rotation length is the segment of time that forest trees are grown before they are cut, and a new regeneration cycle starts.

Extirpated — A species is eliminated from a certain geographic area, while it still exists elsewhere.

Fee Simple Ownership — An ownership situation whereby the landowner owns both the surface and subsurface rights.

Fire Adapted Ecosystem — Natural communities or ecosystems that have evolved with a regular fire interval and can rebound readily and benefit from fire that is consistent with the regimes to which they

are adapted. A “fire regime” describes the frequency at which fires in a given forest type typically burn, the season(s) in which they burn, and the amount of vegetation killed.

Fire Dependent – Natural communities or ecosystems requiring one or more fires of varying frequency, timing, severity, and size to achieve optimal conditions for population survival or growth.

Forest Fragmentation — The process by which a forest landscape is converted into islands of forest within a mosaic of other land uses.

Forest Type – A category of forest community usually defined by its vegetation, particularly its dominant vegetation as based on percentage cover of trees. All delineated stands on State Forest Land are coded with a ‘forest type’. Most vegetated types are based on the plant community types recognized in *Terrestrial & Palustrine Plant Communities of Pennsylvania 2nd Ed.* Non-vegetated types are based on specific anthropogenic use. See the Bureau of Forestry’s *STATE FOREST RESOURCE DESIGNATIONS, CLASSIFICATIONS AND TYPING MANUAL* for more information

Fully Stocked – A quantitative measure of the area occupied by trees, usually measured in terms of well-spaced trees or basal area per hectare, relative to an optimum or desired level of density. A classification of forest land in terms of potential annual cubic-foot volume growth per acre at culmination of mean annual increment in fully stocked natural stands. Stocking is a relative concept - a stand that is overstocked for one management objective may be understocked for another.

Group Selection — A treatment in which the desired outcome is to create an uneven-aged or all-aged stand structure over time by performing small group overstory removals or clear-cuts, creating patches of younger trees. Through time, the entire stand is removed in groups (3 or 4 harvests spaced 20–30 years apart) creating patches of several age classes throughout the stand.

Habitat Diversification — The process by which a forested landscape is broken into a mosaic of seral or successional stages of vegetation types, through management practices and/or natural processes, for utilization by a diversity of organisms.

Hibernacula – Latin for “tent for winter quarters” is a place in which a creature seeks refuge, such as a bear using a cave to overwinter. The word can be used to describe a variety of shelters used by many kinds of animals of various species. Behavior other than hibernating can also occur at hibernacula. Often used in description of sites for over-wintering bats.

High Canopy — The uppermost vegetative layer of a mature forest. High-canopy species, such as oaks and hickories, have the potential to form the dominant overstory layer of the forest. Species that would NOT be considered high-canopy species include trees that reach their full potential in the understory or mid-canopy layers, such as dogwood or striped maple.

General Permits (GP) – Department of Environmental Protection (Department) permits for Chapter 105 Wetland and Waterway Obstruction and Encroachment.

Important Bird Areas – (IBA) As identified by the Audubon Society, these are geographic regions that offer key habitat factors for the occupancy and survivability of some bird species. There are over 80 IBA sites encompassing over two million acres of Pennsylvania’s public and private land. These areas include migratory staging areas, winter roost sites, and prime breeding areas for songbirds, wading birds, and other species.

Improvement Cutting — An intermediate treatment (after establishment of the new stand and prior to final harvest) is conducted to remove trees that will improve residual stand composition and improve residual tree quality, and where the intention of the harvest is not to establish natural regeneration. The goal of this treatment is to expedite growth of higher quality trees by allowing more sunlight and nutrients to residual trees by reducing competition. This is a non-reproductive treatment and the stand's residual basal area should be at least B level stocking or greater. The difference between this and a crop tree treatment is that this type of treatment is performed later in the rotation and through a commercial sale.

Intermediate (harvest) — A timber harvest to enhance growth, quality, vigor, and composition of a stand of trees after establishment or regeneration and prior to final harvest.

Invasive Insects - is an insect that is not native to a specific location (an introduced species), and that has a tendency to spread to a degree believed to cause damage to the environment.

Invasive Plants — Non-native plant species that grow quickly and aggressively, spreading and displacing other native plants. Their establishment causes or is likely to cause economic, environmental or human harm. Invasive plants are usually introduced by people either accidentally or on purpose, into a region far from their native habitat.

Iron Furnace - A historic type of blast furnace that is used for smelting to produce industrial metals, generally pig iron, but also others such as lead or copper. Most iron furnaces used large amounts of wood charcoal as fuel.

Landscape — A land area of generally large size and commonly a mosaic of land forms and plant communities irrespective of ownership or other artificial boundaries.

Natural Area — A Natural Area is a state forest zone that is an area of unique scenic, historic, geologic or ecological value that will be maintained in a natural condition by allowing physical and biological processes to operate, usually without direct human intervention. They are set aside to provide locations for scientific observation of natural systems, to protect examples of typical and unique plant and animal communities, and to protect outstanding examples of natural interest and beauty.

Natural Regeneration — A newer age class of trees created from natural seeding, sprouting, or suckering that will serve to replace trees removed from the canopy, either through aging or harvesting.

Oak Savannah — A type of savanna, or lightly forested grassland, where oaks are the dominant trees. These savannas were maintained historically through wildfires set by lightning or humans, grazing, low precipitation, and/or poor soil.

Overstocked — Is the state of having too many trees in a forested area for the most efficient growth, usually measured in terms of well-spaced trees or basal area. A desirable level of stocking is often considered that which maximizes timber production.

Overstory — The portion of the trees, in a forest of more than one story (stratum), forming the upper most canopy layer.

Overstory Removal — The complete removal of the overstory to release established advanced regeneration. The differentiating factor between this cut and a "clear cut," is that advanced regeneration is present and established with at least 50% stocking of the site. On State Forest Lands, 10-20 square feet of basal area per acre must be retained. Overstory removals on State Forest Lands

are referred to as “Overstory Removals with Residuals”.

Pennsylvania Conservation Explorer (Explorer) — An online tool designed to facilitate conservation planning and environmental review (PNDI) for threatened and endangered species, species of special concern, and other natural resources of concern. The environmental review portion of Explorer screens projects for potential impacts to species under the jurisdiction of PA Game Commission, PA Fish and Boat Commission, PA DCNR, and the US Fish and Wildlife Service. All silviculture and land management activities should be submitted through the PNDI system. The purpose of this system is to call attention to the forester that species of concern, threatened or endangered nature are nearby or within the project area.

Pennsylvania Natural Heritage Program — The Pennsylvania Natural Heritage Program (PNHP) is a member of NatureServe, an international network of natural heritage programs that gather and provide information on the location and status of important ecological resources (plants, vertebrates, invertebrates, natural communities and geologic features). Its purpose is to provide current, reliable, objective information to help inform environmental decisions. PNHP information can be used to guide conservation work and land- use planning, ensuring the maximum conservation benefit with the minimum cost. PNHP manages PNDI (see above).

Pennsylvania Scenic Rivers Program — Scenic river designations are intended to preserve the primitive qualities the natural, and aesthetic values of a river and to protect the existing character and quality of both the river and its adjacent land environment. They shall be free-flowing and capable of, or under restoration, to support water-cased recreation, fish and aquatic life. The view from the river or its banks shall be predominately wild but may reveal some pastoral countryside. The segment may be intermittently accessible by road. The Pennsylvania Scenic Rivers Act of 1982 authorized the statutory designation of outstanding aesthetic or recreational rivers.

Recreational Opportunity Spectrum Continuum (ROS) — ROS is an inventory system developed by the U.S. Forest Service, to characterize land by types of recreation and experiences. This version adopted by the Bureau of Forestry defines five recreation classes for the state forests (primitive, semi-primitive non-motorized, semi-primitive, semi-developed, developed).

Regeneration — Seedlings or saplings existing in a stand or the act of renewing tree cover by establishing young trees naturally or artificially.

Regeneration period — The time between the initial regeneration treatment and the successful re-establishment of a new age class by natural means, planting, or direct seeding.

Reserve or Residuals trees — Trees, pole sized or larger, retained after an intermediate or partial timber harvest of a stand.

Rotation — In even aged systems, the period between regeneration establishment and final cutting.

Salvage Harvest — A timber harvest in which only dead and dying trees are harvested while they still retain a degree of economic value, or in conjunction with other treatments in which the goal is both economic salvage and a silvicultural goal such as salvage-overstory removal, salvage-shelterwood, salvage-improvement, etc. Timber sales in which 20% or more of the volume being removed is dead or dying should be classified as salvage, or salvage along with any other treatment being implemented.

Seed Tree Cut — The attempted establishment of a new stand from a partial overstory removal and

retention of scattered trees for genetically superior seed production and seedling establishment. Usually less than 40 BA is retained to allow almost full exposure of a site to sunlight. Species that are shade intolerant and wind dispersed usually benefit under this type of cut. Once advanced regeneration is established the seed trees are removed.

Severed Ownership — an ownership situation whereby the surface landowner has either partial ownership of the subsurface or the subsurface is owned completely by another entity.

Shade Tolerance – The relative capacity of a plant to become established and grow beneath overtopping vegetation, where sunlight is fully or partially obscured.

Shelterwood (harvest) — The attempted establishment of a new cohort of natural regeneration from the partial removal of the overstory. A shelterwood harvest may be a single treatment or a series of cuts to ensure that adequate seed source is retained, and light levels are manipulated to allow the establishment or promotion of a target species or group of species. The essential characteristic is that the new stand is being established naturally or artificially under the overstory or the “shelter” of the original stand. The characteristic difference between this cut and a seed tree cut is that a relatively contiguous canopy is retained (approximately ≥ 40 BA) and most often species regenerated under this system are moderate to shade tolerant species. Once advanced regeneration is established, the overstory is removed.

Single Tree Selection (harvest) — A harvest in which the desired goal is to create an all-aged stand by removing a uniform number of trees from each age class in an uneven-aged stand or size class in an even-aged stand. This leaves an inverse j-shaped curve for diameter distribution, creating space for the establishment of new seedlings and increased growth of remaining trees.

Silvicultural System — A planned process whereby a stand is tended, harvested, and re-established. The system name is based on the number of age classes and/or the regeneration method used.

Site Class – A classification of growing site quality, expressed in terms of ranges of dominate tree height at a given age or potential mean annual increment at culmination. For the Bureau of Forestry, site classes are numbered 1 (the best), 2 and 3 (the poorest). These classes are designated as follows:

0 Non-Forest

1 Site 1: Characterized by moist, well-drained, fairly deep soils that usually occur in protected coves, along streams, or in bottomlands that remain moist throughout the year. On northern exposures, Site 1 may extend higher up a slope than on southern exposures because of more favorable soil moisture conditions. Dominant and codominant total tree heights have the potential to average > 85 feet at maturity.

2 Site 2: Characterized by soil intermediate in moisture, depth, drainage and fertility that may dry-out for short periods during the year. This site is usually located on slopes between the ridge tops and the coves and bottomlands. Dominant and codominant total tree heights have the potential to average > 65 feet but < 85 feet at maturity.

3 Site 3: Characterized by shallow, rather dry, stony or compact soils which usually occur on ridges or broad flat plateaus. Dominant and codominant total tree heights average < 65 feet at maturity.

Site Index – a species-specific measure of actual or potential forest productivity expressed in terms of average height of trees included in a specific stand component at a specific index or base age. Site index curves are created for different regions to show the total height expectations for a certain species given the site conditions (index) and the age of the tree or stand.

Stand — A contiguous group of trees sufficiently uniform in age class distribution, composition, and structure, and growing on a site of sufficiently uniform quality, to be a distinguishable unit.

State Forest Environmental Review — SFER is the process used by the bureau to assess impacts to a variety of forest resources for projects that may or will disrupt, alter or otherwise change the environment.

Stems Per Acre – a standard measure of the density of trees within a given area, which is given as an average number of stems on an acre. Stem is considered the trunk of an individual tree.

Stocking Level – An indication of growing space occupancy relative to a pre-established standard.

Succession – The gradual supplanting of one community of plants by another; the aging of the forest from young to mature.

Sustainability — The capacity of forests, ranging from stands to ecoregions, to maintain their health, productivity, diversity, and overall integrity, in the long run, in the context of human activity and use.

Systemic Insecticides – Pesticide that is absorbed by and permeates some or all host tissues and is more toxic to the target insects and pathogens than to host.

Two-Aged Harvest — The final overstory removal or clear-cut in a stand in which a significant portion of the stand will be retained until the next rotation. Usually 20 to 30 square feet of BA is retained in oak stands and 10 –20 BA in northern hardwood stands. The residual stand is not removed upon successful regeneration, but instead carried as an older age class (creating two distinct age classes on the same site) well into the next rotation, and usually removed before the next age class reaches maturity.

Two-Aged Shelterwood — This treatment is a preparatory cut for a two-aged harvest. A shelterwood treatment or treatments performed in a stand to establish or promote advanced regeneration, once there is seedling establishment a two-aged harvest will occur.

Under Stocked – Is the state of not having enough trees in a forested area for production of most board feet volume in standing trees measured in terms of basal area. A desirable level of stocking is often considered that which maximizes timber production.

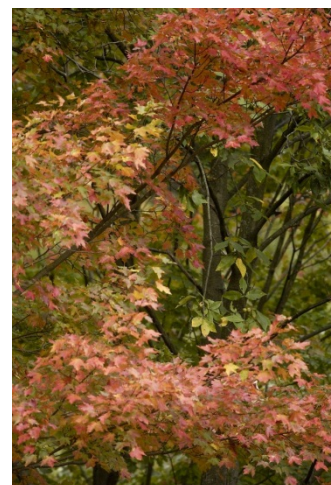
Uneven-aged stand - is a given area of a forest in which the trees are having at least three distinct tree-age classes. Classic uneven-aged forest management aspires to perpetuate an all-aged stand, with many young trees and progressively fewer older trees.

Wild Area — A Wild Area is a state forest zoning category which characterizes an extensive area, which the public will be permitted to see, use and enjoy for such activities as hiking, hunting, fishing, and the pursuit of peace and solitude. No development of a permanent nature will be permitted to retain the undeveloped character of the area.

Appendices

Appendix A - District Interpretive Plan

Tuscarora Forest District: Interpretive Plan



May 9, 2016:

Planning Team Members:

Gene F. Odato

District Forester

Stephen Wacker

Assistant District Forester

David Aurand

Mgmt. Forester



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Introduction

It is the intent of the Bureau of Forestry to have an interpretive plan in place within each state forest district. Once completed, this plan can stand alone or be placed as an addendum to the District Resource Management Plan. This plan is directly linked to the State Forest Resource Management Plan through key messages and guiding principles.

Interpretation is defined as a mission-based communication process that forges emotional and intellectual connections between the interests of the audience and the meanings inherent in the resource. The interpretive plan is a goal driven process that helps us achieve our mission, protect the resource and provide visitors with the best possible interpretive service.

This State Forest District Interpretive Plan uses a thoughtful planning process to identify the stories, management issues and resources that are specific to each state forest district. Completed plans will help us determine which communication strategies are best suited for achieving our goals and setting priorities will help allocate funds for interpretive projects. Resource conservation requires public understanding and support. Interpretation is one tool to help us achieve that goal.

DCNR and Bureau of Forestry Missions and Key Messages

Both the department and bureau missions and key messages should be present in our interpretive efforts. Keep these in mind as you plan your interpretive projects. If an interpretive project does not address our mission or contain a key message, it should not be considered.

<p>DCNR Mission</p> <p>We conserve and sustain Pennsylvania's natural resources for present and future generations' use and enjoyment.</p> <p>Vision</p> <p>As Pennsylvania's leader and chief advocate for conservation and outdoor recreation, we will inspire citizens to value their natural resources, engage in conservation practices and experience the outdoors.</p> <p>Goals</p> <ul style="list-style-type: none">• Improve stewardship and management of state parks and forests• Promote statewide land conservation• Build and maintain sustainable and attractive communities• Create outdoor connections for citizens and visitors <p>DCNR Key Messages</p> <ul style="list-style-type: none">• Natural resources are critical to our health, economy, and quality of life.• Everyone uses and has the opportunity to enjoy Pennsylvania's vast natural resources.• DCNR leads everyday efforts to conserve Pennsylvania's natural resources and connect people to the outdoors.• The future of Pennsylvania's natural resources depends on you.	<p>The Bureau of Forestry's Mission...</p> <p>...is to ensure the long-term health, viability and productivity of the commonwealth's forests and to conserve native wild plants.</p> <p>Bureau of Forestry's Key Messages:</p> <p>The Bureau of Forestry has developed a set of forest-related key messages that complements the department's communications efforts. The bureau considers and uses these key messages when developing communications products.</p> <p>Natural resources are critical to our health, economy, and quality of life.</p> <ul style="list-style-type: none">• Forests are Pennsylvania's principal land use.• Forests provide vital services to society. They clean our air, purify our water, provide habitat for plants and animals, and support key ecological processes.• Forests provide a renewable source of wood products to society. <p>Everyone uses and has the opportunity to enjoy Pennsylvania's vast natural resources.</p> <ul style="list-style-type: none">• Healthy forests benefit all citizens, no matter where they live.• Forests provide nearly boundless opportunities for healthful recreation.• Forests serve as a source of inspiration and wonder.• There is a forest to explore near you. <p>DCNR leads everyday efforts to conserve Pennsylvania's natural resources and connect people to the outdoors.</p> <ul style="list-style-type: none">• DCNR Bureau of Forestry leads Pennsylvania in forest and native wild plant conservation and stewardship.• DCNR Bureau of Forestry seeks to foster an awareness of the forests' many uses and values and inspire people to conserve them. <p>The future of Pennsylvania's natural resources depends on you.</p> <ul style="list-style-type: none">• People and communities every day shape the future of Pennsylvania's forests.• Sustaining our forests and associated values depends on wise stewardship.• We have a responsibility to manage our forests for current and future generations.
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State Forest Resource Management Plan: Communications Management Principle

This guiding principle for Communication Management is established in our State Forest Resource Management Plan and should assist in setting the direction of interpretive efforts.

Communications Management Principle The citizens of Pennsylvania appreciate the forests of Pennsylvania and their resources and values and are engaged in the issues that affect them.	
Goals	Objectives
1. To provide education and interpretive opportunities regarding the values, services, and benefits of sustainable forest management.	1.1 Promote Project Learning Tree with Pennsylvania educators and youth leaders through workshops and material support.
	1.2 Promote forestry and conservation through public education and outreach such as the statewide Envirothon, natural gas tours, ECO Camp, and other public programming partnerships.
	1.3 Provide forest demonstration areas throughout the state forest system that show forest management practices.
	1.4 Create statewide and district interpretive plans and increase the use of interpretive resources.
	1.5 Promote a public stewardship ethic regarding the commonwealth's forests and wild plant resources.
	1.6 Develop state-of-the-art resource management centers to house educational displays and stimulate interest in forest conservation.
	2.1 Maintain a steady and available supply of our public use maps, guides, and printed materials.

2. To provide customer service and information that promotes the use and enjoyment of the state forest	2.2 Continually update and utilize electronic media, providing information in an engaging format on the bureau and its work.
3. To engage the public and consider input in state forest management decisions.	3.1 Utilize advisory committees to engage stakeholders.
	3.2 Provide information on forests, forest issues, and native wild plants.
	3.3 Plan and coordinate public meetings on specific bureau topics including the SFRMP process and shale-gas management as well as issues of local interest at the district level.
	3.4 Monitor and respond to social media questions and comments.
	3.5 Coordinate responses to public inquiries on state forest management topics.

Overview of Tuscarora State Forest

Introduction

TUSCARORA STATE FOREST

The Tuscarora State Forest is located in south-central Pennsylvania in Cumberland, Franklin, Huntingdon, Juniata, Mifflin, and Perry Counties. It consists of 96,067 acres divided into two distinct blocks, the North Block and the South Block. The district is situated in the Ridge and Valley Eco-Region of Pennsylvania and is bisected by the Juniata River and bordered on the east by the Susquehanna River. The Tuscarora State Forest derives its name from the Tuscarora Mountain that runs southwest to northeast through the region. The mountain was named for the Tuscarora Indians; a tribe adopted by the Iroquois Nation and allowed to migrate through the region around 1714.



Goals of Region Wide Interpretive Plans...

- Perry County Comprehensive Plan
- Juniata County Comprehensive Plan
- Mifflin County Comprehensive Plan
- Franklin County Comprehensive Plan
- Cumberland County Comprehensive Plan

History

Land Acquisition History of the Tuscarora State Forest

Prior to the Europeans settling Pennsylvania, dense forests nearly covered the entire state, with the exception of a few natural meadows in the lowlands and

scattered rocky areas in the highlands. These seemingly inexhaustible timber tracts provided the early settlers with raw materials to produce charcoal for the iron and steel industries, ties for railroads, fuel wood and chemical distillation wood, as well as lumber for homes, buildings, furniture, barrels, and boxes. The settlers never envisioned that such forests could ever disappear. However, as Pennsylvania's increasing population turned forest land into farms, and as expanding industries consumed more and more wood, the amount of standing timber grew smaller. Then, in the late 1800s, awareness began to grow that the forests were not inexhaustible. Large tracts of land once covered with virgin forests had been cutover and abandoned by the owners. Forest fires burned uncontrolled throughout much of the cutover area. Between 1860 (when Pennsylvania led the nation in lumber production) and 1900 (when it had to import lumber to fill its needs), various efforts were made to halt the depletion of the forests. The future wood supply and the restoration of once-forested areas greatly concerned conservation-minded citizens.

In 1887, the Pennsylvania General Assembly authorized the governor to appoint a committee to examine and consider the subject of forestry in Pennsylvania and report its findings at the next regular session of the legislature. In 1888, a Governor's Commission was appointed to study the forest situation. Authorized by the legislature once again, the governor appointed a second commission in 1893. As a result of these studies, in 1895, Dr. J. T. Rothrock was appointed Commissioner of Forestry in the newly created Division of Forestry in the Pennsylvania Department of Agriculture.

In 1897, the legislature passed an act authorizing the purchase of unseated lands for forest reservations, thus marking the beginning of the Pennsylvania State Forest System. This act provided for the acquisition of not less than 40,000 acres in the headwaters of each of the main rivers of Pennsylvania, mainly the Delaware, Susquehanna, and Ohio, providing the land selected shall be of a character better suited to the growth of trees than to mining or agriculture, and that 50% of the area have an elevation of not less than 600 feet above sea level. In 1898, 7,500 acres of land in Clinton County became the first land purchased under this new act.

The first state purchase of land in what is now the Tuscarora State Forest was 7,608 acres bought in 1902 from J. Preston Thomas at \$1.72 per acre on the Juniata-Mifflin County Line in Licking Creek Valley. Originally called the Rothrock Forest Reserve, this tract was later merged with the Pennypacker and McClure Reserves to form the present Tuscarora State Forest. The Thomas tract was very familiar to Joseph Rothrock when he was a young boy. Timber in that valley had been harvested over a long time, beginning with John Winn in 1840.

The second purchase, also in Licking Creek, was for 6,738-acres from the Logan Iron and Steel Company in 1906. These lands included land previously owned by the Gifford family and the old Bell's iron furnace in West Licking Creek.

The first major acquisition in the Pennypacker Reserve, now the South Block of the Tuscarora State Forest, was in 1906 when 4,708-acres were bought from Harry W. Meetch. An additional 9,851-acres were acquired that same year from William B.

Meetch. In 1907, 4,311-acres were acquired from the Perry Lumber Company of which William B. Meetch was president.

Purchased From	Acres	Price (\$)	Date
J. Preston Thomas	7,608	13,114.62	9/30/1902
Logan Iron & Steel Co.	6,738	23,582.88	2/01/1906
H. W. Meetch	4,708	12,079.28	9/24/1906
W. B. Meetch	9,851	27,101.25	1/02/1907
Perry Lumber Co.	4,311	10,098.36	4/18/1907
D. S. McNitt	5,156	11,601.56	11/26/1910
Vincent Lumber Co.	3,570	10,677.00	9/09/1932
Max N. Manbeck et ux	2,806	11,224.00	5/12/1948
James M. Junk	1,589	9,540.48	7/27/1950
U.S. Dept. of Agriculture	4,150	Gift	5/26/1955
Kaiser Alum. & Chem. Co.	5,373	53,735.83	1/20/1964
Shippensburg Boro Authority	3,344	1,800,000	2/26/2004

The lands of the Perry Lumber Company were located on Big Round Top, Rising Mountain, and Amberson Ridge. Details of the company's operations are scarce, but two of the major stockholders were W. B. Meetch and Chas. L. Darlington. They had several portable sawmills located at various places on their land. The Meetch lands extended from Rising Mountain to Bower Mountain and Blue Mountain.

The 4,150-acres deeded to the Commonwealth by the United States Department of Agriculture in 1955 were originally acquired by the federal government during the depression years to retire sub-marginal farm land from cultivation and other agricultural uses. The government plan for this area, LU Pa 4, stated that over one-half of the area was non-forest or semi-forest land being farm land under cultivation, abandoned farm lands reseeding naturally, or abandoned farm lands planted in conifers. The two tracts in Fowler Hollow were 100% forested. The plan lists an area of over 3,900 acres in actual and potential timber and with the remainder to be used as leased camp areas and a recreational area in Fowler Hollow.

The 5,373 acres known as the Kaiser Tract were purchased from the Kaiser Aluminum and Chemical Corporation, which had acquired the land in 1938 with the purchase of the Van Dyke Silica Brick Company. The Van Dyke firm obtained the area from Henry Haws who purchased it upon the bankruptcy of the W. P. Zartman Lumber Company in 1917.

Beginning in 1904, Zartman assembled the acreage from smaller landowners and started cutting timber. In 1916, Zartman went bankrupt and abandoned this operation and one of similar size in Dauphin.

Since around 1988, there have been several additions and two deletions to District Acreages. A purchase of 250 acres was made in the Licking Creek Area (Mifflin

County) on the North Slope of the Blacklog Mountain. This was called the "Doberman Tract".

A 206 Acre tract in the Spruce Gap area off of Pine Ridge Road was determined to belong to Mifflin County Commissioners. This was called the "Mifflin County Tract".

Another deletion occurred when the 283-acre Spielgelmyer Tract on the Blue Mountain near Denholm was determined to be that of Gerald Spielgelmyer, who owns and operates Spielgelmyer Lumber Company. This transaction took place during 1990 in Juniata County.

Also, in 1990, the Bureau purchased the Steltzer Place. This 200-acre tract was very important to the Tuscarora State Forest since it was an interior holding, located in the upper east end of Blacklog Valley within Juniata County. Although the timber was cut extremely hard, it has very high value for wildlife habitat. The Davenport purchase occurred in 1993 and increased the district acreage by 382 acres. It lies on the north side of the Bower Mountain, in Perry County.

Another purchase, which was a little complicated, took place on the Conococheague Mountain's south side near Blain, Perry County. It involved a purchase of three different tracts and a land "swap" which resulted in addition of 96 acres to the District totals. This was the Hoverter/Foreman exchange and occurred in 1993.

In Huntingdon County the Tuscarora State Forest added 16 acres to its total with the acquisition of the "Bible-to-Youth Camp" (BYC) grounds in West Licking Creek in 1995. The Commonwealth had previously (1980's) owned this land. The camp had become vacant with the deteriorating buildings, which were burned during the winter of 1997.

A more recent large purchase was the Borough of Shippensburg's forested watershed and reservoir. The 3,344-acre watershed in Gunter's Valley was added to the state forest system in 2004.

One of the more interesting facets of westward expansion into these mountains was the discontinued construction of the Path Valley Railroad tunnel in the Conococheague Mountain near Big Round Top in western Perry County. During discussions with the Perry County Historical Society the foresters realized that if the geology would have supported a train tunnel in the 19th century the western end of Perry and northeastern edge of Franklin Counties would be much different today. So much so that the state forest would not be what exists today. The rural nature of the landscape would be totally different. The train tracks now run the length of the Juniata River and the PA Turnpike goes through the mountains in Franklin and Fulton Counties instead of Perry County.

The major activities of the Civilian Conservation Corps (CCC) program were road construction and improvement, trail improvement, building construction and recreational area development. Most of the present facilities on the Tuscarora State Forest were developed during the CCC era.

The Works Progress Administration (WPA) also contributed major improvements to the Tuscarora state forest during the Depression era. Local unemployed men were hired to build roads and recreational facilities. This was similar to the work of the CCC. A WPA crew was headquartered at the Bryner Ranger Station and built the Fowlers hollow Picnic Area and the Bryner Road. They also worked on various roads and trails in the North Block

The first modern timber management plan was developed for the Tuscarora state forest in 1952. The original plan covered only the south block of the District. Three years later the plan for the north block was implemented. These original plans were based upon the development of an uneven-age management system. On January 1, 1965, the plans were amended to permit a gradual transition to an even-age management system.

Previous to this Resource Management Period, the Tuscarora state forest was composed of six ranger divisions. During this period the four divisions, which comprise the south block, Col. Denning, Cole House, Showaker, and Bryner, were combined into one with the headquarters at the Bryner. West Licking Creek and East Licking Creek, which comprised the North Block, were combined and the headquarters located at East Licking Creek. The Bryner Ranger Headquarters was re-modeled and two new buildings constructed. A new building was also constructed at East Licking Creek. Two buildings remain at the Showaker and two remain at West Licking Creek. The other buildings were removed at various times.

The Kansas Valley Picnic Area and the County Line Picnic Area were both closed in the fall of 1980. Money and resources were then concentrated on the renovation of Karl Guss Picnic Area. Included in the renovation was a new latrine, new pavilion, a water well, and a new footbridge along with new playground equipment and stones. Recent additions to the picnic area include new road surface, handicapped accessible tables, and the removal of the playground equipment. Also, several areas have been made handicapped accessible, which include the privy, pavilion, water pump, bridge, and two fishing access points. In 1999 and 2001, existing fish habitat structures on Licking Creek within the picnic area were rehabilitated as District Work Projects. During the 1970-1985 management period numerous State-owned buildings, formerly leased as camps, were removed. From 1985–2015 a few more state-owned buildings were removed, and some leased camps were rebuilt either on the same site or at new locations.

Key Resources and Events

Box Huckleberry Natural Area

In 1845, S. F. Baird, who later became the Secretary of the Smithsonian Institute, discovered an 8-acre colony of box huckleberry (*Gaylussacia brachycera*). However, it was not until 1918 that it aroused attention. At that time, Dr. F. V. Coville of the U.S. Department of Agriculture, after extensive studies, announced that the entire colony consisted of a single plant at least 1,300 years old. There is a possibility that it might be even older since cultivation and road building may have destroyed parts of the colony.

The box huckleberry forms a dark green mat only a few inches high on the acid soil in which it grows. In May and June, white or pink flowers appear and are followed by light blue fruit in July and August. These berries often lose their interior parts and become nothing but hollow shells.

The plant has creeping stems with upright branches, which bear oval evergreen leaves. The leaves, which resemble those of boxwood, are responsible for the common name of box huckleberry. In late fall and winter the leaves acquire a bronzy hue, lending a bit of color to the winter woodland.

The colony has spread by means of runners whose average growth is about six inches per year. This, coupled with the area occupied by the colony, is the means of determining the age of the plant. Reproduction of this plant from seed is virtually impossible; thousands of seeds produce only a few weak seedlings.

The Commonwealth acquired the 10.18 acres on which the box huckleberry is located in two separate transactions. In 1928, Lillian and Earl Kimmel deeded, by gift, four acres of the box huckleberry colony. The second parcel of 6.18 acres was acquired by the Commonwealth in 1968 from the Raccoon Valley Retreat, Incorporated.

The area, which is located southeast of New Bloomfield, was formally dedicated as a National Natural Landmark by the National Park Service in 1968.

The Frank E. Masland, Jr. Natural Area

Frank E. Masland, Jr. Natural Area is a 1,264 acres Situated between Laurel Run Road, Boiler Trail, Blain-McCrea Road, and the Laurel pipeline. Historically, it has been called "The Laurel Run Wilderness Area" and the timber harvesting has not been permitted since 1950. Along Laurel Run are found large, mature oak, white pine, yellow poplar, and hemlock, and the overall effect is one of unique beauty. Much of this area suffered significant mortality from the gypsy moth and is still recovering.

The Hemlocks Natural Area

The Hemlocks Natural Area consists of 131 acres long, both sides of Patterson Run. It is a narrow area approximately one and a half miles long and averages about 500 feet in width. The area supports at least 11 tree species including hemlock, red oak, yellow birch, red maple, and chestnut oak.

Nearly fifty percent of the hemlocks are over 24 inches in diameter and 4 ½ feet above the ground. Trees with diameters above 340 inches are common, and several exceed 40 inches in diameter. The largest tree measured is a 52-inch hemlock, 109 feet tall, and the tallest one measured is 38-inch hemlock 123 feet tall. A ring count of a cross section of a wind-thrown hemlock established the age of the oldest trees at 280 years. The area was officially designated as a Natural Area in 1970.

Hemlock woolly adelgid was first found at this site in 1999 but it may have been present before that. In 2001 the predatory beetle *Pseudoscymnus tsugae*, was released to combat the infestation. By 2002 most of the hemlock trees in the natural

area were in obvious decline and some had already died. A project review was proposed to treat selected trees in the Natural Area with insecticide to try to save some of the large old trees that the Natural Area was established to protect. This project is continuing, and several research projects are underway to monitor the impact of the adelgid, the insecticide, and the changes to this ecosystem. Treatment to preserve at least a remnant of this small patch of old growth habitat should continue.

These natural areas also have the only special protection amphibian and reptile regulation in the Forest. The killing or taking these species is strictly prohibited.

The Gunter dam and reservoir formerly owned by Shippensburg Water Authority is in the Gunter Valley. The dam is scheduled to be removed in 2017 and Trout Run will run free again. The former reservoir area will be re-vegetated, and the stream improvement devices will be placed in the stream. A few low water impoundments will hopefully be designed and installed to improve wildlife habitat.

East Licking Creek, a High-Quality stream, is designated Delayed Harvest Only, Artificial Lures Only. This is the most popular trout stream in the state forest. Trout Unlimited has worked with the Tuscarora State Forest Staff and the PA Fish and Boat Commission to improve ATV access to the stream in order to stock the stream with trout. The recreational experience has been enhanced by distributing the stocked trout throughout the stream and not just at the bridge and picnic area.

There are several large-scale events that occur on the state forest. The largest being the Enduro, a motorcycle event in June that attracts hundreds of off-road motorcycles. A fifty-mile foot race and mountain bike race also make use of the south block portion of the state forest.

Many people enjoy the state forest just for the beauty of nature. So many drive the roads hoping to see a bear or a rattlesnake. Some drive long distances to see the spring migration of warblers and even more come out to hunt deer, bear and turkeys. The hundreds of miles of hiking/biking/equestrian trails are used throughout the year. One of the most popular trails is the Flat Rock trail that begins in Colonel Denning SP. Any given day will have people hiking the trail so they can visit the Flat Rock Vista.

Purpose and Goals

Purpose

The Tuscarora State Forest is one of the 20 state forests administered by the Pennsylvania Department of Conservation and Natural Resources, Bureau of Forestry. It comprises about 4% of the 2.1 million-acre state forest systems. Within the bureau, the administrative responsibility of the Tuscarora State Forest is delegated to the district forester, whose office is located at 4455 Big Spring Road Blain, Pennsylvania 17006-

9734. The district forester is responsible for executing all of the sections of the State Forest Resource Management Plan. The Tuscarora State Forest has been reserved for timber production, recreation, and clean water supply.

District Interpretive Goals

1. Foster an awareness and encourage sustainable use of resources by communicating, promoting and modeling good stewardship and best management practices.
2. Encourage exploration and participation in low impact recreation within the Tuscarora State Forest.
3. Support effective partnerships with local communities that benefit the community, the resource and the visitor.
4. Develop engaging experiences that promote intellectual and emotional connections between the resource and visitors.
5. Communicate the ongoing challenges of balancing natural resource use with society's needs, wants and desires.
6. To foster an appreciation and understanding of the history of Pennsylvania's forests and their role in our lives.

Objectives (outputs, outcomes and impacts)

The objectives provide a measurable way in which the goals will be accomplished.

Outputs:

1. Interpret and communicate to the visitor our resource management efforts while maintaining the wild character of the state forest. (Goal 2,4,5,6)
2. Develop at least one program or project with the Juniata/Perry County Forest Landowners group or the Tuscarora Forest Property Owners. (Goal 2, 3, 4, 5)
3. Work cooperatively with County Historical Societies and the Perry County 2020 to interpret the history of the region. (Goal 2, 3, 4, 6)
4. Provide and maintain historic, cultural and natural history waysides through Tuscarora Treasures. (Goal 2, 4, 5, 6)
5. Maintain a variety of recreational program offerings. (Goal 1 and 4)
6. Increase the visibility of the state forest by attending at least one community event where the state forest is promoted. (Goal 1, 3, 4, 5)
7. Work cooperatively with local school districts to serve as an outdoor classroom/laboratory. (Goal 2, 3, 4, 5)
8. Develop at least one additional volunteer opportunity. (Goal 3, 6)
9. Maintain a Community Recycling program at the district office. (Goal 1, 3)
10. Maintain a self-guided auto tour in North and South Blocks of the Tuscarora. (Goal 1, 2)

Outcomes: The anticipated short-term action resulting from the above outputs – “What the visitor will do.” Link them to the outputs.

1. Volunteerism will increase by 5% at Tuscarora State Forest (Outputs 1, 7, 9).
2. Vandalism will decrease by 15%.
3. Litter will decrease by 10%.
4. School group visitation will increase by 2%.
5. Friends group participation will increase by 15%.
6. General support will increase by 10%.
7. Rattlesnake survival is increasing.
8. Increase the # of Private Forest Landowners that adopt Silvicultural Best Management Practices.

Impacts: The long-term benefits to the state forest as a result of the above outputs and outcomes – What happens long-term. Link these to outcomes.

1. Staff time devoted to litter pick up will decrease by 15%. (Outcome 3)
2. Demands on staff time and operational budget required for state forest projects will be re-directed to other needs because of volunteer efforts. (Outcomes 1, 5)

3. BOF programs will receive adequate public support and funding.
(Outcome 6)

Audiences and Market Considerations

Who makes up your current audience/visitors? Who are the players involved in the use and stewardship of your state forest? Are there any groups not serviced that you would like to include? Have you provided interpretation for all of your audiences?

1) Current Visitors

- During the summer and fall season of 2014 with the help of Colonel Denning State Park staff we surveyed hikers on the Flat Rock Trail. We found out that people from 7 states, and all parts of Pennsylvania came to hike out to the vista on Blue Mountain.
- A glance at our camping permits will show that we do get some campers from a few other states but mostly south-central PA.
- During large snow events snowmobilers from all over PA are attracted to visit the trails because of our snow grooming and excellent trails.
- Hunters and fisherman love to practice their sport in the wilds of the Tuscarora.
- People enjoy driving the roads to enjoy the scenery and hoping to get a glimpse of wildlife.
- Fourth grades from West Perry School District and others visit the Hickory Ridge Demonstration Area in May.
- Pipeline and forest workers visit the office to meet with staff and to see the live poisonous snakes. They tend not to kill them as they once did.
- Historians

2) Current Web Visitors

- (a) Web visitors (9,000+) are typically visiting our Facebook page. Ease of operation allows us to maintain a friendly, interesting and responsive page. Our Facebook page has attracted worldwide attention because of our efforts with trail cameras.
- (b) We have updated the webpage and people do visit it.

3) Key Audiences

- | | |
|-----------------------|----------------------------------|
| • Hunters | • Hikers |
| • Fisherman | • Mountain Bikers |
| • Campers | • Pipeline and forest workers |
| • Driving tours | • Private Forest Landowners |
| • Birders | • Historians |
| • School age students | • Mobility Device Permit Holders |
| • Snowmobilers | |

4) Future Markets and Trends

- We see a future market in larger groups of extreme sports enthusiasts like 50K foot and Mountain bike races.
- Since we stopped stocking the trout streams there has been a drop in the numbers of fisherman on the streams.
- The number of birders is possibly trending upwards because of the good

population of spring warblers.

- We expect to see more people using the river islands by kayak and canoe. Kayak use on the river is definitely increasing at this time.
- We would like to see more forest landowners visit the state forest and become more in-tune with sustainable forestry.
- The mobility device permit program has improved access for dozens of visitors.
- Senior citizens and children need easier walking trails at the SF picnic areas.
- The continued use of social media, QR codes and the like will allow us to maintain contact with visitors through electronic media.
- The Tuscarora SF recognizes the importance of the PA Statewide Comprehensive Outdoor Recreation Plan (SCORP) and will continue to cultivate connections with the local community.

5) Theme and Sub-themes

The theme is a central statement that is the guiding message for all interpretation at the state forest. It defines the approach that interpretation will take. If this theme is correctly interpreted through a variety of media, it is the message that visitors take home. Sub-themes further develop the theme and are the logical progression into storylines. These are the stories that are important to you district. What do you want the visitor to know about your forest district? What message do you want the visitor to take home?

Central Theme: Tuscarora State Forest connects the past with the present through sound management of its forest resources.

Sub-themes:

Tuscarora State Forest resources will survive for future generations' use and enjoyment through sound resource management and active stewardship.

- Develop Tuscarora Treasures to highlight important and interesting historical and natural resources.
- Tuscarora State Forest is part of a larger landscape influenced by surrounding communities.
- Maintain a healthy relationship with the community through fire protection and prevention, Special Activities and Commercial Activities Agreements for concessionaires.
- Our take home message should be one that motivates people to make the connections with our resources.

Current Interpretation (personal and non-personal)

Create an inventory and overview of the programs, waysides, exhibits, brochures, maps, etc., currently offered by this state forest.

- Personal
- Non-personal

Issues, Challenges and Opportunities

Key issues and challenges to interpretation/operations at the site and a list of possible solutions to each of these concerns. Interpretation is a management strategy.

How can you use interpretation to resolve some of your key management issues?

Many of the management issues are centered on vandalism and the repair and maintenance thereof. It is a challenge to stay ahead of the constant vandalism that occurs to every aspect of our business. Roads and ditches are rutted and tore up by 4x4 trucks, dirt bikes and ATV's. Driving around gates, damage to gates, locks cut, bathrooms ruined, picnic tables burned, vistas with graffiti, fire towers damaged, and stolen signs are but a few of the issues. Interpretative panels and posters can help to advertise the financial burden that vandalism brings to the state forest. Picnic Areas and fire towers have been discontinued due to the constant vandalism. Our challenge is to stay ahead of the vandals with unique ways to impede their progress. Simple things such as the use of vertical posts for road signs instead of horizontal boards have alleviated theft.

A second full-time ranger would help to deliver messages and provide law enforcement to deter criminal action.

Recommendations for Personal (P) and Non-personal (NP) Media

This section includes the specific descriptions for personal (staffing, programs) and non-personal (exhibits, publications, waysides, etc.) media as well as costs for each recommendation.

This is how you accomplish the objectives and prioritize your interpretive projects and funding.

This section is linked to the Project Request Sheet/Share Point Site. Your priorities become our priorities.

*Priority	*Rec Number	Recommendations (in priority order)	Corresponding Objectives	Estimated Cost	Project Lead
		Personal Services (P):			
	P1	Staffing (2 additional) 1 salaried/1 seasonal		\$80,000/year	DF
	P2	Interpretive Programs for Schools		\$2,000	Book
	P3	Campsite on-line registration		\$5,000	Glodek

	P4	Recreational Program - toboggan runs		\$2,000	Program staff
	P5	Rattlesnake cages, food, brochure		\$2,000	Shaffer
	P6	Exhibit photos and taxidermy mounts		\$5,000	Shaffer
		Non-Personal Services (NP):			
1	NP1	I&E Trailer		\$5,000	Shaffer
	NP2	Interactive web site		\$1,500	Wacker
	NP3	State Forest Welcome sign/Big Round Top		\$5,000	Glodek
	NP4	State Forest Welcome sign and kiosk Gunters Valley		\$10,000	Glodek
	NP5	Self-guided Auto Tour South Block		\$1,000	Wacker
	NP6	Self-Guided Auto Tour North Block		\$1,000	Wacker
	NP7	South Block Hiking trails map		\$2,000	Wacker
	NP8	North Block Hiking trails map		\$2,000	Wacker
	NP9	North Block Snowmobile trail map		\$2,000	Wacker
	NP10	Interactive Facebook page		\$2,000	Shaffer
	NP11	Trail Cameras – take photos for Facebook		\$3,000	Shaffer

*The Priority number and Recommendation Number are needed when requesting an interpretive project from the Communication Section.

Evaluation Strategies

- How did we do?
- These are the methods that will be used to measure the effectiveness in meeting the objectives.
- Is that wayside effective?
- Are there less complaints?
- Review this plan every cycle in conjunction with the District Management Plan and SFRMP to discuss updates and changes needed.

Implementation Plan

For this section, you can take the recommendations and group them into “Ongoing Efforts”, “Phase I” and “Phase II” projects, if that is helpful in planning.

References

Comment card distribution
 District 3 State Forest Resource Management Plan
 Tuscarora State Forest map
 Oak Regeneration Study
 Woodrat Management Plan
 Doubling Gap Recreation Plan