

William Penn State Forest Resource Management Plan

Department of Conservation and Natural Resources

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BUREAU OF FORESTRY



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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, comprise 13 percent of the forested area in the commonwealth. The Bureau of Forestry is the steward of this land, and part of the bureau's mission is to manage state forests under sound ecosystem management, to retain their wild character and maintain 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, to ensure that the overarching goal of state forest management – ensuring sustainability – is achieved.

State forest management is a coordinated effort involving central office program areas and field staff in 20 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 provide 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 William Penn 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 William Penn State Forest. 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 bureau also creates District Activity Plans that describe the management activities 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.

The William Penn Forest District is a unique patchwork of state forest lands in a district that spreads over nine counties. It includes the largest city in the state, a host of suburban communities, and framed by the Appalachian trail and two major rivers. This state forest is situated to provide high level outdoor recreation, educational opportunities, and resource management to the diverse populations that live and work in southeastern Pennsylvania.

This William Penn 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 further below.

Executive Summary

The William Penn 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 William Penn 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 William Penn 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 William Penn State Forest consists of 2,000 acres of state forest lands and 6 Landscape Management Units (described below and on page 61). The William Penn Forest District consists of Berks, Bucks, Chester, Delaware, Lancaster, Lehigh, Montgomery, Northampton, and Philadelphia Counties in the southeastern part of Pennsylvania, mostly in the Reading Prong and Piedmont ecoregion. Landforms, geology, and totality of ecosystem factors have made this forest district notable for: high density populations, high quality agriculture ground, high quality timber that includes red oak and tulip-poplar. Generally, soils and growing conditions on state forest lands here are of good quality in terms that impact biomass production.

Major historic impacts to the forests here have included: deforestation, uncontrolled wildfires, increasing development pressure and various introduced pests and diseases.

Currently, most of the forest in this district is of uniform age class and structure because of widespread deforestation in the past followed by a lack of periodic disturbance. For many reasons, this uniformity places limitations on the forest's ability to regenerate optimally and provide the best benefit for multiple ecosystem factors, including human values. Additionally, the forest is under continuous threat from damaging plants, animals, and diseases, and the forest's role amidst a dynamic set of social circumstances is continuously evolving.

As part of a public trust, the William Penn 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 William Penn 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 forest communities here are of the Red Oak-Mixed Hardwood, Tulip-Maple, and Miscellaneous plant communities. The Miscellaneous includes the serpentine barrens, and understocked stands with numerous invasive trees. The district manages for the maintenance and regeneration of these communities through routine silvicultural practices and overall forest health promotion.

This district's does not have an annual timber production goal. Since most of the lands are new acquisitions, timber harvests focus on harvesting ash and addressing previous poor harvesting practices. 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. Prescribed fires, invasive species

treatments, deer exclosures, and other techniques are also important land management tools in this district.

Additionally, the Bureau of Forestry is the jurisdictional agency for the conservation of native wild plants, and this district bears custodial responsibility for managing some outstanding communities and/or ecosystems, including: Serpentine Pitch Pine-Oak forest, 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 may implement special management that targets specific wildlife because of some custodial responsibility, a mandated protection status, a wildlife's identity in the State Wildlife Action Plan, or the wildlife's recreational/ cultural value to people. This district practices targeted management for rough green snake, as well as a multitude of moth and butterflies.

Recreation is a major forest use on the state forest system and in this district. The State Forest's land base limits recreation potential to mostly day hikes, but still allows most users ample opportunities to interact with native ecosystems. Popular recreational uses of this state forest include: cycling on the rail trail, mountain bike riding, deer hunting, bird hunting, hiking.

Additionally, the district seeks to couple some recreation opportunities with education and interpretation. This district manages multiple educational features, including: trail head kiosks.

To facilitate land management objectives and meet public use demands, the district manages an array of infrastructure, including but not limited to: 1 miles of public use roads, 2.3 miles of administrative roads, and a list of parking lots, trails, etc. The district has one maintenance division that serve as base 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.

District-wide priority management goals are the following (which are not in priority order):

- Land Acquisition: The William Penn Forest District is in a unique area for land protection. While the region has been settled for centuries, there is a strong local support for continued conservation of land.
- Recreation: The William Penn Forests is in the densest population region of Pennsylvania. So along with all the other ecosystem management goals, dispersed, low-density recreation plays a big part.
- Communication: Reaching the myriad of state forest users is a daunting task. Our goal is to improve communication of key messages to the public through interpretive panels, programs, and education. This involves many staff including all the forestry personnel, administrative staff, and managers.
- Wildland fire: William Penn Forest District has the largest number of volunteer fire companies. Our goal is to continually train these volunteers to be Red Card and wildland fire ready to protect our resource.

To facilitate consistent, structured, and integrated resource management and planning across large landscape units, state forest lands and adjoining lands are organized by *Landscape Management Unit*

(LMU) (described in more detail starting on page 61). LMUs are the “building blocks” of the William Penn 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 (6) LMUs in the William Penn Forest District (Figure i). LMU plans for this district begin on page 61.

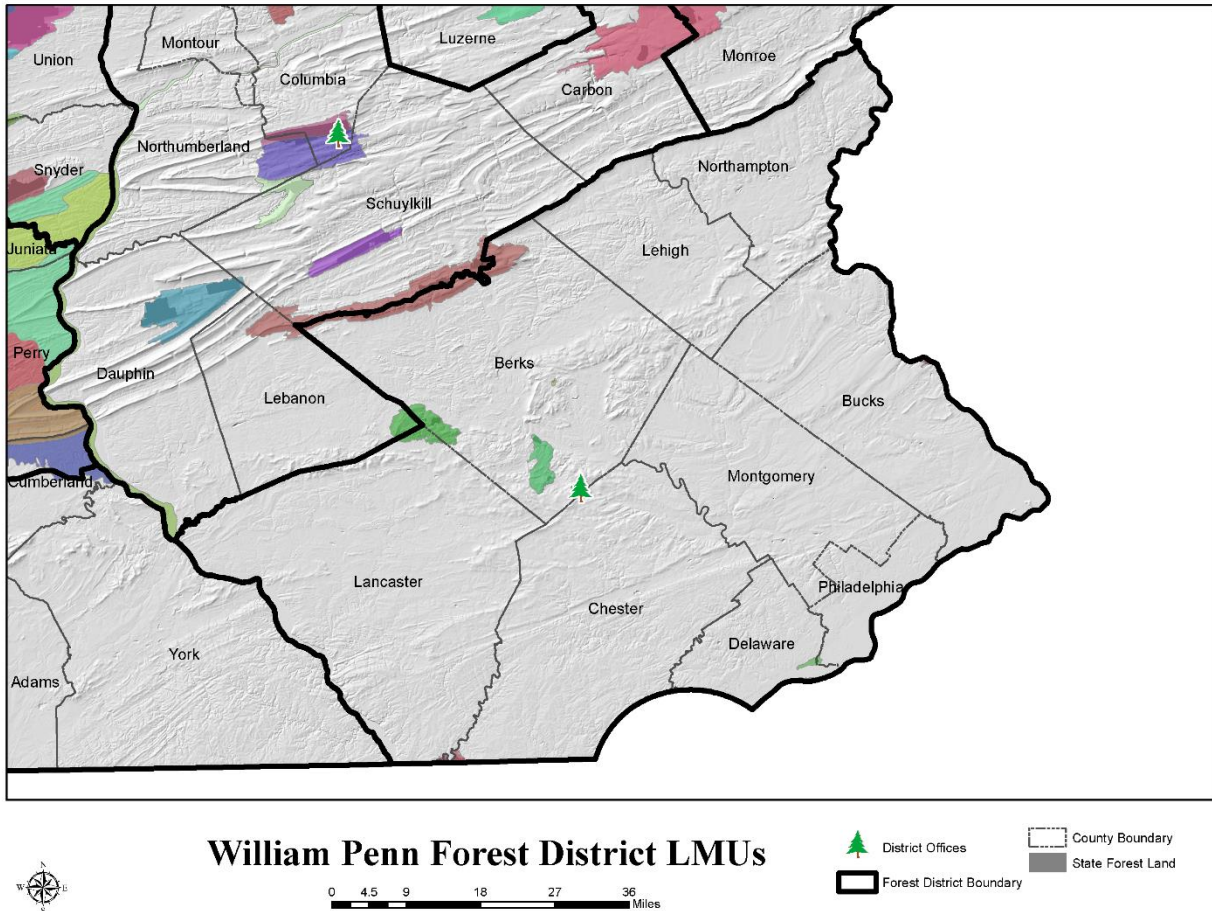


Figure i: LMUs for the William Penn Forest District

List of LMUs in William Penn State Forest

- Gibraltar-Berks Green Hills
- Goat Hill Serpentine Barrens
- Johnson Natural Area
- Little Tinicum Natural Area
- Berks South Mountain
- Ruth Zimmerman Natural Area

District Priority 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 Chapter

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

Wildland Fire

- William Penn Forest District staff continually trains to upgrade its personnel to meet the growing demands for prescribed fires. Currently we are working on getting two of our staff to Burn Boss RXB2 (Burn Boss Type 2) qualification to direct prescribed fire operations on low and moderate complexity burns.
- William Penn Forest District has the largest number of volunteer fire companies. Our goal is to continually train these volunteers to be Red Card and wildland fire ready to protect our resource.

Recreation

- The William Penn Forests is in the densest population region of Pennsylvania. So along with all the other ecosystem management goals, dispersed, low-density recreation plays a big part.
- Except for the David R. Johnson tract all lands have trails or proposed trails. The goal is to construct the proposed trails and update or maintain current trails. The Wertz Tract in Wernersville will be next for trail development. Strewn with remnants of the old logging days, The Wertz tract has the potential for historic interpretation. Following will be the Ruth Zimmerman tract with a hiking trail.
- Currently hiking is the only trail use. In the coming years, our goal is to expand to include biking, horse and cross-country skiing.

Communications

- Reaching the myriad of state forest users is a daunting task. Our goal is to improve communication of key messages to the public through interpretive panels, programs, and education. This involves many staff including all the forestry personnel, administrative staff, and managers.
- A district with a growing Hispanic population requires publications and signage to accommodate that need. The William Penn District public use map has been translated into Spanish and is awaiting printing.
- Working with partner organizations is key to delivering the message of the state forest system to the public within the district.

Timber and Forest Products

- A primary part of the Bureau's mission is to provide sustained yields of quality timber. Although our land base is small in comparison to the other districts, the William Penn Forest will meet its timber harvesting goals, while using the most up to date science and research, and innovative techniques to maintain the sustainability of our forest.

Forest Health

- Many invasive plant species endeavors to take root in the William Penn State Forest. Our goal is to manage invasive plants and eradicate high threat species to the best of our ability, training, and equipment. We will use our staff, volunteers, and other means available to us, such as our Bureaus' newly developed Early Detection Rapid Response (EDRR) program.

Native Wild Plants

- The Goat Hill tract harbors many rare and endangered plant species. With the help of the Friends of the Serpentine Barrens and staff, our overarching goal is to protect and enhance those species of concern.
- Being the only freshwater tidal lands, the Bureau owns Little Tinicum Island has a suite of wild plants that warrant protection. It is our goal to get a complete vegetative management plan completed in the next 5 years.

Geologic Resources

- As stated in the Native Wild Plants section, the Goat Hill tract harbors many rare plants. The reason is the geological makeup. The caustic Serpentine soils are rare across the United States. Our goal is to protect those rare soils from the pH altering of invading vegetation. Currently mechanical removal and prescribed fire are our preferred tools to protect and sustain the soils. But we support and promote any research and learning that will help us understand the complex and dynamic interplay between vegetation and soil.

Land Acquisition

- The William Penn Forest District is in a unique area for land protection. While the region has been settled for centuries, there is a strong local support for continued conservation of land.

Funding to support this endeavor comes from all levels, including Federal, state, local governments, and other local conservation organizations. As opportunities arise, acquisitions of new lands adjacent to state forest tracts or within the Landscape Management Unit will remain a high priority.

District Overview

1) Location and Description

The William Penn State Forest, formerly known as the Valley Forge State Forest, encompasses the nine-county area in southeastern Pennsylvania stretching from Northampton County in the north to Lancaster County in the south. Named for William Penn, a philosopher, Quaker, and founder of the English colony of Pennsylvania, the William Penn State Forest manages over 2100 acres of state forest land. In this heavily populated part of the state, these tracts in the William Penn State Forest are mainly small and widely scattered throughout Berks, Bucks, Chester, Delaware and Lancaster counties. Several of the William Penn tracts contain unique landscapes, and some of the flora and fauna are listed as world-rare. With the aid of the Highlands Conservation Act, passed by Congress in 2004 which authorized up to \$100 million in land acquisition funding, the William Penn State Forest has doubled its land holdings in 10 years. Reauthorized through 2021, the act should provide the opportunity for more land acquisitions in the future. The water of the William Penn State Forest is part of two different watersheds, the Chesapeake Bay, and the Delaware River.

The virgin forest in the William Penn Forest District consisted of American chestnut, mixed oak, white pine and hemlock. The wood was harvested for charcoal, homes, mines and farmland from the mid-1800s to the early 1900s. The chestnut blight hit in the early 1900s and eliminated the American chestnut from the forest. Fires also burned cutover areas in the early 1900s. Several gypsy moth defoliations killed many acres of oaks from the mid-1980s to the early 1990s.

Historically high deer numbers, and long-term proliferation of several invasive plant species have contributed to the current-day forest types found in the William Penn State forest. At the higher elevations, there are oak dominated forests containing red, chestnut and white oak and northern hardwood forests containing red and sugar maple, white ash, red oak and American beech. On the side slopes, there are tulip poplar-beech-maple forests. In the bottomlands are scattered eastern hemlock found along streams and ravines. Although the region contains some of the most productive soils in the world, development-both industrial and residential-continues to alter the character of the forest by way of forest conversion and fragmentation.

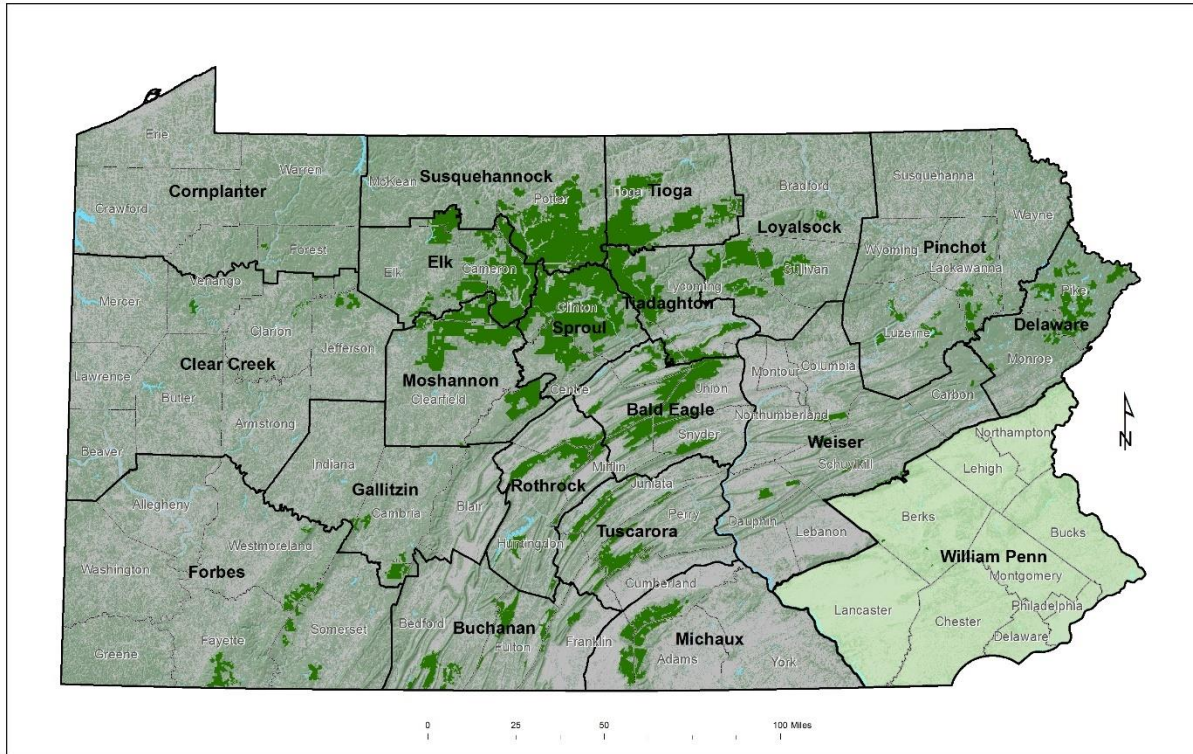
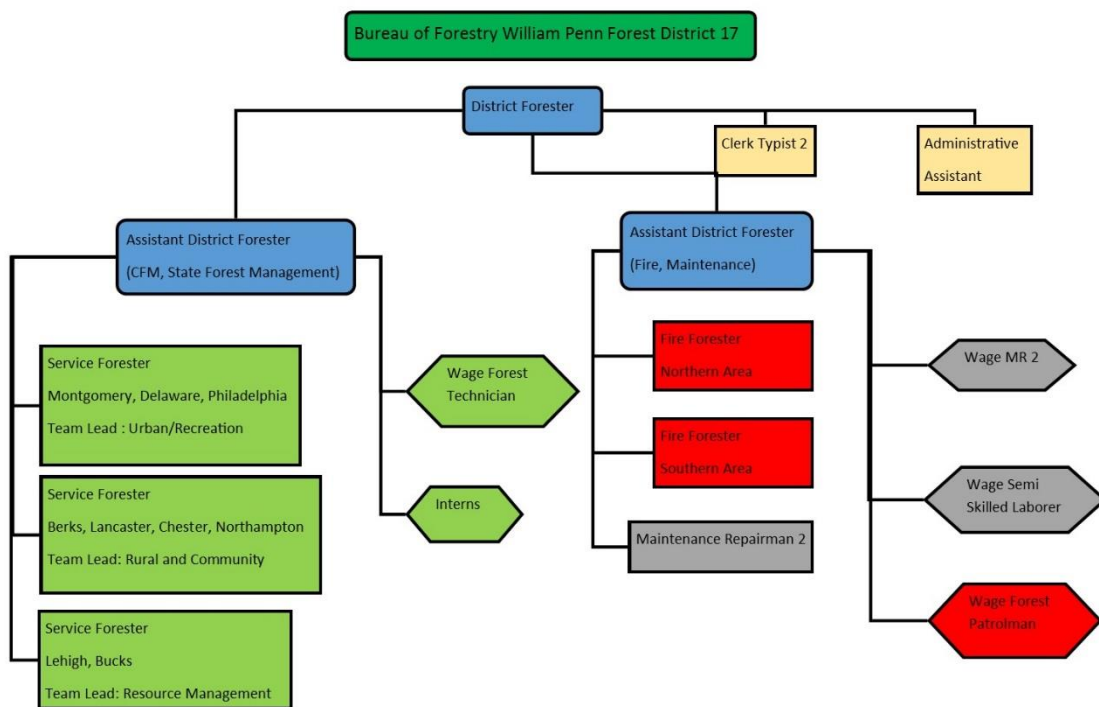


Figure 1-1. Location of William Penn Forest District with state forest land (dark green).

2) District Organization and Human Resources

The William Penn District is one of the 20 state forest districts administered by the Pennsylvania Department of Conservation and Natural Resources, Bureau of Forestry. It comprises less than 1% of the 2.2 million-acre state forest system. However, approximately 60% of the Commonwealth's population resides here. Within the bureau, the administrative responsibility of the William Penn Forest District is delegated to the District Forester, whose office is located at 845 Park Road, Elverson PA 19520. This headquarters shares the office with French Creek State Park. The District Forester is responsible for executing all the sections of the SFRMP on state forest land. Two assistants help accomplish this mission. One assistant manages primarily the foresters in conducting resource management activities including timber sales, landscape planning, wildlife projects, recreation and boundary lines. The other assistant manages primarily maintenance staff in conducting forest operations including roads, trails, bridges, infrastructure, rights of way, as well as wildland fire suppression and prescribed fire. The William Penn District has one maintenance division based out of the Hopewell Fire Control Station, located at 617 Fire Tower Road, Birdsboro, PA 19508 (Also in French Creek State Park) Following is an organizational chart of the William Penn Forest District staff:



3) Historical Land Use and Disturbance

The William Penn State Forest has a land use history like the rest of the state. The one main difference is that this area has been settled for close to 400 years. The landscape has been marred by the loss of the chestnut in the 20th century. Emerald ash borer is devastating the ash trees, eliminating them from the landscape. The William Penn was also not spared from effects of the Gypsy Moth. Prior to becoming state forest lands, the area around the Wertz and Gibraltar Hill tracts were defoliated in the 1970's and 1980's. The one constant is that the forest has been a resource to communities for timber, charcoal, clean water, among other uses. Today, the landscape is being managed for the entire ecosystem, while providing the greatest good to the people in the community.

Little Tinicum Island is an ever-changing landmass constantly shaped by the Delaware River. The early settlers apparently were part of the New Sweden Company. Later the island came under the control of the Dutch and then by the British. In 1783, after the revolution, a treaty between New Jersey and Pennsylvania annexed the island to Pennsylvania.

It is thought that the island supported an auxiliary, a waiting station for boarding parties, of the Lazaretto quarantine station from 1800 to 1880. This quarantine facility was for the detainment of ill immigrants. Perhaps the most influential impact on the island was a deposit site for dredging and silt from the river. During World War II, the shipyards of Philadelphia were a vital part of the US

Navy's support system. The river channel needed to be deepened to allow the warships passage. This fill was placed on the island, within constructed berms. A trail is located on the berms today. Expansion of the Philadelphia International Airport has also placed fill on the island. Evidence of the island dredging activities are still evident in the large iron pipes crossing the island.

The Goat Hill area was originally inhabited by the Leni Lenape Indians. One factor in their choice of this location was the Octoraro Creek – a source of food, water, and transportation.

Sometime after King George II of England granted this land to William Penn in 1682, English Quakers and Scots probably settled the area. Agriculture was the main use of most of the area, but because of its poor productivity for agricultural crops, Goat Hill was not farmed extensively. It was most likely used as a source for fuel wood and as pasture for cattle. Evidence of barb wire and other fencing can be found throughout the tract.

John Churchman, a mathematician, purchased about 500 acres of the barrens, most likely including Goat Hill, in the early 1800's. In 1828, he leased much of the area to Isaac Tyson of Baltimore who began to mine chromite. Most chromite came from deep and pit mines elsewhere on the barrens. However, more than 1,500 tons of placer chromite was dredged from Pine Run on Goat Hill.

Between 1828 and 1850, Tyson also mined about 2,250 tons of magnesite from Goat Hill. The mines were then taken over by Powers & Weightman Company of Philadelphia who mined another 8,500 tons between 1854 and 1871.

Goat Hill lay dormant except for some residential construction on its fringes until 1979. That year an excavating company proposed to open a stone quarry on Goat Hill. Many residents, opposed to the quarry proposal, formed the Concerned Citizens of West Nottingham Township action group to preserve the barrens.

As a result of their initial efforts, other non-profit groups, private citizens, and government agencies became interested in Goat Hill. Their combined efforts led to the eventual acquisition of Goat Hill by the Commonwealth through the Nature Conservancy. Since its acquisition, Goat Hill was originally designated as a State Forest Natural Area. It was changed to a Wild Plant Sanctuary in 2006. This status allows for habitat management which would benefit the sensitive plant and animal species.

The David R. Johnson tract is just a portion of the lands formerly owned by the Hartmann family. While most of this tract was left forested, approximately 7 acres were used for orchards.

The Ruth Zimmerman tract was originally used as pastureland for grazing. The wetlands and rock outcroppings made the land unsuitable for any other purpose. Mrs. Zimmerman pieced the 33-acre tract together over the years by purchasing small portions of land when they became available.

The George W Wertz tract has a long history of resource use and protection. There is evidence of approximately 50% of the tract was cleared for agriculture in the 19th century and eventually abandoned in 1910. After abandonment, quality tulip poplar and ash regenerated the site. On the side slopes and rocky areas, the tract was most like harvested 2 or 3 times. This mountain was a source of timber and charcoal for the growing towns in Berks County and the city of Reading. Charcoal hearths dot the tract, and old mule paths can still be seen connecting them to the valley below. The area of this tract adjacent to Texter Mountain Road was also mostly cleared for agriculture. Stone fences and old roads crisscross the woodlands. Recent timber harvesting has promoted the vast growth of invasive plants. Now that these are state forest lands, invasive species management is a priority goal to restore them to healthy forest lands.

In 1895, the Wernersville State Hospital was established. Over the next 15 years, multiple tracts were acquired adjacent to Sportsman Road to protect the water source for the hospital. The woodlands were tapped as a source of spring water, and logs from the forest supplied a sawmill during the hospital construction, as well as another local mill. Active timber management ceased after construction was complete. This resumed in 2016, once the land became state forest land.

The tracts of the William Penn State Forest in the Green Hills LMU have a more limited agriculture history. Gibraltar Hill has been harvested multiple times in the past 40 years, as well as a timber management in the 19th century. Charcoal hearths dot the mountain sides. Since it is adjacent to the Schuylkill River, the tract was a convenient distance to the Schuylkill Canal to move logs and charcoal. After the canal, the Reading Railroad was built next to it. Rail sidings were built in the neighboring village of Gibraltar. One could assume that they were also used to move products from the hill.

4) Acquisition History

The widespread and rapid depletion of Pennsylvania's forests that occurred in the latter 1800's was viewed critically by conservationists of that era. Concern was expressed that the seemingly inexhaustible forests would not last forever, and something should be done to halt the uncontrolled cutting that left devastated forests in its wake. Accordingly, in 1887 the 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. A second commission authorized by the Legislature was appointed in 1893. Because 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 State Forest system. This act provided for the acquisition of not less than 40,000 acres in the headwaters of each of the principal rivers of the Commonwealth, 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". The first purchase under this act was made by the Division of Forestry in 1898 when 7,500 acres were purchased in Clinton County.

The first purchase of land for the William Penn State Forest was in January 1935. The commonwealth paid \$1.00 to the Cornwall Estate for ten acres in Lancaster County near the Lebanon County Line. The site contained the Cornwall fire tower that was erected in 1923. Today, this land surrounded by State Game Lands # 156 is an administration site for numerous communication towers.

The Hopewell Fire Tower site was also acquired in 1935, the same year the tower was erected. This ten-acre tract surrounded by French Creek State Park is located in Berks County. Today, the tract serves as an administration site with buildings used for fire equipment storage.

In November 1982, Little Tinicum Island, 80 acres in the Delaware River, Delaware County, was acquired. The Commonwealth purchased the island for \$100,000 from the Tinicum Real Estate Holding Corporation in order to preserve its ecology, which is unique to Pennsylvania.

In December 1982 the Goat Hill Serpentine Barrens, 602 acres of the approximately 1,000-acre barrens, was purchased for \$239,500 with the assistance of the Nature Conservancy. A neighbor,

Rose Chase facilitated the preservation of the site after interest in resuming quarrying was announced.

The David R. Johnson tract, known locally as the Hartmann tract, was acquired by the Commonwealth in 1987. This 56-acre parcel located in Solebury Township, Bucks County, was donated by Dorothy J. Hartmann.

In 1989, the Valley Forge Forest District received a 33-acre forested wetland tract of land in Berks County as a gift from Ruth Zimmerman. She saw how the land around her was being developed and she wanted to preserve her land for future generations. Seven years later, Spurgeon Gassert donated ½ acre of land that adjoined the Zimmerman Tract.

In 2015 the land management of the forests of the Wernersville State Hospital was transferred to the Bureau of Forestry to manage as state forest land in perpetuity. These 388 acres are in Berks County and forms the 'George W. Wertz Tract'. The name for the new state forest tract was well researched with the Heidelberg Heritage Society. George Wertz was the farm owner, which in the late 1800's lobbied the governor's administration to site a new state hospital in Wernersville. The abundant clean air and mountain water was the key to this development. Subsequently, Wertz advocated for the purchase of forested tracts from 1890-1915 to protect that water. The agreement for this transaction is that the Department of Health, which administers the state hospital, receives 50% of any timber revenues generated on this land for 10 years. In 2017, 45 acres were added to this tract to create a mosaic of state forest lands. The goal is to connect the properties and expand the tract through future acquisitions.

The introduction of the Highlands Conservation Act, a federal program, opened funding opportunities to acquire easements and fee simple purchase of lands. Starting in 2015, this has enabled the forest to grow. This funding source secures 50% of the purchase costs. A combination of township, county, DCNR funds, as well as seller donation helps to facilitate the balance of the purchase. Local conservancies, such as Natural Lands and Berks Nature have been instrumental in procuring these new lands.

Gibraltar Hill (234 acres) was added in 2015. This rugged Berks County mountain was slated for residential development. Another tract slated for development, Buck Hollow (80 acres) was acquired in 2016. Both Gibraltar and Buck Hollow saw expansions in 2018 of (23 and 20 acres, respectively).

Projects that have been funded but not transferred to DCNR Bureau of Forestry as of 9/1/18 include Buck Hollow expansion (101-acre Terrada Tract), Wertz expansion (51-acre Staudt tract), and a new tract in Honey Brook and West Caln Twp. in Chester County (156 acres). Goat Hill is also looking at an expansion pending the completion of a 120-acre donation from The Nature Conservancy.

5) Cultural and Historic Resources

The William Penn State Forest is located in a landscape rich with cultural and historic resources. Adjacent to the Gibraltar Hill Tract in Berks County is the Schuylkill River Trail, a regional multi-use recreation and commuting facility envisioned to be 120 miles between Frackville, Schuylkill County, and Philadelphia. The Berks County section, locally known as the Thun Trail, was constructed on the abandoned Schuylkill division of the Pennsylvania Railroad. That was a line built in the 1890's to

compete with the Reading Railroad's coal hauling operations that fed Philadelphia's industrial Revolution.

Prior to the rail line being constructed, commerce was transported by the Schuylkill Navigation Company through their Schuylkill River slack water canal system that connected Pottsville, though Reading, to Philadelphia. In Reading it intersected with the Union canal to transport goods to and from central Pennsylvania's Susquehanna River. Navigation Company remnants, such as locks, dams, canals, worker housing, aqueducts, and tow paths are found in abundance. For example, the aqueduct over the Allegheny Creek, Gibraltar Hill's eastern boundary, was built as a bridge for boats because the creek could not be incorporated into the canal system

The William Penn State Forest is home to two historic fire tower sites. The Cornwall site in Lancaster County no longer has a tower, but the stone ground cabin still exists. It is used as the headquarters for a radio club today. Located on the highpoint of French Creek State Park is the Hopewell fire control station. A fire tower is located on top of Williams Hill, along with the associated stone ground cabin. This cabin is periodically used for the District 17 Fire Warden Association. This group assists the district in manning the tower on high fire danger days.

The Wertz tract has many historical ties to the state hospital, as mentioned before. A feature immediately adjacent to our boundary on the Hospital creek was a stone dam constructed by the Civilian Conservation Corps. At time of construction, it was second largest dam in Berks County. This dam is being removed in 2018 due to flooding risks. Prior to the CCC constructed dam, there was another structure there impounding the water. Locals called it the 'Schmutzdiek' (grease dam) This impoundment created the resources for a gun barrel foundry on the banks of the creek. Evidence of both of those structures are long gone.

6) Ecoregions, Physiography, and Land Cover

The geology of the William Penn State Forest is extremely complex and spans approximately one billion years of the earth's history. The oldest rocks, those of Precambrian age, crop out in various locations within the district. In particular, are the coarse-grained graphite-bearing limestone and the Pickering gneiss which are in the northern part of William Penn. In the southern portion of the district, the Baltimore gneiss is the oldest and is found in the Honeybrook uplands as well as in the Philadelphia area. These ancient rocks have been subjected to numerous events of deformation during their more than half billion years of existence. These events of incredible pressure resulted in the folding and faulting of the bedrock orientation, giving them their unique physical characteristics.

The youngest rock areas in the William Penn District are the Brunswick and Gettysburg formations, created in the Triassic age (225-195 M.Y. ago), which cross the area in an irregularly shaped band from the Susquehanna River in northern Lancaster County to the Delaware River in northern Bucks County. These sedimentary rock areas are intruded at various locations by Triassic diabase dikes and sheets of igneous origin. Even younger yet is an unconsolidated area of sand, gravel, clay, and silt known as the Cape May Formation. This area is found along the Delaware River from northeast of Levittown to southwest of Chester. This formation is part of the larger Coastal Plain region which dominates the Mid-Atlantic seaboard. The material was laid down during the Pleistocene time when maritime waters spread across what is now New Jersey

Numerous folds cross the Forest District in a general northeasterly direction, normal to the direction of compression. Some of the major folds in the Lancaster-Chester County area include the Mine Ridge-Tucquan anticline, Peach Bottom syncline, Chickies-Chestnut Hill anticline, Columbia syncline and the Kennett anticline. Normal faulting occurred throughout the Forest District during the Triassic period (190 225 M.Y.). These normal faults, caused by distention of the rocks rather than compression, as exhibited in thrust faulting, produced a long trough into which as much as twenty thousand feet of sediment accumulated.

Unique geologic and geographic areas

The south-western portion of the Forest District in Lancaster county is bounded by the steep albite-chlorite schist cliffs of the Octoraro Formation along the Susquehanna River. This geography was created by incredible amounts of glacial meltwater draining from the retreating ice in northern Pennsylvania at the end of the last ice age.

Along the Maryland/Pennsylvania border, there are outcroppings of the ultramafic serpentine rock which carries a variety of heavy metals within it including chromite and magnesite. This rock creates a unique ecosystem around it comprised of many rare and endangered plants.

In a narrow band stretching through northern Bucks and Montgomery counties are olivine diabase boulder fields that are commonly known as ringing rocks. They acquired this name due to the sound that resonates when struck by a hammer. This rock was created when the earth's crust stretched, allowing mafic magma to rise from the upper mantle and converge with the sedimentary rocks. Because of this combination of minerals, the olivine diabase rock was instilled with a high resistance to weathering and erosion.

The Blue Mountain is the northern border of the William Penn State Forest, bordering Berks, Lehigh, and Northampton counties. It consists of shale and sandstone from the Martinsburg, Bloomsburg, and Shawangunk Formations and serves as the southeastern escarpment of the Appalachian Mountains. The Blue Mountain reigns as the highest peak in the Forest District at 1,695 ft. in Northampton County. The high point on state forest land for the district is located on the Wertz tract in Berks County at 1160 ft.

Eco-regions

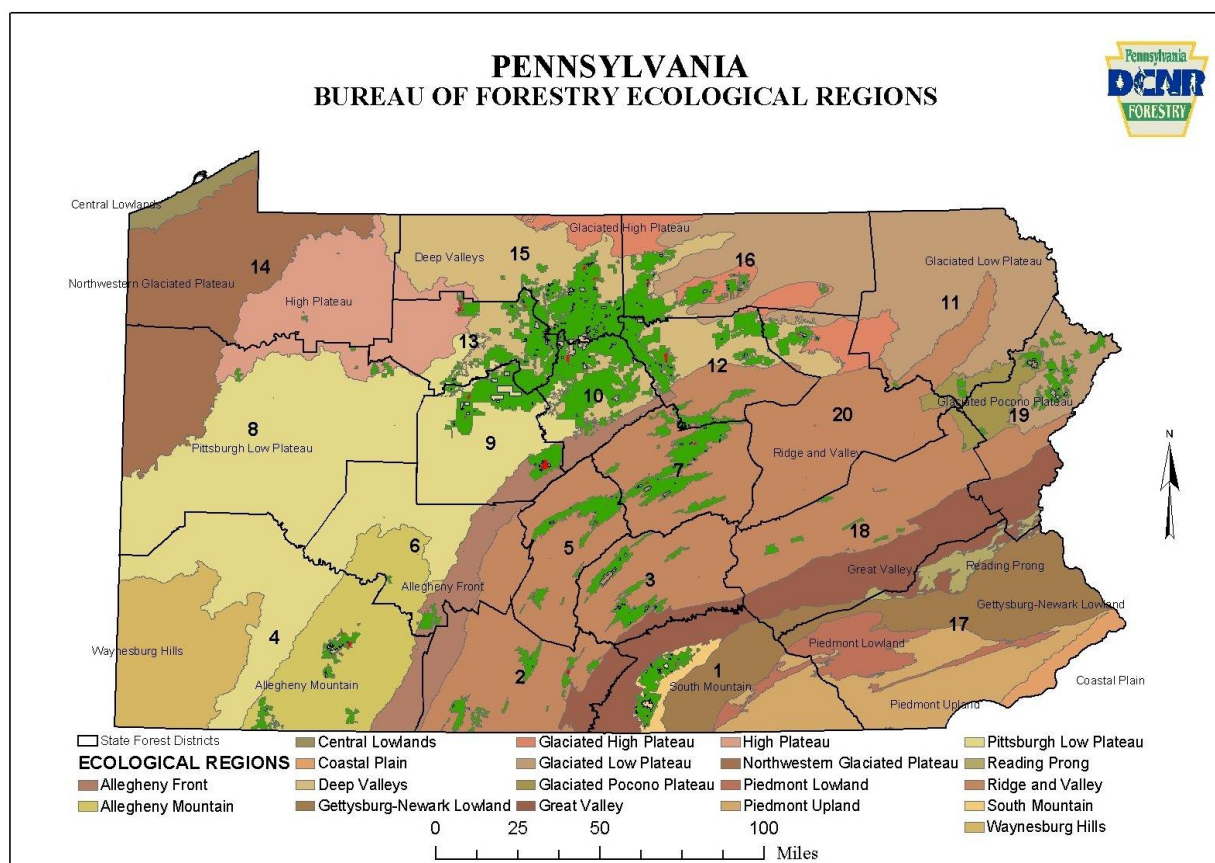


Figure 6-1. PA Bureau of Forestry Ecological Regions

Piedmont Lowland Section:

The Piedmont Lowland Section consists of broad, moderately dissected valleys separated by broad low hills. This section is developed primarily on limestone and dolomite rock. Karst topography is common. Local relief in the Piedmont Lowland is generally less than 100 feet but may be as much as 300 feet. Elevations range from 60 to 700 feet. Drainage is basically dendritic in pattern, but some areas have virtually no pattern because of the well-developed subsurface drainage.

The Piedmont Lowland Section occurs mainly in Lancaster County, but parts of it are also in Berks, Chester, and Montgomery Counties. This section can be viewed along many roads including US Route 30, east of the Susquehanna River to Downingtown, PA Route 23, west of Morgantown, and PA Route 340, from Lancaster east to White Horse.

Piedmont Upland Section:

The Piedmont Upland Section consists of broad, gently rolling hills and valleys. Views from uplands often give the viewer the impression that the uplands comprise the remnants of a once continuous sloping surface that is now dissected by the valleys eroded into it. This upland area is developed mainly on metamorphic rocks called schists. These rocks usually have a very well-developed plane (schistosity) that

was formed during metamorphism. This plane dips at moderately steep angles to the south, and stream erosion is often either parallel to or normal to the plane of schistosity. In some places the drainage pattern has a very pronounced rectangular orientation, but for the most part the drainage pattern is dendritic. Local relief is generally less than 300 feet, but it can be as much as 600 feet. Elevations in the Piedmont Upland range from 100 to 1,220 feet but are generally between 400 and 600 feet. The Piedmont Upland Section occurs throughout the Forest District in parts of Lancaster, Chester, Delaware, and Montgomery Counties.

Reading Prong Section:

The Reading Prong is part of the Precambrian basement which is discontinuously exposed in the north-central Appalachians. The rocks that make up the prong consist of diverse gneisses. The New England Province and the Blue Ridge province share many geological similarities, and some experts consider the Reading Prong merely a continuation of the Blue Ridge Mountains, which reach their northern terminus at South Mountain near Harrisburg. In the gap between the Blue Ridge and the Reading Province, the two mountainous regions descend into the Appalachian Piedmont. Together, the Blue Ridge province and the New England province are often referred to as the Crystalline Appalachians. Rocks of the Reading Prong are characterized by elevated concentrations of uranium, the decay of which produces gaseous radon, a potentially hazardous source of indoor contamination in structures constructed on the prong.

The Reading Prong runs through southern Berks, southern Lehigh, and southern Northampton counties. Notable landscape features include Mount Penn in Berks County, South Mountain in Lehigh County, and Chestnut Hill near the town of Easton in Northampton County.

Gettysburg-Newark Lowland Section:

The Gettysburg-Newark Lowland Section consists mainly of rolling low hills and valleys developed on red sedimentary rock. There are also isolated higher hills developed on diabase, baked sedimentary rock (hornfels), and conglomerates. Almost all the underlying sedimentary rock dips to the north or northwest and many of the smaller drainageways are oriented normal to the direction of dip so that some of the topography has a northeast-southwest linearity. However, the basic drainage pattern is dendritic. Soils are usually red and often have a visually striking contrast to the green of the vegetation. Relief is generally around 100 to 200 feet, but locally is up to 600 feet on some of the isolated hills. Elevation in the Gettysburg-Newark Lowland ranges from 20 to 1,355 feet. The section is made up of sedimentary rocks that were deposited in a long, narrow, inland basin that formed when the continents of North America and Africa separated more than 200 million years ago. The Gettysburg-Newark Lowland occurs in southeastern Pennsylvania and extends from the Pennsylvania-Maryland boundary in Adams County across parts of York, Dauphin, Lancaster, Lebanon, Berks, Chester, and Montgomery Counties to the Delaware River in Bucks County. The Section is crossed by many roads, along which the character of the section can be viewed. Selected routes within the Forest District are: Interstate 76 (Pennsylvania Turnpike) from Harrisburg to Morgantown; US Route 422 from Reading to King of Prussia; and Pennsylvania Route 309 from Emmaus to Fort Washington.

Great Valley Section:

The Great Valley Section consists of a very broad lowland that lies south of Blue Mountain in southeastern Pennsylvania. The lowland has gently undulating hills eroded into shales and siltstones on the north side of the valley and a lower elevation flatter landscape developed on limestones and dolomites on the south side. Local relief is generally less than 100 feet, particularly in the carbonate area, but may be up to 300 feet in the shale area. Elevation ranges from 140 to 1,100 feet. Several large streams such as the Susquehanna and Schuylkill Rivers cut across the Great Valley. However, most of the well-defined drainage originates on the slopes of Blue Mountain and flows across the shales.

The lowland occurs in seven counties and extends from the Pennsylvania-Maryland border in Franklin County to the Delaware River in Northampton County. Routes along which the Great Valley Section can be viewed within the William Penn State Forest district include: Interstate 78 at the Berks/Lebanon county line to its junction with US Route 22 at Allentown, and US Route 22 from there to New Jersey; US Route 422 from Hershey to its junction with US Route 222 near Reading, and US Route 222 from there to Allentown.

Ridge and Valley Section (Blue Mountain Section):

The Blue Mountain Section is a linear ridge to the south, where it is a south limb of a broad fold; and a valley to the north. The valley widens eastward and includes low linear ridges and shallow valleys. Local relief is moderate to high. The section's highest elevation is 1,680 feet and the lowest, 300 feet. The Blue South Section is formed on sandstone, siltstone, and shale, and some limestone and conglomerate. Very resistant sandstones occur at the crests of the Blue Mountain. Shales and siltstones occur on the slopes and valleys.

The Blue Mountain Section occurs in east-central Pennsylvania and within the Forest District in parts of Berks, Lehigh, and Northampton Counties.

Roads where the Section can be viewed within the Forest District include Interstate 476 (Northeast Extension of the Turnpike) that goes through Blue Mountain, Pennsylvania Route 946 east of Walnutport and Pennsylvania Route 143 from Lenhartsville to New Tripoli.

7) Vegetation Communities and Native Flora

Forest/Plant Community Types

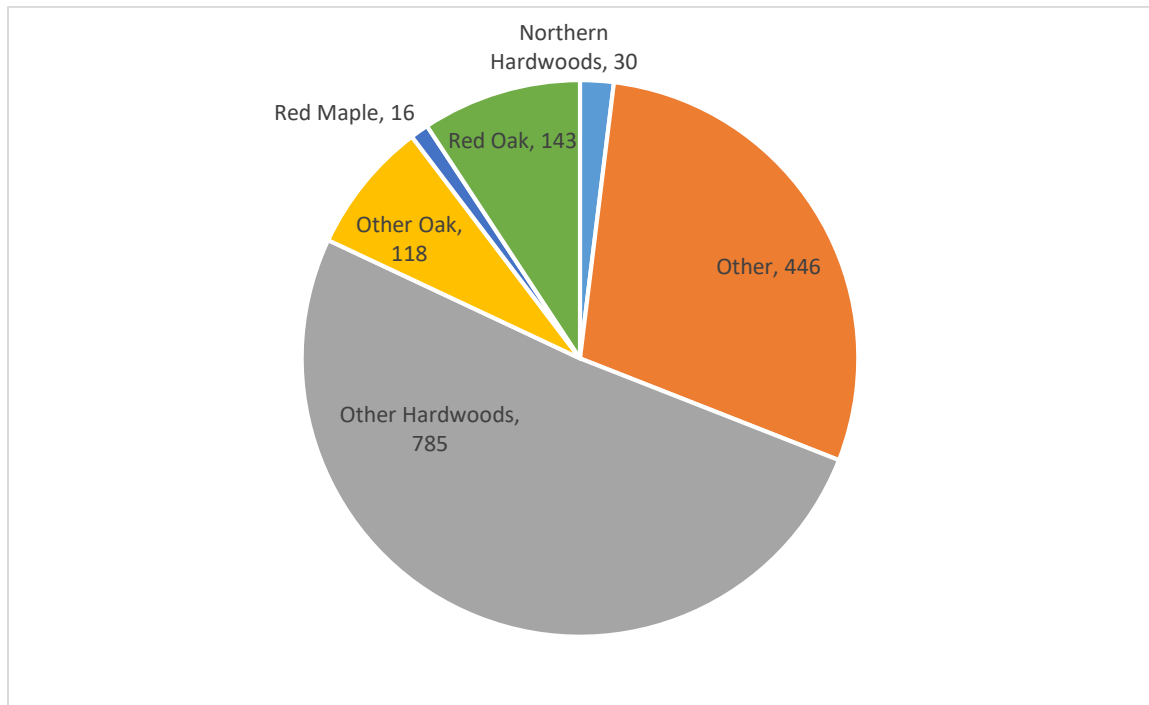


Figure 7-1. Acreage of state forest land in this district by aggregated forest type. The forest types are described on p. 108 of the 2016 SFRMP.

The William Penn State Forest is dominated by the Other hardwood forest community type. William Penn has any tracts spread across the entire footprint of the district. This results in a large degree of variation of forest types, ranging from oak, northern hardwoods, to tulip poplar stands and the Goat Hill Serpentine Barrens which is composed of dominant Pitch pine as well as unique serpentine soils.

The “serpentine barrens” of Goat Hill in southern Chester County is one of the districts most unique tract it is a distinctive terrain underlain by the rock serpentinite. Serpentinities are largely composed of magnesia and silica with trace (but relatively elevated) amounts of toxic nickel and chromium. Because of this unusual chemistry, serpentinites form very thin, infertile soils that stunt the growth of typical plant species. Instead, a specialized group of plants (flora) tends to dominate the serpentinite regions. These barren areas are characterized by sparse, grassy vegetation with scattered trees, in contrast to the large trees and forests of most of Pennsylvania. The barrens also contain many species that are uncommon in Pennsylvania, such as long-hairy field chickweed, prairie grasses, and the rare serpentine aster. The more wooded areas have the quite common and hearty greenbrier. The result is an exceptional landscape for Pennsylvania. The following link references the unique features of the Goat Hills serpentine barrens.

(http://www.docs.dcnr.pa.gov/cs/groups/public/documents/document/dcnr_20032484.pdf)

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

William Penn - Vegetation Communities and Native Flora

The most common forest community (by total acres) within the William Penn state forest is tulip tree-beech-maple forest. These woods occur on fairly deep, not strongly acidic soils, at a mid- to lower-slope position. This often very mixed type has greater than 40% of the overstory basal area in *Liriodendron tulipifera* (tuliptree) with *Acer rubrum* (red maple) as a commonly associated species. *Fagus grandifolia* (American beech) is often present and, when present, is often codominant. In successional, lower slope situations, *Liriodendron tulipifera* (tuliptree) may occur in nearly pure stands. The long list of possible associates includes various oaks, mostly *Quercus rubra* (red oak), as well as *Nyssa sylvatica* (black gum), *Acer saccharum* (sugar maple), *Fagus grandifolia* (American beech), *Carya tomentosa* (mockernut hickory), *Carya ovata* (shagbark hickory), *Betula lenta* (sweet birch), *Tsuga canadensis* (eastern hemlock) and, in western Pennsylvania, *Magnolia acuminata* (cucumber-tree). Total conifer cover does not exceed 25% of the overstory. Common shrubs and mid-story trees may include various viburnums, *Carpinus caroliniana* (hornbeam), *Cornus florida* (flowering dogwood), *Ostrya virginiana* (hop-hornbeam), *Hamamelis virginiana* (witch-hazel), and *Lindera benzoin* (spicebush). There may be a rich herbaceous layer, especially in the ephemeral, spring flora. On richer sites that are not over-browsed, this may include species like *Podophyllum peltatum* (may-apple), *Sanguinaria canadensis* (bloodroot), *Botrychium virginianum* (rattlesnake fern), *Dicentra cucullaria* (dutchman's-breeches), *Dicentra canadensis* (squirrel corn), *Allium tricoccum* (wild leek), and *Claytonia virginica* (spring-beauty). The majority of these acres occur in the northern tracts of the district in Berks County. Rich cove forests

within these tracts do harbor great herbaceous plant diversity, especially in the spring months. One species of note is nodding trillium (*Trillium cernuum*), which can be found along rocky streams and seeps in areas with rich slopes.

Two of the most unique plant communities in all of Pennsylvania are also tracts within the William Penn State Forest. Goat Hill serpentine barrens, in Chester County, is a 670-acre mosaic of open grasslands, rocky barrens, savannah forests and acidic seeps. The underlying serpentinite bedrock creates a very unique soil conditions at the site, which are high in magnesium, chromium, nickel and low in calcium. Typically, on the open grasslands and rocky barrens sites, very little topsoil is present. Only a few tree species, such as pitch pine, eastern red cedar, blackjack oak, and post oak can grow within the serpentine openings. Much of the understory of the adjacent forests are dominated by a thick layer of greenbrier. Some species have become adapted to these otherwise inhospitable serpentine openings, creating very unique assemblages of warm season grasses and herbaceous plants. This site is known to support 25 state-listed plant species and 37 state-listed animal species, many of which are lepidoptera species. Of the state-listed plant species, very hairy chickweed (*Cerastium velutinum* var. *villosissimum*), serpentine aster (*Symphyotrichum depauperatum*), and glade spurge (*Euphorbia purpurea*) are globally rare species. Goat Hill Serpentine Barrens is classified by the Bureau of Forestry as a Plant Sanctuary, which allows for the careful management of these unique plant communities and state-listed species.

The second unique plant community is found on Little Tinicum Island, a two-mile island located in the Delaware River across from the Philadelphia International Airport. Given the tidal nature of the Delaware River, intertidal freshwater mudflats and marsh habitat create unique conditions on Tinicum Island. The mudflats, which are exposed during low tides, harbor unique, state-listed plant species such as subulate arrowhead (*Sagittaria subulata*) and Smith's bulrush (*Schoenoplectus fluviatilis*). Moving to the interior areas of the island, tidal marshes harbor additional state-listed species, such as indian wild rice (*Zizania aquatica*) and waterhemp ragweed (*Amaranthus cannabinus*). Interior portions of the island are dominated by species such as silver maple, sycamore, box-elder, sweetgum and many invasive plants, such as Japanese knotweed, common reed, oriental bittersweet, and empress tree.

8) Forest Health

Protecting the forest health is critical to the Bureau of Forestry's ecosystem management efforts. It is the mission of the Bureau to "ensure the long-term health, viability and productivity of the commonwealth's forests." There are many forest health issues affecting the William Penn State Forest as well as the other landowner ships in southeastern Pennsylvania. William Penn foresters work with the Bureau of Forestry division of Forest Health to manage native and non-native insects and diseases. Southeastern Pennsylvania is home to a wide range of invasive plants as well.

Insects and Disease

Forest insects and diseases are serious health threats to our forests. As trees age or are over stocked they become stressed and unable to fight off external factors, which makes them subject to insects and disease. This can lead to tree decline or full mortality. External factors that can stress trees include drought, excessive precipitation, abnormal temperatures and wind. Some insects and diseases are

native to our area and the United States. However, non-native plants or insects create much more devastation to our forest ecosystems because they have no natural enemies here.

Native Pests

Many native insects feed on our native tree species and normally do not cause widespread harm. However, sometimes extreme outbreaks of these pests do occur and have a substantial effect on the health of certain tree species. There are a number of caterpillars native to southeastern Pennsylvania that over the past 4 years have caused little harm to our forests beyond normal tree defoliation. The Eastern Tent Caterpillar and Fall Cankerworm have had minimal impact on the William Penn State Forest tracts. This past year (2018) there was a higher than normal occurrence of Tulip Polar Scale. This soft body native pest had a higher population in 2018 due to abnormal rainfall and humidity.

Southern Pine Beetle

The Southern Pine Beetle is a native pest that is one of the most destructive insects of pine trees. It is primarily found south of the Mason-Dixon line. North of the Mason-Dixon it is causing havoc in New Jersey, Long Island and along the southern edge of Connecticut. Southern Pine Beetle was discovered in Pennsylvania in the 1930's near Mont Alto, and most recently it has been found in the William Penn State Forest in southern Chester County along the Maryland line. It killed approximately 400 acres of Pitch Pine at Nottingham County Park in 2017. Goat Hill Wild Plant Sanctuary, a William Penn forest district tract near Nottingham has a high percentage of Pitch Pines. As of 2018 the Bureau of Forestry has no idea of what mortality, if any, to expect from this beetle at Goat Hill. The adult beetle is very small at 2-4 mm in length. The southern pine beetle bores under the bark much like Emerald Ash Borer. As it feeds, it creates galleries in which it later lays its eggs. The beetle also carries a blue stain fungus, which in combination with the galleries, kills the tree. If one looks closely at the bark of an infected pine tree you can see the adult exit holes. Loblolly, Pitch, Pond and Virginia Pines are favored hosts. In high population outbreaks, it will attack and kill all pine species including spruce and hemlock.

Non-Native, Invasive Pests

Many non-native, invasive insects and diseases have found their way into the William Penn State Forest. The Chestnut Blight and Dutch elm disease were introduced into the United States and changed the makeup of the forest during the early part of the century. The Gypsy Moth was introduced from Europe and became a major threat to the forest ecosystem in the late 1980's and 1990's. Of the introduced pests and diseases that have more recently affected our forests, the most prevalent in the William Penn State Forest are the Gypsy Moth, the Emerald Ash Borer and the Spotted Lanternfly.

Gypsy Moth

The Gypsy Moth was introduced into the United States in 1869 and was first discovered in Pennsylvania in 1932. Since the 1970's defoliation by the gypsy moth has killed millions of Oak trees across Pennsylvania. These defoliations led to an aggressive pesticide aerial spray program to try and curtail damage caused by this introduced exotic pest. White, Chestnut, Black and Red Oaks are all preferred by the gypsy moth caterpillars. Gypsy moth usually avoid Ash, Butternut, Black Walnuts, Locust, Sycamore and Yellow Poplar. Although it usually takes more than one year of defoliation before a tree dies, conifers may be killed after a single defoliation.

None of the William Penn State Forest tracts have experienced high gypsy moth populations within the last few years. However, other forest land in the district has been severely impacted. Thousands of acres of forested land has been severely impacted by Gypsy Moth along the Appalachian ridge (Blue Mountain) from the Delaware Water Gap to the Berks/Lebanon line and beyond. Over the past 4 years we have conducted aerial spray programs along the Appalachian ridge in Northampton County, Lehigh County and Berks County. Several private landowners along the Appalachian ridge and other landowners in the northern sections of these counties were also included in the aerial spray program. The Pennsylvania Game Commission land in the district was also affected and was part of the spray program.

The Bureau of Forestry will continue to suppress gypsy moth populations in oak stands in forest districts and state parks.

Emerald Ash Borer

The emerald ash borer is a half-inch long metallic green beetle. Larvae of this beetle feed under the bark of ash trees and eventually girdle and kill the entire tree. Emerald ash borer was first identified in North America in southeastern Michigan in 2002. This pest feeds exclusively on ash trees in North America. Tens of millions of ash trees have been lost to the ash borer, which usually kills ash trees within 3-4 years of infestation. EAB was first detected in Pennsylvania in 2007 on the northern edge of the Forbes Forest District in the western part of the state. It was first detected in the William Penn State Forest in 2014. We have since treated 235 Ash trees on three different sites in the William Penn State Forest. The selected trees have been treated with an insecticide and will be re-treated every three years.

Districts will work with the Division of Forest Health to identify lingering ash. A lingering ash is defined as an ash tree that is still alive after 95% ash mortality has been present for at least two years. 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.

Spotted Lanternfly

The Spotted Lanternfly is a very new invasive pest to the North American Continent. It was first discovered in 2015 in southeastern Berks county. It is native to China and Vietnam and was introduced to Korea where it has become a major pest. It is an invasive plant hopper that sucks the sap from many different tree species but is especially attracted to the invasive tree called "Tree of Heaven". The lanternfly has the potential to greatly impact the stone fruit, grape and logging industries. The Spotted Lanternfly sucks the sap from these host species it then excretes a honeydew that falls onto the leaves, stems or fruit of the host. This honeydew then produces a sooty mold which will ruin the crop and make it unmarketable. Spotted lanternfly lays its eggs on anything with a flat surface. The egg masses are in a mud-like cocoon. Spotted Lanternfly goes through four pupal stages until it is a fully-grown adult by mid-August. The Lanternfly is prevalent at the Zimmerman, Gibraltar and Wertz tracts in the William Penn State Forest, and is spreading rapidly throughout the district. There are two current suppression methods to try to control the lanternfly. First is applying sticky bands that will catch the insects as they move up and down on the main stem of the trees. Second is the trap tree method, whereby you remove all but a few Trees of Heaven in an area. Next you treat those few remaining trees with an insecticide. When the lanternflies land on these trees they will begin to feed and will soon die after ingesting this

insecticide. Both methods do work, however they have not been successful at keeping the population from spreading at its rapid pace.

Invasive Plants

Invasive plants are defined as a species that are non-native to the ecosystem under consideration, and whose introduction causes economic or environmental harm, or harm to human health. Invasive plants usually become a weed pest, a plant that grows aggressively, spreads, and displaces other native 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 whole areas. Invasive plants are brought into areas accidentally or purposefully. These plants are often referred to as exotic, non-native, or introduced. In their natural range, these plants are limited by factors that keep them in balance, including pests, herbivores, or disease. However, when introduced into an area where these limitations are absent, some species can become invasive. Invasive plants reduce habitat for native wildlife and plants. They often emerge earlier in the spring and push natives out through fast reproduction. This limits habitat available for native wildlife and disrupts the food chain.

Invasive plants are noted for their ability to grow and spread aggressively. Invasive plants can be trees, shrubs, vines, grasses, or flowers, and they can reproduce by roots, shoots, seeds, or all three.

The following is a list of Invasive plants found in the William Penn State Forest:

- Mile-a-minute
- Japanese stilt grass
- Ailanthus
- Japanese angelica tree
- Japanese barberry
- Bush honeysuckle
- Multi-flora-rose
- Autumn Olive
- Garlic Mustard
- Oriental Bittersweet
- Poison Hemlock
- Japanese Knotweed
- Japanese Hops
- Phragmites

The William Penn State Forest has taken a proactive approach to control and reduce invasive plants on the state forest.

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.

The bureau is presently in the second harvest allocation period of the model.

At the time the harvest allocation model was developed, the William Penn State Forest consisted of lands that were either Administrative, Natural Areas, or Wild Plant Sanctuary. Those classifications were not part of the model, as commercial timber harvesting was not a priority goal. Since that time however, the district has added almost 1000 acres of managed state forest land across various tracts.

The first William Penn State Forest timbersale took place on the Wertz tract from 2016-2018. This project was initiated to salvage ash trees killed from the emerald ash borer. A subsequent winter storm blew down a significant number of residual trees in that sale, as well as outside the block. The project grew from 41 to 45 acres due to the storm.

A non-commercial timber harvest also took place on the Goat Hill Wild Plant Sanctuary as part of an initial project to restore the serpentine grass ecosystem.

10) Wildlife

Habitats

The William Penn State Forest may be small but has a diverse array of wildlife habitats. Ranging from serpentine grass savannah, forested wetlands, tidal estuary, and mountain tops; multiple species utilize our lands. Common game species include white-tailed deer, squirrels, turkey, and woodcock. The conservation status of various species of wildlife is always considered.

The William Penn State Forest has partnered with two other organizations to facilitate quality habitat. Working with the local chapter of The American Chestnut Foundation, two plantings of American chestnut have been established. These trees are of the latest backcross generation that is hoped to hold a strong resistance to the chestnut blight disease. As a field experiment plot, both sites are being treated for invasives. One will be fence, and one will not be fenced due to lower deer pressure. The goal is to evaluate how the chestnut can compete with natural regeneration.

The National Wild Turkey Federation (NWTF) has also sponsored projects on the forest. A sickle bar mower was purchased to maintain a short grass and forb area along roads and trails for foraging poults. The NWTF has also sponsored a grassland restoration project on Goat Hill. The initial phase of the project was to use a forestry mower on the green briar, which the NWTF assisted to fund.

Future plans in the William Penn State Forest include reclaiming agricultural areas on new acquisitions to perennial warm season grass/ wildflower meadows, installing additional American chestnut plantings, and installing supplemental plantings on regenerating stands.

White-tailed Deer

White-tailed deer are an important part of the history of Pennsylvania's forest. The recovery of deer populations from near extinction in the late 1800's to their present abundance provides opportunities for hunting and recreation. However, it has been well documented that deer can cause damage to tree seedlings and plants. Deer can also cause regeneration failure requiring expensive fencing around recently harvested areas, and dramatically reduce habitat for other wildlife. When the white-tailed deer population is out of balance with habitat, it impacts state forests and parks by browsing tree seedlings, shrubs, and wildflowers beyond their capacity to reproduce, impacting the ability to sustain a healthy, fully functioning forest. Excessive browsing of early forest regeneration can suppress certain tree species and promote the expansion of unpalatable or resilient species, further slowing the regeneration process. By exhausting their major food source and obstructing forest regrowth, deer in high numbers can cause a forest's ability to support future deer populations to decline.

Establishing young forests enhances the mix of forest habitat and is good for other wildlife and overall forest health. Out-of-balance deer populations impact other wildlife and frustrate efforts to establish healthy, young forests. The Bureau of Forestry recognizes the ecological importance and considerable influence of white-tailed deer on commonwealth forests and is dedicated to maintaining a healthy forest plant community in balance with a healthy deer population. To accomplish its mission of conserving Pennsylvania's forests, DCNR manages deer on its lands and promotes sustainable deer management on all commonwealth forest lands.

The Deer Management Assistance Program (DMAP), established by the Pennsylvania Game Commission, gives DCNR an additional tool to promote forest regeneration by focusing hunters on specific areas of state forestland impacted by deer. These areas provide hunters with additional harvest opportunities for antlerless deer which helps to promote a sustainable forest and diverse wild plant community. As of 2018, the William Penn State Forest has not participated in the DMAP program. The PGC management units of 5B and 5C historically have had ample amounts of antlerless permits for the hunters that use the area.

Deer exclusion fences are being used on the forest to protect the establishment of the next generation of trees. Two fences are established on the Wertz tract, as the lands are being reclaimed from damage due to invasive plants and insects. This tract is also in a Deer Management Area 4 for chronic wasting disease. The state forest will have educational signage posted regarding the rules and scope of the quarantine area. More information regarding CWD management can be found at:

<https://www.pgc.pa.gov/Wildlife/Wildlife-RelatedDiseases/Pages/ChronicWastingDisease.aspx>

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 (2019) 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](#)

State Wildlife Action Plan

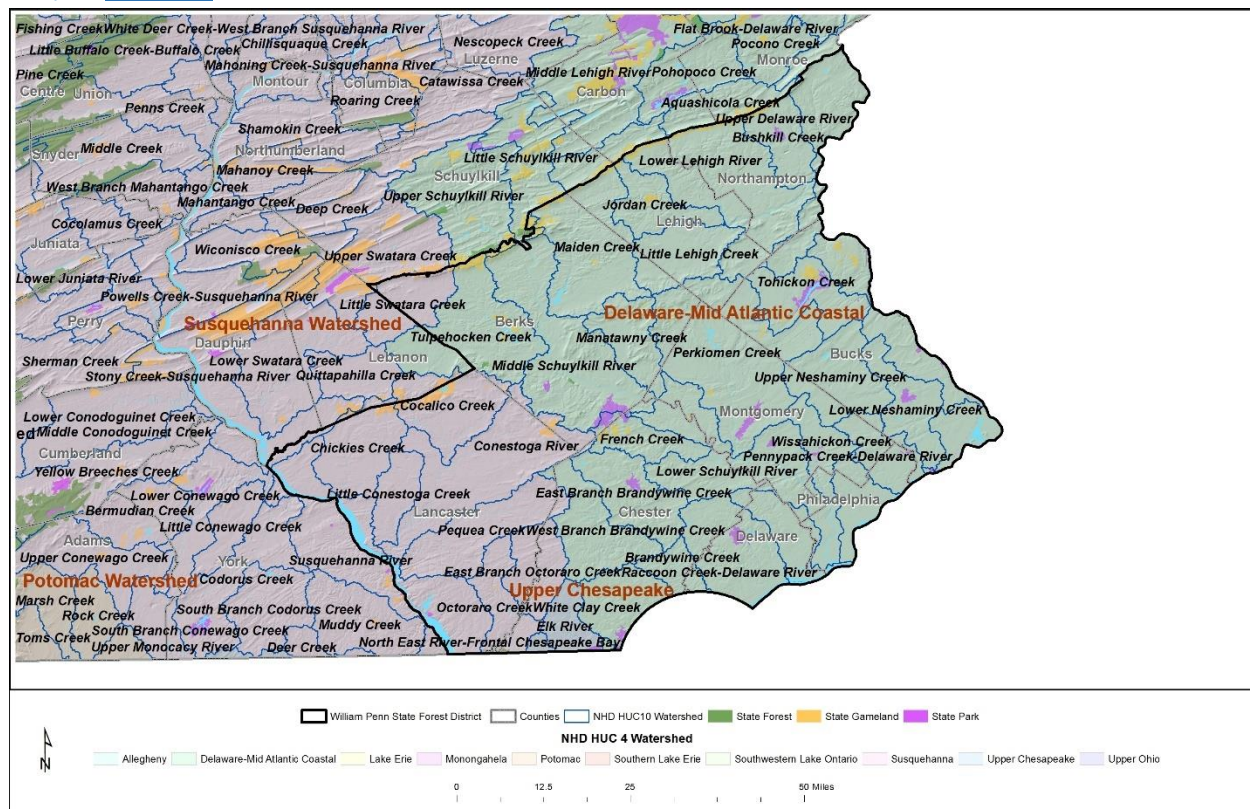
Management of the state forest system is guided by the State Forest Resource Management Plan, which includes wildlife management goals to provide habitats for a wide variety of wildlife. This wildlife includes Species of Greatest Conservation Need (SGCN) identified in the Pennsylvania Wildlife Action Plan, which is administered by the Pennsylvania Game Commission and Pennsylvania Fish and Boat Commission.

For planning purposes, the Pennsylvania Wildlife Action Plan has been used by the DCNR Bureau of Forestry to:

- inform an implementation document for each forest district containing:
 - o High priority SGCN known to occur in each forest district.
 - o High priority SGCN that could potentially be found in each forest district.
 - o Specific habitat types and characteristics where each species might be found.
 - o General habitats management recommendations to support each species.
- draft strategies for each forest district to protect, maintain, or enhance wildlife habitat features during forestry management activities.

Advancing from planning to implementation, these forest district documents are guiding management for SGCN. Thus, strategically associating the State Forest Resource Management Plan and Pennsylvania Wildlife Action Plan fosters coordinated resource management planning and implementation to benefit Pennsylvania's SGCN and state forest habitats.

11) Water



Major Watersheds

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

a) Major Watersheds

Defined by the Department of Environmental Protection's State Water Plan, the William Penn State Forest lies within the Susquehanna/Chesapeake Basin (Lower Susquehanna Subbasin) as well as the Delaware Basin (Lower Delaware Subbasin). The Susquehanna systems drain into the Chesapeake Bay, a vitally important ecological and economical resource in the mid-Atlantic region. For additional information on the water resources of the state forest lands, see the Water Resources Section of the State Forest Research Management Plan.

http://www.docs.dcnr.pa.gov/cs/groups/public/documents/document/dcnr_20032045.pdf

b) Major Municipal Supplies

There are no public water impoundments located on the William Penn State Forest. However, the William Penn State Forest is within several watersheds that contribute to public water supplies. Most public water systems near the William Penn State Forest source water from groundwater wells, though a few suppliers do utilize surface water and spring water sources. The Wertz tract forms the headwaters for both the Robeson and Wernersville Municipal Authority's wells. This tract is also at the beginning of the watershed that feeds Blue Marsh Lake, which is a surface water source for the Western Berks

Water Authority. Collectively, all of the lands in the district, with the exception of Goat Hill, fall within the Schuylkill/ Delaware river drainage. Multiple municipalities adjacent to the river use that for a component of their supply. State Forest Land is part of the mosaic that protects that vital resource.

c) [Fish and Boat Commission Stream Habitat Prioritization](#)

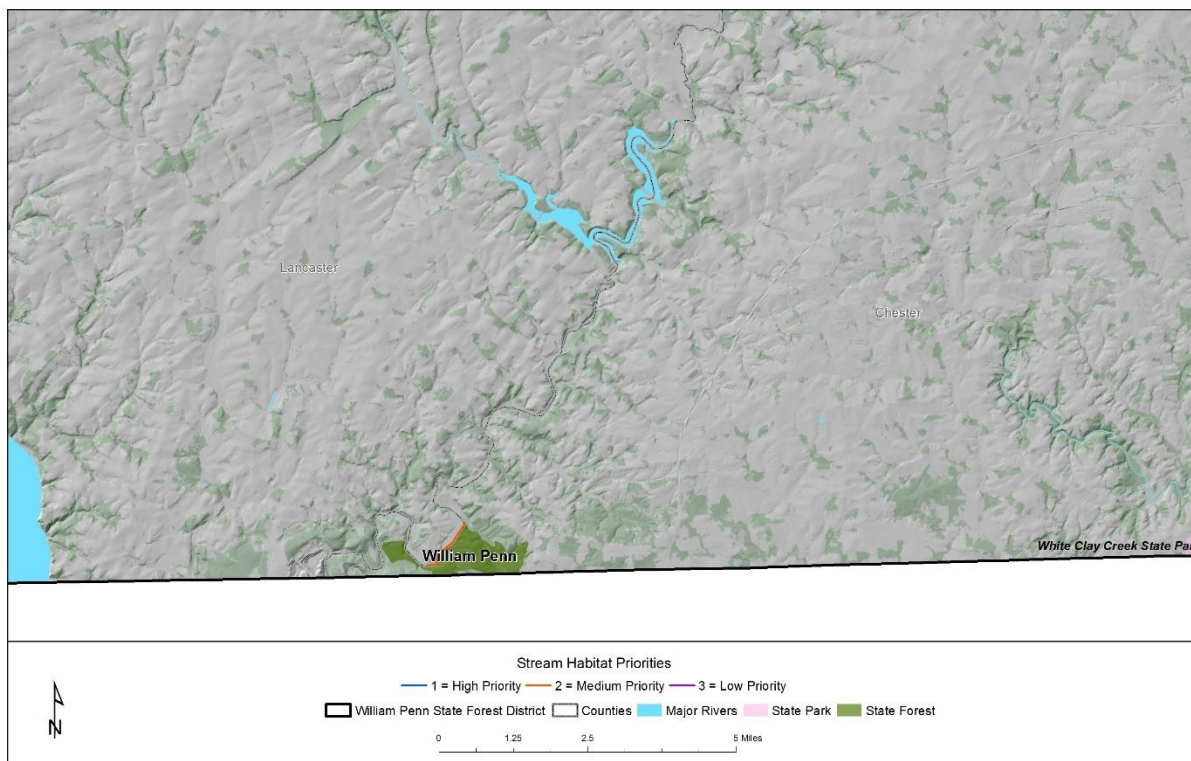


Figure 11-2. Streams within the district prioritized for aquatic habitat improvement projects based on PFBC Stream Habitat Improvement Prioritization Tool.

The Octoraro Creek is designated as a scenic river and is part of a river trail system. This water way forms part of the boundary on the Goat Hill tract. The Hospital Creek on the Wertz tract is classified as an exceptional value stream and is known to have breeding trout populations.

William Penn	Hospital Creek	Berks	1
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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.

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.

d) [Acid Mine Drainage](#)

Acid mine drainage does not have an impact on William Penn State Forest lands.

e) [River Islands](#)

The Pennsylvania Bureau of Forestry is the de facto owner and manager of river islands that do not have a legal deed associated with them. There are a few small areas in the Schuylkill River that fall into this category.

Most notably is Little Tinicum Island (LTI), a natural area in the Delaware River across from the runway of the Philadelphia International Airport. This island fluctuates in size from 80 acres of dry land at hightide, to 200 acres of mudflats and estuary at low tide. It is the only fresh water tidal ecosystem managed as State Forest Land. LTI is home to plants not commonly found in PA as well as a host of invasive plants. The New Jersey side of the island has a sandy shoreline, which is conducive to primitive camping and is well used throughout the year. Access to the island is difficult, however. Boats must travel to the New Jersey side because the mudflats create dangerous mooring conditions on the Pennsylvania side.

12) [Wildland Fire](#)

Wildfire can be a destructive force but also a tool in managing our natural resources. Native Americans used fire as a tool for land clearing, providing defensible space for villages and driving game. Early European settlers used fire much in the same way, and in time began producing charcoal in open pits within the woodlands to fire iron furnaces. Today fire is being used to control undesirable plant species and to prepare or maintain sites for preferred plant species.

a) [Wildfire Suppression](#)

DCNR is legally mandated to “provide reasonable protection of all wild lands in the commonwealth from damage by wildfire” (71P.S. subsection 1340.302d). This state law requires that the Bureau of Forestry responds to, suppresses and investigates wildfires. The William Penn State Forest shares jurisdiction for all wildfires whether on private or public lands within the district. The District Forester, as designated through law, also serves as the District Fire Forester. Except for the clerical staff, all William Penn forest district employees are at a minimum qualified as wildland fire fighters. Several employees are highly qualified and fill overhead positions on complex incidents throughout the state. Clerical staff plays an important role in finance, dispatch and other logistical needs. The Incident Command System (ICS), utilized nationally for emergency management, is adhered to by the William Penn Forest District.

The primary objective in wildfire suppression is always firefighter and public safety. In the William Penn State Forest, primary fire staff consists of two fire foresters that cover nine counties spanning over 4,500 square miles. Other foresters in the district, as well as the maintenance staff, assume roles in fire management that are diverse and adaptable depending on needs. On a single complex fire, for example, all employees are assigned a role with ICS as outlined in the District's Fire Resource Plan. These assigned positions are dependent upon experience and level of training. Each year, wildfire training courses are provided by the Bureau of Forestry and taken by all staff and many fire wardens in the district.

Primary fire season in the Northeastern United States is early spring, once the snow melts and prior to leaf out. Seasonal William Penn Forest District employees have been scheduled to begin work with this factor in mind, commencing work in early March and going off in late November. The nine-county area of the William Penn State Forest also contains over 400 volunteer fire companies and numerous paid fire departments that are depended on heavily for initial attack. There are also 21 volunteer Forest Fire Warden Crews within the District. These fire wardens and crews are specially trained to respond to wildfires.

Over the last 10 years the William Penn Forest district has responded to hundreds of fires. Most of these fires have been less than 1 acre. The top three causes of wildfire in the district are debris burning, arson, and railroad-caused fire. Less than 1 percent of these fires have been caused by lightning. Property damage has been minimal with only several outbuildings being destroyed.

Figure 12-1. Number and year of Wildfire Responses

Year	Number of Fires	Acres Burned
2008	130	187
2009	55	80.34
2010	23	86.39
2011	26	52.37
2012	97	834.2
2013	68	56.32
2014	72	122.87
2015	75	151.93
2016	49	132.89
2017	102	75.75
10 Year Average	69.7	178.006

Over this period there have been three notable fires of size. In the spring of 2008, a prescribed fire escaped, burning a total of 75 acres in Nottingham Park in Chester County. In November of 2016 an incendiary fire on Mt. Penn within the City of Reading burned just less than 50 acres. The most notable fire, however, was the Hopewell Fire, which ignited on April 9, 2012 and burned 741 acres in Hopewell Furnace National Park and adjacent French Creek State Park. A downed power line was the ignition source. The major factor that enabled this fire to increase in size was the large amount of fuel that was available. An early fall snow storm in 2011 snapped the tops of many large trees with an abundance of curing leaves still attached. With virtually no snowfall during the subsequent winter, the fuel tops continued to cure, which made this fuel readily available. The day of the fire, the area experienced

winds in excess of 20 miles per hour. It took nearly a week to bring this fire under control and it was not fully extinguished until there was a significant rainfall.

The William Penn State Forest takes pride in over 100 wildfire prevention programs administered each year by the staff and Volunteer Forest Fire Wardens. Most of these programs include a visit from Smokey Bear and spreading his message Only You Can Prevent Wildfires.

a) Prescribed Fire

In the summer of 2009, the PRESCRIBED BURNING PRACTICES ACT, P.L. 76, No. 17 became law. This law allows state government agencies and private landowners to use fire as an ecological and environmental management tool. The William Penn State Forest uses prescribed fire on state forest land to restore and revive rare and endangered plant species, enhance native seedling growth, control competing vegetation, reduce duff layer, create wildlife habitat, and reduce fuel loading. Prior to ignition, foresters invest months and even years to determine if prescribed fire is the best management practice for a site. The right weather and site conditions must line up, which is very difficult to achieve, for prescribed burns to be successful.

Prescribed burning also provides an excellent opportunity for district staff, forest fire wardens, and volunteer fire department personnel to gain knowledge and experience on fire behavior and the influences that dictate it. The William Penn State Forest has conducted prescribed burns on several state parks since 2014 in Berks, Bucks, Chester, and Northampton counties. In 2018, the district plans to conduct a prescribed burn on state forest land in the serpentine barrens at the Goat Hill Wild Plant Sanctuary tract in southern Chester County and anticipates expanding its use into the management of other state forest lands as the opportunities arise.

13) 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 William Penn State Forest State Forest.

- Roads
 - 1.01 miles of Z1 (SFL Public Use Roads)
 - This is the access road to the Hopewell fire control station.
 - 2.33 miles of Z3 (SFL Administrative Roads)
 - No Z2 (SFL Drivable Trails)
- Trails
 - .13 miles of T0 (Designated National Scenic Trail)- HorseShoe Trail
 - No T9 (Designated State Forest Hiking Trail)

- 8.64 miles of T8 (Designated Local District Trail Shared-Use)
 - 1.71 miles of T7 (Designated Local District Trail Specific-Use)
- Gates
 - 3 at Goat Hill
 - 1 at Honeybrook
 - 3 at Buck Hollow Complex
 - 3 at Gibraltar Hill
 - 2 at Wertz Complex
- Bridges and culverts- The district is in the planning process for the first bridge crossing. This will be located on Goat Hill Wil Plant Sanctuary
- Leased towers
 - N/A
- Radio and communications towers
 - Privately owned communication towers lease land on: Cornwall tract in Lancaster County, Hopewell and Gibraltar Hill tracts in Berks County.
- Fire towers
 - There is one fire tower and historic ground cabin on SFL, located on the Hopewell Tract. Historically, there was a tower on the Cornwall tract, which has since been dismantled. There is a fire tower on Mt Penn, which is owned by the City of Reading and staffed by volunteers from Alsace township fire company.
- Buildings
 - Office Buildings: The district headquarters is located in French Creek State Park, where Parks and Forestry share the headquarters building. Lehigh Field Office is located at the Trexler Nature Preserve. That building is owned by Lehigh County Parks Department and is shared with the county and Wildlands Conservancy. The Evansburg Field Office is in Evansburg State Park in a renovated ranch home. Parks owns the building with a long-term agreement for the district to use it. That office shares space with a regional DCNR Bureau of Recreation and Conservation employee.
- Picnic Areas
 - There are no designated State Forest picnic areas. Hopewell has a site with picnic tables. Most parking areas also have a picnic table.
- Camping sites
 - Primitive camp sites are located on the Wertz, Buck Hollow, and Gibraltar Hill tracts.
- Boundary
 - Total=35.86 Miles
- Right of Ways 1.3 miles
 - 0.8 miles at Goat Hill
 - 0.5 miles at Gibraltar
- Parking
 - 5 @ Wertz Complex
 - 1 on Texter Mountain Road
 - 3 on Sportsman Road
 - 1 on Huntzinger Road
 - 1 on Horseshoe Trail at Cornwall Tract

- 1 on Mexico Road Zimmerman
- 2 Gibraltar
 - Killian Drive
 - Ridgeway Road
- 1 on Buck Hollow Road at Buck Hollow Complex
- 2 at Hopewell Firetower Road
- 1 at Goat Hill on Red Pump Road
- 1 at Johnson on Route 32
- Boat launches
 - There are not launches on state Forest land. Access for Little Tinicum Island is from Gov. Prince Park or Tinicum Township Fire Company (Administrative access only)
- Dams
- Wastewater and water treatment facilities- N/A
- Leased camps- N/A
- Deer exclosures- As of 2020, there are no fences constructed
- Restrooms/latrines/etc.-N/A
- Vistas-N/A
- Kiosks-Kiosks are located at most parking areas. General tract information is located there, as well as hunting season information ad special project information. On Huntzinger Road (Wertz) there is a kiosk that describes the American chestnut restoration project. That was constructed as an Eagle Scout project in 2019.
- Monuments- N/A
- Vehicles
 - The district maintains a fleet of: 1 SUV, 1 passenger sedan car, 4 half ton pickup trucks, 1 ¾ ton pickup, 7 1-ton pickup trucks, a Dump truck with snow plow, and a rollback capable of hauling 24999 GVW
 - There are also 2 boat trailers, 1 small utility trailer, 1 small equipment trailer, 1 large equipment trailer, and 1 enclosed trailer that is utilized for the fire program.

District	Count of Stream Crossings
17 - William Penn	4

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 AOP. 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. The end goal is for the road to not impact the stream. The following is a list of priorities to consider when replacing stream crossings, from highest to lowest priority.

Priorities for Culvert Replacement

1. Failing critical infrastructure

2. Assessed as no aquatic organism passage (AOP)
1. Class A brook trout streams
2. Exceptional Value (EV) streams
3. Wild brook trout streams
4. High Quality (HQ) streams
5. PA Fish and Boat Commission Stream Priority 1 for habitat improvement
6. NAACC priority tool (length of stream reconnected)

This District has approximately 4 culverts, which will be assessed over time using the NAACC protocol.

14) Special Designations

a) Conservation Landscapes

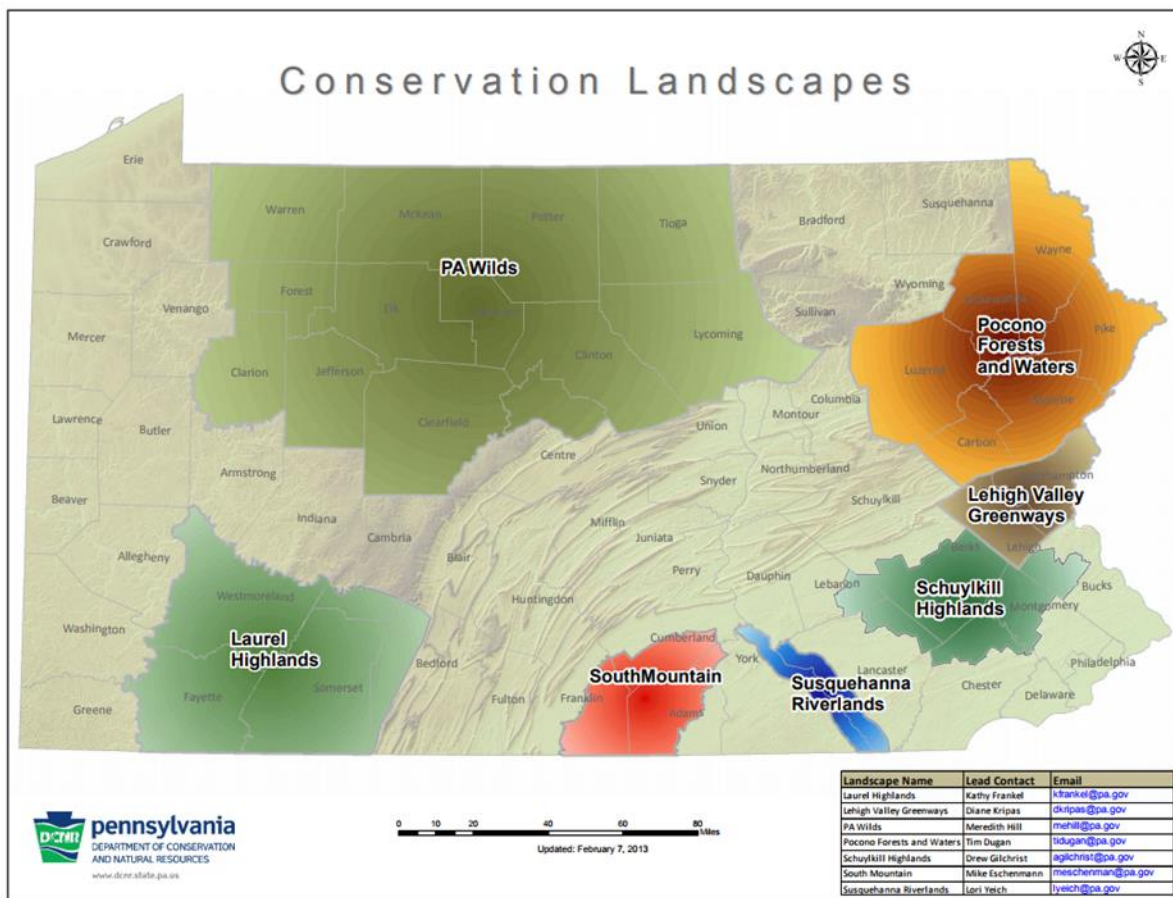


Figure 14-1: The seven Conservation Landscapes in Pennsylvania. The Pennsylvania Wilds is situated in the northcentral part of the state.

Driven by the values of conservation, sustainability, and community revitalization, conservation landscapes are built on several ingredients:

- **Presence of DCNR-owned lands** -- Large blocks of state parks and forests provide the foundation for the landscape and a staffing presence
- **Sense of place** -- Regions with a sense of place and identity in many cases are based on shared landscape not political boundaries
- **Readiness** -- Often driven by opportunity or threats such as changes in the economic base, depopulation, or sprawl
- **Engagement** -- Civic engagement process that brings people of the region together to identify common values and concerns
- **Strategic investments** -- State agencies with regional and statewide partners provide high-level leadership, financial support, and technical assistance to build better communities, to conserve identified values and to invest in “sustainable” economic development

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 7-1), 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.

There are currently seven conservation landscape partnerships within Pennsylvania. The William Penn State Forest lies within the Schuylkill Highlands Conservation Landscape which exists to protect trails and lands in some of the state’s most populated communities.

From Valley Forge National Park to the historic City of Reading, the 929,057-acre Schuylkill Highlands Conservation Landscape in southeastern Pennsylvania is a region of special historical, natural, recreational, and economic importance.

Berks, Bucks, Chester, Lebanon, Lancaster, Lehigh, and Montgomery counties are among the state’s most populated counties. They are also home to critical unprotected lands such as: source water, head waters, riparian buffers, watershed lands, natural areas, contiguous forested lands, and other key habitats.

Some interesting areas within the landscape include:

- The largest unbroken forest between Washington D.C. and New York City (12,930 acres)
- 660 miles of Exceptional Value and High-Quality streams
- Source of drinking water for 1.75M people
- Schuylkill River Bike & Water Trail

- High concentration of cultural sites
- 3 National Parks, 5 State Parks, 9 Important Bird Areas

The Schuylkill Highlands Conservation Landscape is hoping to protect what is special in this region by saving high-quality lands and connecting people and communities through a network of trails and gateway communities.

Goals of the Schuylkill Highlands

The area's importance derives from the need for water quality protection, habitat conservation, and recreational development in a region set for considerable growth over the next 20 years.

Achieving the goals of this conservation landscape will require municipalities to implement appropriate land use ordinances and practices that steward this landscape.

The goals of the Schuylkill Highlands landscape are:

- **Collaboration & Engagement:** Create opportunities for unique multi-partner approaches to issues, problem solving, project work and region-wide policy that support the quality of life of residents and conservation values.
- **Recreation, Trails, and Interpretive Experiences:** Create an interconnected trail network to destinations and gateways to increase the recreational opportunities for connecting residents and visitors to the outdoors, and to heritage sites in the Schuylkill Highlands.
- **Economic Vitality and Natural Resource-Based Tourism:** Encourage sustainable practices that respect the cultural, historic, recreational, and natural resources of the Schuylkill Highlands.
- **Conservation of Natural Resources:** Conserve, protect, restore, and steward lands, watersheds, greenways and habitats of high natural resource value.

Areas of Focus

The region is at the nexus of two landscapes that have been separately identified for protection:

- **The Highlands**, as defined by an Act of Congress through The Highlands Conservation Act, which declares the area to be nationally significant.
- **Schuylkill River watershed** is within a National and State Heritage Area where the preservation, interpretation and celebration of the river's industrial heritage is key to new economic growth.

The region also contains a number of large habitat areas that have been called out for protection. The Hopewell Big Woods is perhaps the largest and best known, but the Oley Hills, Unami Forest, Neversink Mountain, and Swamp Creek Corridor are other well-known examples.

The backbone of this conservation landscape is the Schuylkill River Trail. By completing a crucial segment in Chester County, as well as the necessary connector spurs from many communities and destinations, the trail will successfully link together recreational hubs and river towns from Valley Forge to Reading.

Exploring the Region

In the Schuylkill Highlands region, you can explore:

- Trails
- Birding sites
- Cultural and historic areas
- Destination farms
- Recreational areas
- Water-sport activities

Scenic trails form an impressive recreational network linking communities and unique resources, including:

- French Creek State Park
- Hopewell Furnace National Historic Site
- Valley Forge National Historic Park
- The 130-mile-long Schuylkill River Trail
- Hopewell Big Woods

a) 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.

Table 14-1. Total acreage of Wild and Natural Areas on state forest land within William Penn State Forest.

William Penn	Name	Acreage
Natural Areas	David R. Johnson Natural Area	55.5
	Ruth Zimmerman Natural Area	33.5
	Tinicum Island Natural Area	80.0
	Natural Area Total	169.0
Wild Areas		
	Wild Area Total	
Total		169.0

Little Tinicum Island was conserved for the following reason as written on the grant application:

The Pennsylvania Department of Environmental Resources proposes to purchase Little Tinicum Island located in the Delaware River, southwest of Philadelphia and offshore Tinicum Township in Delaware county, Pennsylvania. The island, which is slightly over two miles in length and ranges in width from 140-840 feet, will be purchased using Coastal Energy Impact funds. The method of purchase will be a combination of fee simple and tax-deductible gifts. The main purpose of acquiring the area will be to maintain the current open space and natural character of the island.

This island exists because the Delaware River changes its course nearly 90 degrees at Philadelphia, upstream from the island. This bend slows the velocity of the river along the northern shore, so that the island is not exposed to the full erosional force of the river. The current is slow enough so that marsh vegetation is established along 90 percent of the island's perimeter. As is the case with adjacent National Tinicum Marsh (John Heinz Wildlife Refuge), the island is of greater than local importance, because it serves as a refuge for birds' native to the Arctic and eastern North America. It also provides two valuable fish refuges. Additionally, man benefits as well from the existence of Little Tinicum Island because it provides one of the last few remaining open space areas in an otherwise highly urbanized region.

In conclusion, the acquisition of the island supports the goals and objectives of the Pennsylvania Coastal Zone Management Plan and the Federal Coastal Zone Management Act, which states that it is the national interest to preserve, protect, develop and where possible to restore or enhance the resources of the nation's coastal zone for this and succeeding generations.

Our intent to pursue changing Little Tinicum Island from a Natural Area to a Wild Plant Sanctuary (WPS). Creating a WPS we give us the ability to better protect the rare, tidal vegetation that is unique to that very small portion of that Pennsylvania ecosystem that has tidal, fresh-water marshes.

a) High Conservation Value Forests

Table 14-2. Acres of High Conservation Value Forest by category. To comply with Principle 9 of the FSC U.S. Forest Management Standards, the bureau evaluated and assessed areas for inclusion as HCVFs. While the BOF believes that all state forest lands are of highest conservation value, areas not designated as such are still of equal importance and are protected through law and best management practices. The areas which have been identified as HCVFs are mapped and managed in a manner that will maintain and/or enhance the values for which they have been designated. More information about HCVFs can be found in the SFRMP, p. 64.

HCVF Category	Acres
1.1, areas legally protected or managed primarily for concentrations of biodiversity values that are significant at the ecoregion or larger scale	1,120
1.2, areas with significant concentrations of rare, threatened or endangered species or rare ecological communities, endemic	1,113
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	788
3.3, rare, threatened, or endangered ecosystem	523
4.1, areas providing a source of community drinking water	1
4.3, extensive floodplain or wetland forests that are critical to mediating flooding or in controlling stream flow regulation and water quality	96

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.

a) [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

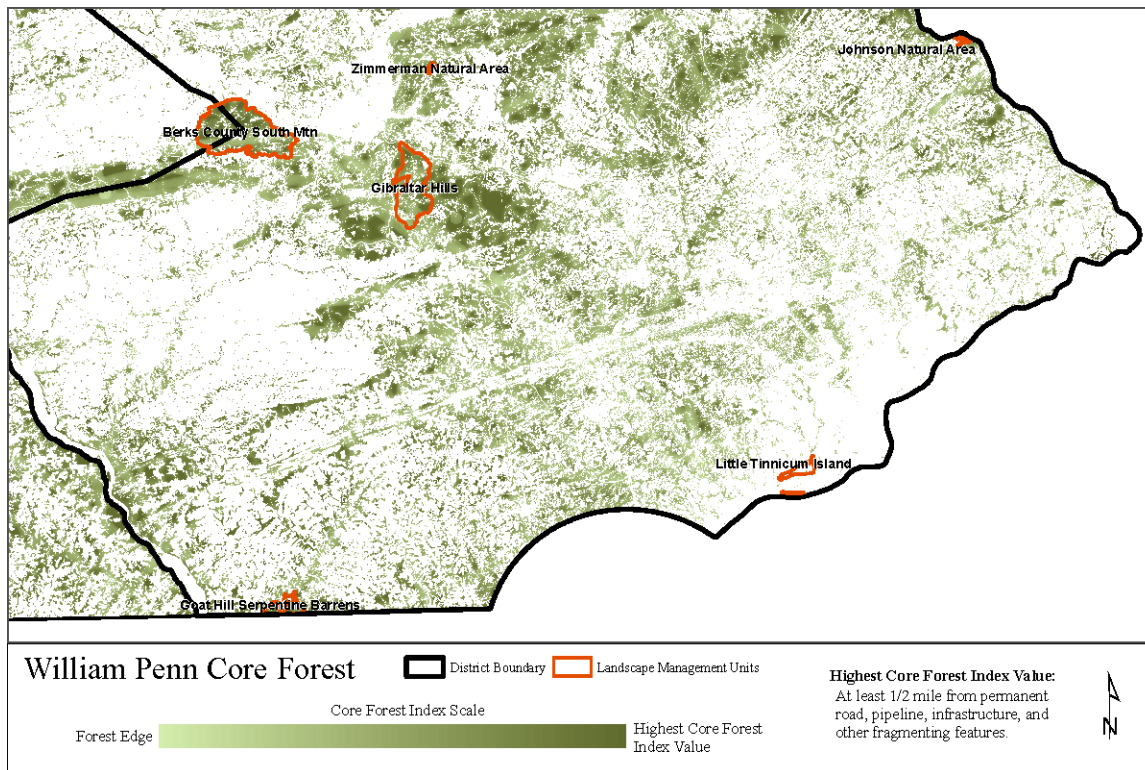
1. No permanent conversion of forest land will occur in these areas, including roads, pipelines, recreational parking lots, natural gas infrastructure pads, and other activities that permanently convert forest to non-forest.

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.

Table 14-3. 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. The yellow highlighted LMUs are Core Forest Focus Areas (i.e. LMUs within the top 20% of core forest index scores state-wide).

LMU Name	Statewide Percentile	Core Forest Index Value
Gibraltar Hills	74%	96.65
Goat Hill Serpentine Barrens	43%	94.64
Berks County South Mtn	39%	94.32
Zimmerman Natural Area	11%	86.81
Johnson Natural Area	6%	76.85
Little Tinicum Island	0%	24.96



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.

15) Ownership and Population Centers

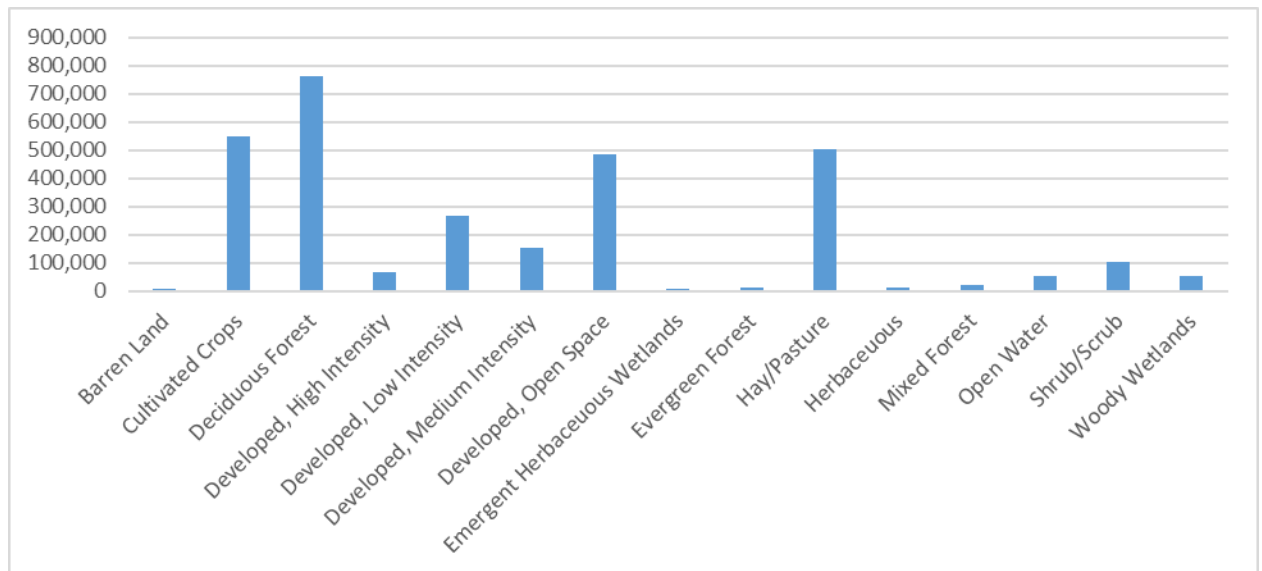


Figure 15-1. Acres of land cover types from National Land Cover Database for entire district.

Within the William Penn Forest District, the largest landcover type is by far deciduous forest. However, the William Penn District is unique due to the many differing land cover type and elevations within the district. These cover types range from extremely flat, developed urban areas around the large metropolitan areas of Reading, Allentown, and Philadelphia to large undeveloped tracts of farmland and fragmented, small woodlots interspersed in and around small rural communities.

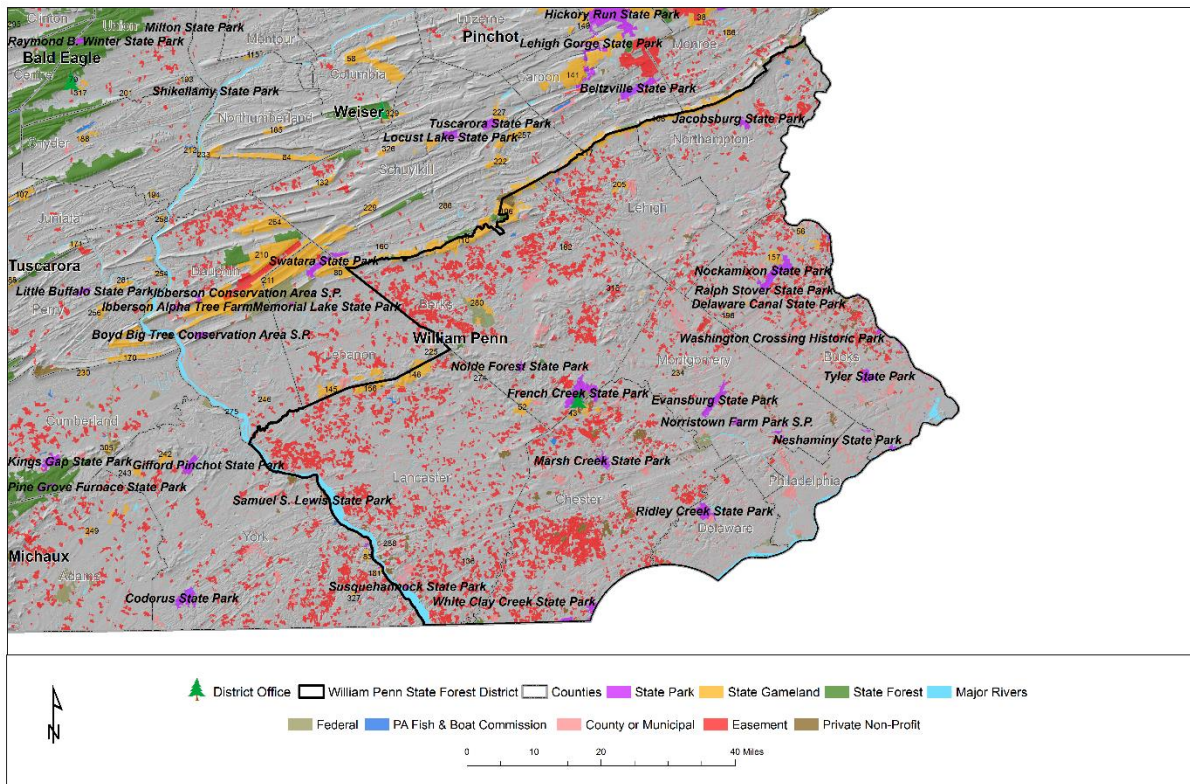


Figure 15-2. Map of public lands, population centers, and land use types (aggregated from National Land Cover Database).

As illustrated in Figure 15-1, within the William Penn Forest District, the largest population center is made up of Philadelphia and its surrounding suburbs. Most of the population in the forest district resides in Philadelphia and Delaware Counties which accounts for 60 percent of Pennsylvania's population.

William Penn District	
Land Ownership Type	Acres
State Forest	1535.56
State Parks	29275.47
State Gamelands	53166.45
Federal	14850.65
Local/Municipal	19743.18
Conservation Easements	372297.8
Total Acres	490869.1

Table 15.1 Public/conserved lands within the William Penn State Forest

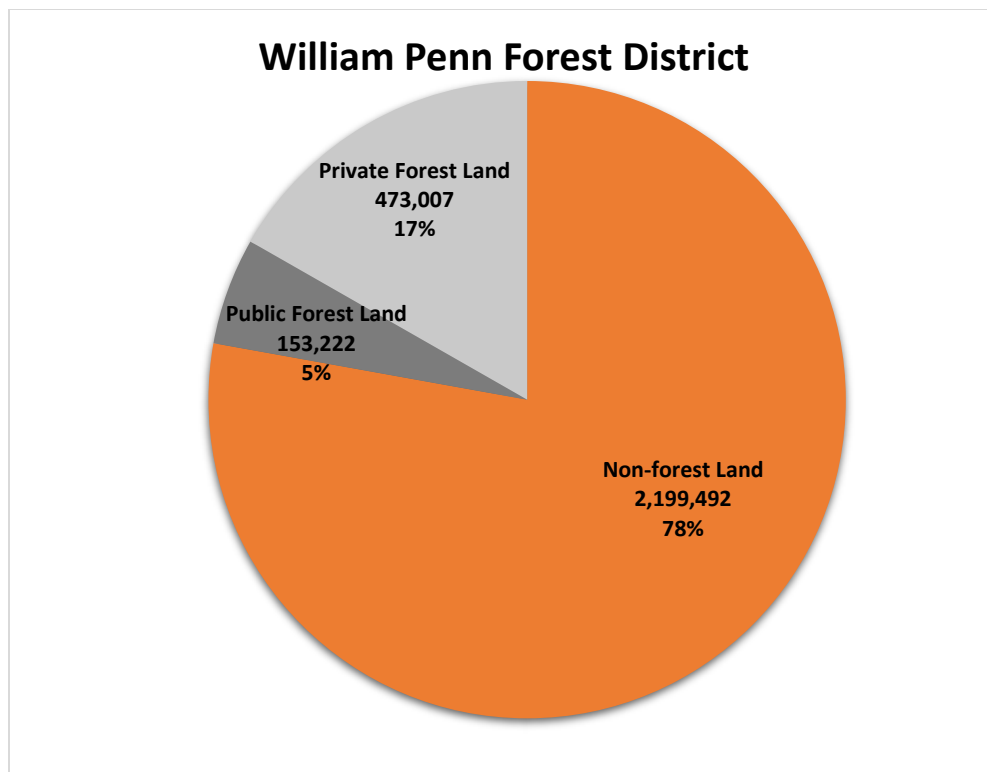


Figure 15.3 Private and Public Forest Lands and Non-forest Land in the William Penn State Forest.

There is far more Non-forest land in William Penn Forest District than forested land. There are many areas of developed, urbanized areas around Philadelphia, and Delaware Counties. The more undeveloped, rural areas are largely located in northern Berks and Lehigh, and Lancaster counties.

Much of land use is Non-forested at seventy eight percent of the districts land base. Forest land covers twenty two percent with only five percent in public forest land. There are many state parks within the district as well as eight tracts of state forest land. The William Penn Forest district covers nine counties which explains the disparity of Forested land to Non-forested percentage when compared to other forest districts with less development and fewer counties.

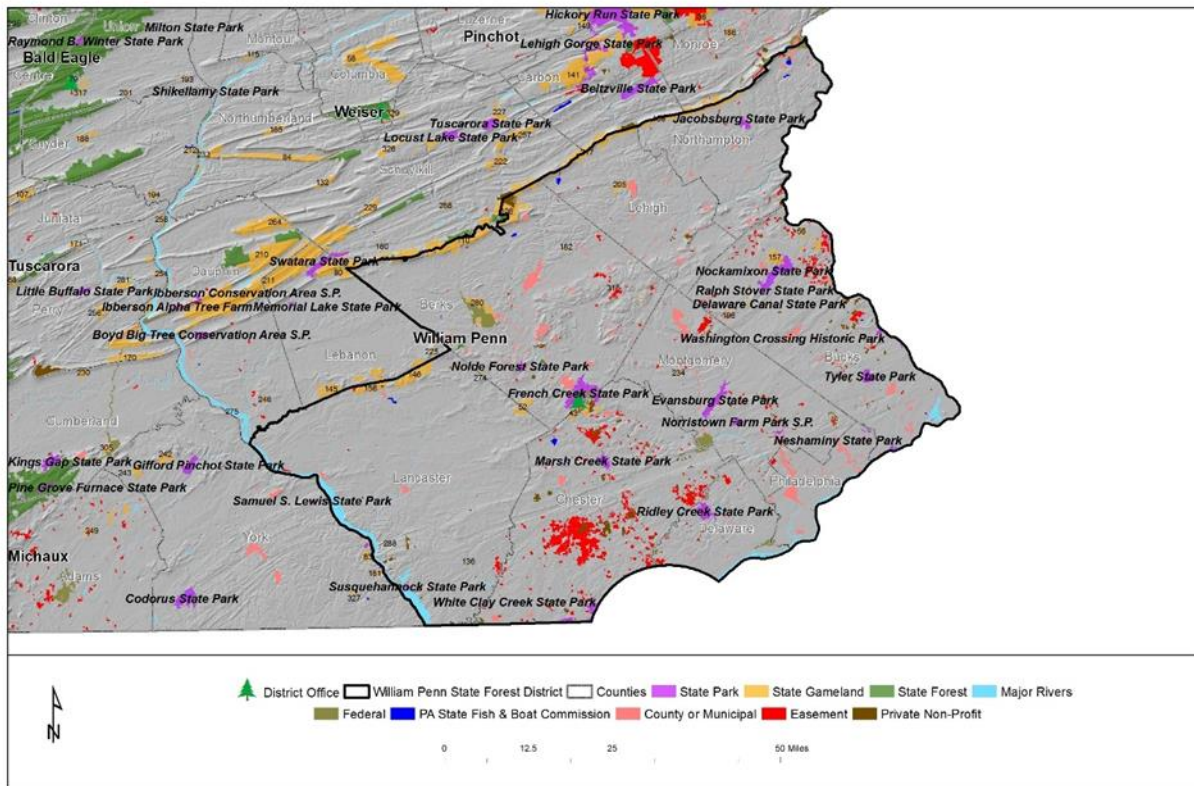


Figure 15-4. Public/conserved lands within entire district.

Public lands in the district are made up by the William Penn Forest found in Berks, Bucks, Chester, and Delaware counties which currently consists of 1,500 acres protecting high conservation value forest and important bird habitat.

The 602-acre Goat Hill Serpentine Barrens is the largest forest tract with a unique ecosystem designated a Wild Plant Sanctuary.

Additionally, the district also consists of numerous state parks, state game lands and municipal parks scattered throughout.

The bulk of game land acreage is located on the Blue Mountain on the northern tier of district, primarily Berks, Lehigh, and Northampton counties with several in Lancaster county.

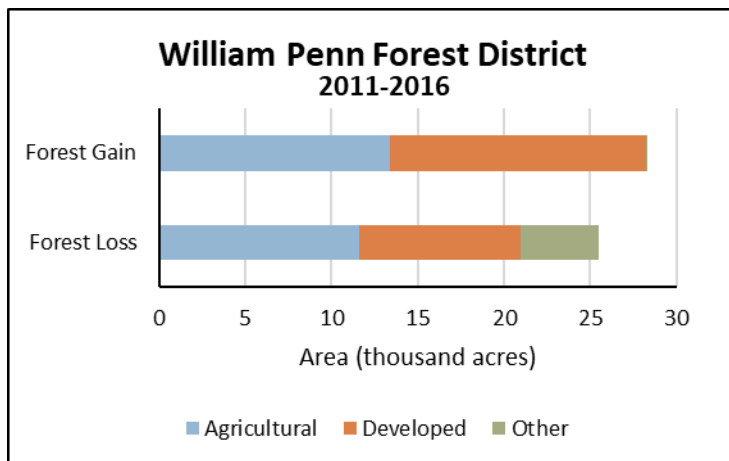


Figure 15-5. Gross forest loss and forest gain 2011-2016 (based on US Forest Service FIA plot data: <https://www.fia.fs.fed.us/>) by land-use categories within William Penn Forest District.

The US Forest Service Forest Inventory and Analysis (FIA) program characterizes the areas of the State using several use categories which are generalized to the following broad classes: forest, agriculture (including pasture and cropland), developed land (including residential and commercial areas, and rights-of-way), water, and other non-forest land. Estimates for land use are produced from all measured plots in an inventory cycle (i.e. these estimates are based on plot expansions, not on a cell by cell analysis of landcover, as in the NLCD shown in various maps in this document). However, these data can be useful in understanding land-use changes dynamics, which allows land managers to make informed policy decisions. The categories 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). To read more about this nationwide forest inventory program, visit <https://www.fia.fs.fed.us/>

For the most part, the forest land gain and loss in the William Penn District mimics the statewide trend of gaining forest land mostly from developed and abandoned agricultural lands and losing forest land to development. Within the district, the gains in forest land are out pacing the losses in forest land, placing an even higher importance to conserving the forested public lands in the district.

16) Economy and Forest Products

The William Penn State Forest lies within the most populated portion of Pennsylvania, and consequently its forest products industry is smaller than that of other areas of the commonwealth. However, there are still several family owned sawmills in the district that produce high quality forest products. In the William Penn forest district, there are approximately 11 circular/band mills that produce about 40 million board feet of lumber yearly. Six of these mills are in Lancaster County, four are in Berks County,

and one mill is in Bucks County. Lancaster County, in fact, is the largest forest products employer in the state, when considering secondary processing which includes furniture, cabinets and millwork.

There are also many private loggers that reside in the district that produce a large amount of hardwood volume yearly. The principle species of tree sawn in the William Penn State Forest is the tulip poplar. The William Penn forest district grows some of the best Tulip Poplar trees in the commonwealth. The second major species sawn is oak. red oak, black oak, chestnut oak and white oak are all present in the William Penn State Forest. Good color and veneer quality are common. Among other species sawn in the district are ash, maple, birch, and beech.

The William Penn State Forest consists of eight tracts ranging in size from 35 to 606 acres. The timber species ranges from good quality sites of tulip poplar and mixed oaks, to serpentine barrens containing mostly pitch pines. In 2015, the district administered its first timber sale on the Wertz tract in Berks County. Wertz is approximately 405 acres, and the timber sale area was 50 acres. The sale was conducted to salvage a large portion of the ash trees before they were destroyed by the emerald ash borer. The sale was originally 130,000 board feet of mostly white ash; however, a major wind event came through the area during the harvest, and there was a significant amount of blow down as a result. An additional 150,000 bdft of mostly Tulip Poplar was then marked, bringing the total timber sale volume to 280,000 board feet in total.

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>

17) Recreation

The William Penn State Forest may be small in comparison to other forests across the Commonwealth, but it provides a wealth of public recreation opportunities. Since this land is located within an hour drive of a large contingent of the state's population, there is opportunity for increased public use. Working with local planning commissions, the William Penn State Forest is being designated as a critical resource

for passive recreation. Primary recreation on William Penn State Forest lands include hunting, hiking, birdwatching, and primitive camping.

Major Recreational Uses

Trails

Trails form the basis of most recreational pursuits in the state forest. The William Penn State Forest has tracts located on a water trail, as well as 2 regional trails. Little Tinicum Island is in Delaware County on the Delaware River. This island is a popular stopping point for river users. The Schuylkill River Trail (SRT) spans from Pottsville to Philadelphia. A stop just south of Reading connects you to the Gibraltar Hill Tract. The SRT is a non-motorized rail trail that caters to biking and hiking.

The state forest is also situated on the Horse-Shoe Trail. This trail network spans from Harrisburg to Valley Forge. Historically it was developed on existing public lands when possible. The private lands that it occupied were typically arranged on a handshake deal. Decades after the trail was established, development pressure has forced the trail out of the forest and onto local roads. This was the case when the trail was constantly being re-routed in Robeson Township, Berks County. The acquisition of the Buck Hollow tract allowed the trail to route on to state forest land. This enabled the long-term preservation of that section of trail and enabled a connection of state forest land to that network. The Horse-Shoe Trail caters to hikers and equestrian users.

Camping

The state forest is open to primitive backpack camping. There are 2 designated campsites (Buck Hollow and Gibraltar Hill) with a fire ring and picnic table. Future plans are to expand our designated campsites on the larger tracts. As of 2018, there are no motorized camping sites. This may change, as additional tracts are added to the State Forest. Camping information for the William Penn State Forest may be found on the website, as well as information posted in the kiosk at the parking area.

Cross-Country Skiing and Snowshoeing

The Gibraltar Hill tract has a dual use trail, where users can cross country ski. It is not groomed in the season for this purpose, however the neighboring SRT sees ski use when weather permits.

It is expected that snowshoeing will increase as more people find the new tracts of the William Penn State Forest.

Fishing

Cold-water fishing is available in the Hospital Creek on the Wertz tract. Larger bodies of water such as the Delaware River and Octoraro creek offer other fishing opportunities.

Hiking

Shared used trails (red blazed), cross-country ski trails (blue blazed), foot-travel only (yellow blazed), and gated state forest roads are popular for hiking. In addition to the Horseshoe and Schuylkill River Trails, other hiking opportunities exist on the William Penn State Forest.

- Little Tinicum Island has a 1-mile loop trail on the berm that was developed during dredging activities in World War II. This trail contains a wildlife viewing platform on a tidal inlet and shaded views of the river.
- Goat Hill Wild Plant Sanctuary contains a 3-mile loop 'Rose' trail, named for the woman that facilitated the preservation of the site. Other unmarked trails are on this site.
- Gibraltar Hill connects to the Schuylkill River trail. Approximately 5 miles of trails that were former logging roads traverse the site.
- Buck Hollow has a 1-mile section of the Horseshoe trail, with plans to expand the trail network in the future.
- The Wertz tract has approximately 1.5 miles of unmarked trails. It is expected by 2020 to have a trail head constructed along with two loop trails totaling close to 6 miles.
- Zimmerman Natural Area is in the planning stages (2018) to install a trail that traverses the property. Since it is a wet site, a designated trail will encourage sustainable recreation.

Horseback Riding

Equestrian use is directed to the Horseshoe trail. A trail head that can accommodate trailers is in the planning stages for the Buck Hollow tract.

Hunting and Trapping

Hunting for deer, turkey, and, squirrels is popular. Deer are generally the most sought-after species. While occasionally seen in the area, the William Penn State Forest is generally outside of the normal range of Pennsylvania black bear. Several species of furbearers exist on state forest land. Other than a few safety zones around buildings and picnic areas, hunting and trapping are permitted throughout the state forest.

Picnicking

As of 2018, there are no designated picnic areas on the William Penn State Forest tracts. However, after the trail head is constructed on the Wertz tract, the next phase of the recreational plan is to develop a picnic area there.

Most parking areas have a picnic table adjacent to the informational kiosk. At the site of the Hopewell Fire Control Station, there is a stone pavilion and picnic tables available to the public. This site is situated in the middle of French Creek State Park. There are no rest room facilities available here.

Mountain Biking

Mountain bikes may be used on some of the trails on Gibraltar Hill and the connecting SRT.

Snowmobiling

William Penn State Forest does not have groomed state forest roads or trails for snowmobiling.

ATV

William Penn Forest District does not permit the use of atv's on its state forest lands. There are no local opportunities for the public to recreationally operate an atv either.

Americans with Disabilities Act Facilities

Currently there are no trails designed to accommodate wheel chairs or other assisted mobility devices on state forest land. Local trails, such as the Schuylkill River trail are accommodating. Most of the areas that have a congregation of picnic tables adjacent to a public parking area have an ADA accessible table as part of the group.

Americans with Disabilities Act Information

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. Once the form is completed the district can provide the Orange Placard for the vehicle that is to be utilized, or the blue Mobility Device Permit Sticker for the mobility device that is to be utilized. 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. A list of areas where permits may be utilized and are not permitted can be found on the back of the Mobility Device Permit. Violations of the permit may result in the permit being terminated.

Vistas

There are not any developed vistas on William Penn State Forest lands. However, there is a natural overlook on the ridge of Gibraltar Hill which overlooks the Schuylkill River south of Reading.

Search and Rescue

Due to the district's small size, lack of ranger staff, and proximity to State Parks, direction for search and rescue coordination would come from State Parks or another partnering organization.

Recreational Opportunity Spectrum

Recreation Opportunity Spectrum (ROS) is an inventory system built on the premise that people expect certain types of recreational experiences on public land, and that land managers should be able to direct people to appropriate places for those experiences.

ROS allows the land manager to provide recreational opportunities across a spectrum, or continuum, of five land-use classes so that the user may find satisfying recreational experiences in a variety of recreation activities.

To determine appropriate recreational opportunities, experiences, and uses of public lands, land managers need a systematic and consistent inventory and assessment as part of the long-range planning process. The chart below (Figure 17-1) shows acreage of William Penn State Forest in relation to various categories of ROS.

The classes of ROS from the least developed to the most developed are Primitive, Semi-Primitive Non-Motorized, Semi-Primitive, Semi-Developed, then Developed. As you can see from the chart, very little

of the William Penn State Forest contains land in the Primitive zone. Most the William Penn State Forest is categorized as 'Other Zones' which is Semi-Developed and Developed zones.

The Recreational Opportunity Spectrum Model is used as a planning tool to ensure addition of anthropogenic features such as roads, trails, or parking areas are designed to minimize erosion of opportunities for forest users to experience “primitive” or “wilderness” conditions in certain areas of the forest. ROS model results for the William Penn are somewhat unreliable at predicting user experience because such a large portion of the district’s trails are undocumented and therefore unmodeled. Therefore, it is much more likely for forest users to encounter a higher density of trails and higher rates of human presence in areas of the William Penn the ROS model would suggest are Semi-Primitive or Primitive.

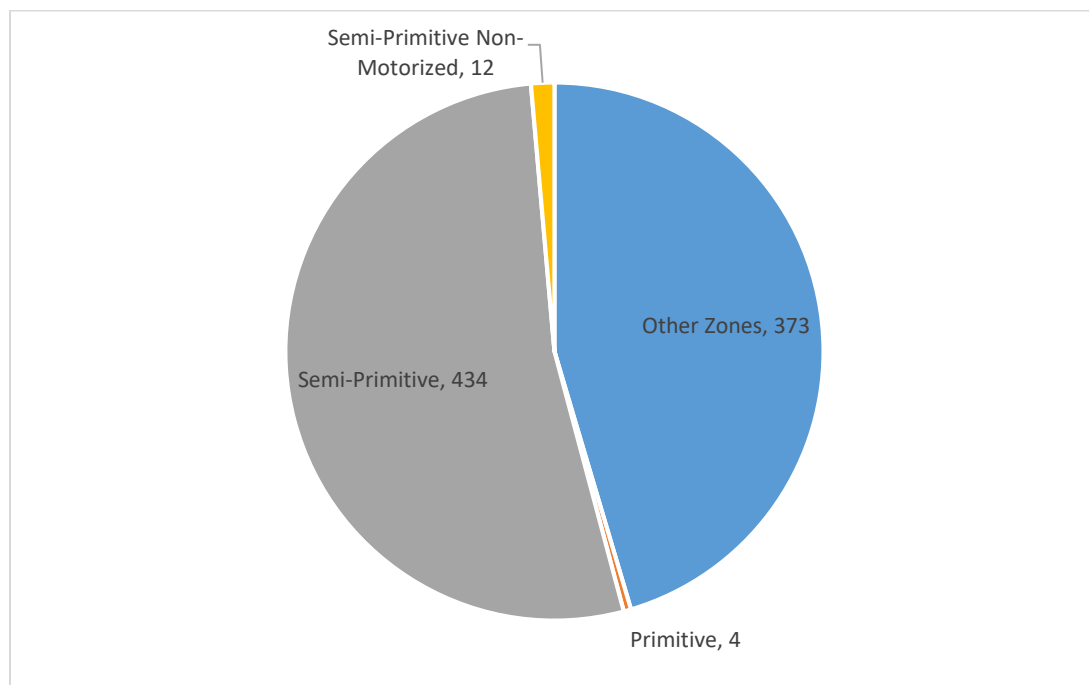


Figure 17-1. Acres of state forest land in this district by Recreation Opportunity Spectrum (ROS) classifications (2012). ROS is an inventory system developed by the U.S. Forest Service, to characterize land by types of recreation experiences. ROS is described on p. 42 of the 2016 SFRMP. “Other Zones” refers to Semi-Developed and Developed zones.



Figure 17-2. Graphical depiction of ROS zones and their characteristics.

18) 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.

The William Penn State Forest takes an active role in communication through the following:

Communication:

Media

- Web based
- Social- The district has a Facebook page, with the goal of updating weekly.
- Typically, in the busy spring season, we may field requests for interviews with local TV or radio stations.

Printed

- It is becoming increasingly more difficult to have a presence in the 'local 'papers. Most of the local papers have been acquired by larger management firms, with less of a focus on local reporting.

Public Contact/Engagement

- Fairs/Expos/Shows
- Career Fairs
 - At least one career fair is staffed in Berks County, sponsored by the Berks Ag Resource Network.
- Displays/Exhibits
- Incidental (while staff is performing other duties)
- District office walk in
- Rangers
 - There are no DCNR Forestry rangers on staff.

Educational Presentations and Programs

- Youth

- Envirothon
 - The district actively participates and coordinates the forestry section of the test in 9 counties. Multiple counties also have a middle school program.
- FFA/4H
 - Seasonally participate in FFA Career Development Events
- Scouts
 - Assist local scout camps with resource management and merit badges. There are staff that are certified merit badge counselors.
- Schools
 - Approximately 5 elementary school programs are attended in the spring.
- Project Learning Tree
 - Service foresters are trained in PLT
- Fire Prevention/Smokey Bear
 - Fire Prevention is a large focus with the volunteers in the fire program. Each year, the program strives to include new concepts and keep the audience engaged.
- Adult
 - Woodland Owner Associations
 - Actively partner with the Southeast PA WOA
 - Forest Landowners
 - Three Service Foresters engage with more than 200 landowners a year.
 - Urban Forestry/Tree City/Arbor Day
 - Participate in more than 50 Tree City USA programs

Interpretation

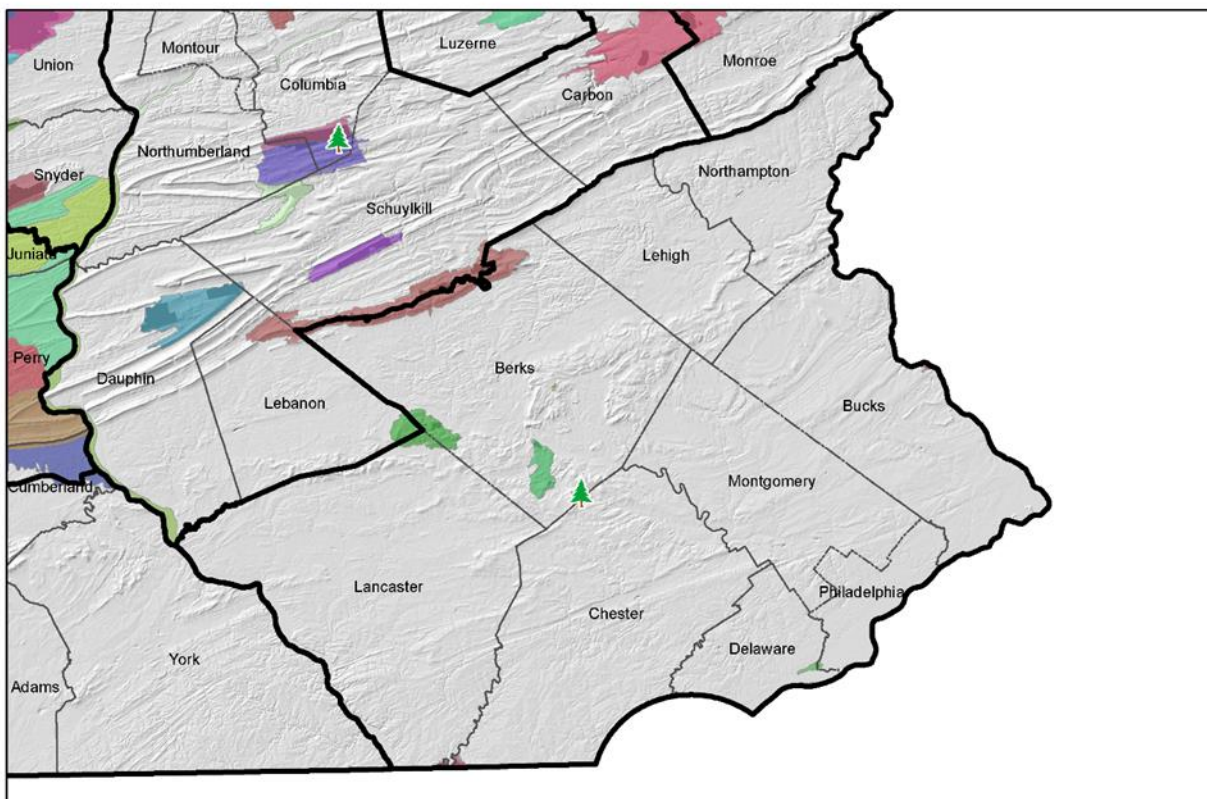
- Interpretive Wayside Panels/Kiosks/Trails
 - Kiosks are located at most parking areas.
- RMC/District offices- The William Penn District Office shares the headquarters with French Creek State Park. Interpretive displays focusing on wildlife and CCC work in the area are located in the lobby.

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 William Penn District are found below. Each LMU Plan contains three elements:

- Overview – a 1-2-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.

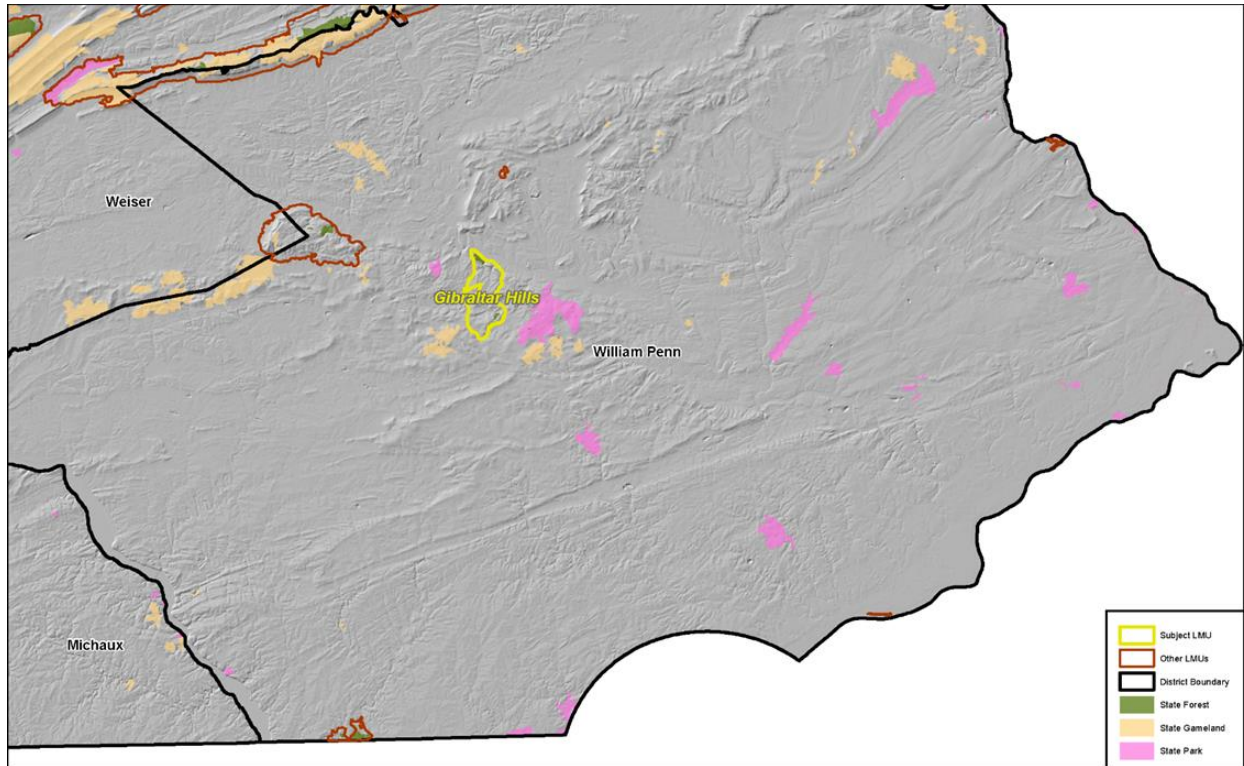


William Penn Forest District LMUs

0 4.5 9 18 27 36 Miles



Gibraltar-Berks Green Hills



Gibraltar Hills LMU



Overview

The Green Hills LMU is approximately 2300 acres in the southern Berks County. It lies approximately 6 miles south of the Reading metro area. One of the newer additions to the William Penn State Forest system is located here, the Gibraltar Hill and Buck Hollow Tracts (458 total acres). The area has many different land uses. Urban development and agriculture all play major roles in forest fragmentation. The vast majority of the forest type is eastern hardwoods, dominated by tulip poplar and mixed oaks. Historically, this area supplied timber and charcoal to surrounding iron furnaces during the late 1800's into the early 20th century. Joanna Furnace is a popular furnace that can be visited today. Natural resources from this area were an early target as railroad systems made transportation to the surrounding communities easy. After the major logging of the early 20th century, the land was either farmed or allowed to revert to the mixed forest seen today. The timber industry is still present throughout the LMU almost exclusively by the private sector. It is home to one of the largest contiguous forest areas in the Green Hills area. Gibraltar Hill is also one of the highest elevations in the Green Hills area of southern Berks County. Because of the high elevation, it contains several cell towers along with television network dishes.

This LMU is a focal area for new state forest land acquisitions. It is home to a diverse forest of oaks and hardwoods, along with the challenges of managing for invasive plants and now the spotted lantern fly. The Horse Shoe Trail is on a portion of SFL and there is also a connection to the Schuylkill River Trail. Promoting the development of trails and camping opportunities will enhance the public use of these tracts.

Priority Goals

- a) Maintain and organize the existing trail network.
- b) Promote recreational opportunities with diverse communities.
- c) Promote sustainable forestry while utilizing various management practices moving the stand from a degraded state to a sustainable ecosystem.
- d) Work with partners to assist with trail classification and maintenance.
- e) When available, acquire adjacent lands to improve access and to add to state forest land.
- f) Attempt to manage and control invasives for habitat restoration in particular, angelica tree, ailanthus, mile-a-minute, spotted lantern fly, and stilt grass.
- g) Continue to develop a relationship with adjacent landowners and local municipalities, while developing this tract as a demonstration site of sound forestry.

Profile

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

	Acres
State Forest Land	458
LMU Total	2345

Ecoregion: Deep Valleys

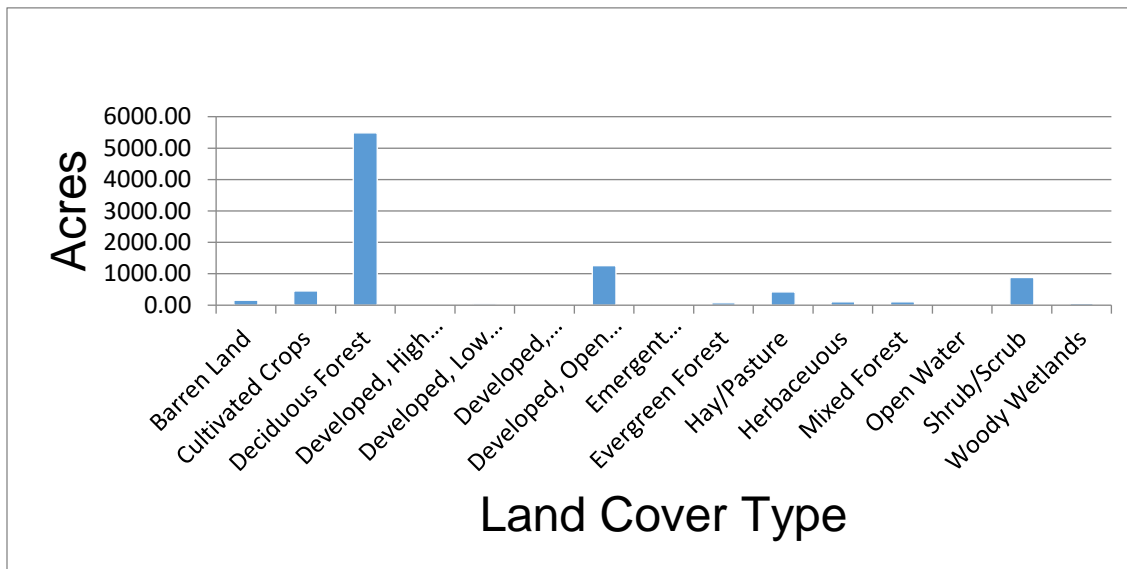


Figure 1. LMU acreage by land cover categories from the National Land Cover Dataset for the entire LMU.

The majority of the area is forest land. Most of the landscape is privately owned, with scattered residential developments.

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 Road	1
Total	1

The administrative road is on the Gibraltar Hill Tract leading to the radio towers.

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	5.4
Biking	5.4
Equestrian	0.6
X-Skiing	5.4

The Horse Shoe trail is located on the Buck Hollow Tract. The trail system at Gibraltar Hill is designed to promote two loop trails on the forest.

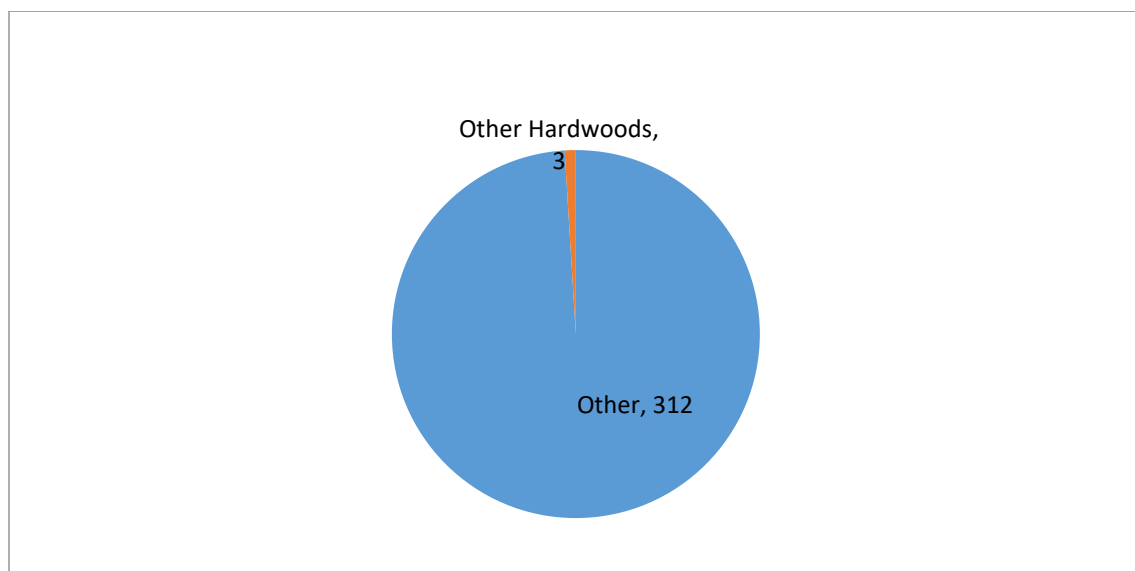


Figure 2. Acreage of state forest land in this LMU by aggregated forest type. The forest types are described on p. 108 of the 2016 SFRMP.

The forest is a mix of oaks and tulip poplar stands. On the northern slope of Gibraltar Hill is a forest type not usually seen in Berks County. Sugar Maple and Basswood are common trees. Most of the acreage on SFL is understocked due to poor timber harvesting practices when it was privately owned. Subsequently, Ailanthus and royal Paulownia trees can be easily found in the overstory.

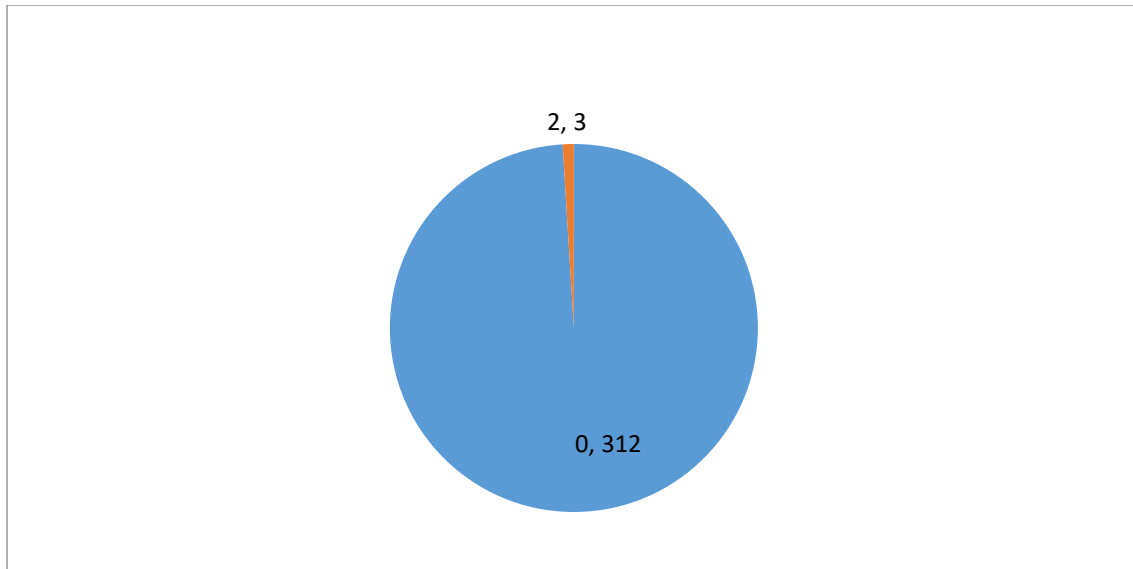


Figure 3. Acreage of state forest land in this LMU by site class. Site classes denote the potential quality of the growing site. “Site 0” indicates non-forested lands or forested lands where the vegetation has not yet been typed. Other site classes are described on p. 53 of 2016 SFRMP

Site 1 areas are typically in riparian areas or lower slopes. Most of the land is a site 2. It is a mid and upper slope region that is typically is rocky with sandy soils. Site 3 tend to be ridge tops and other areas with shallow soils, which do not support vigorous tree growth.

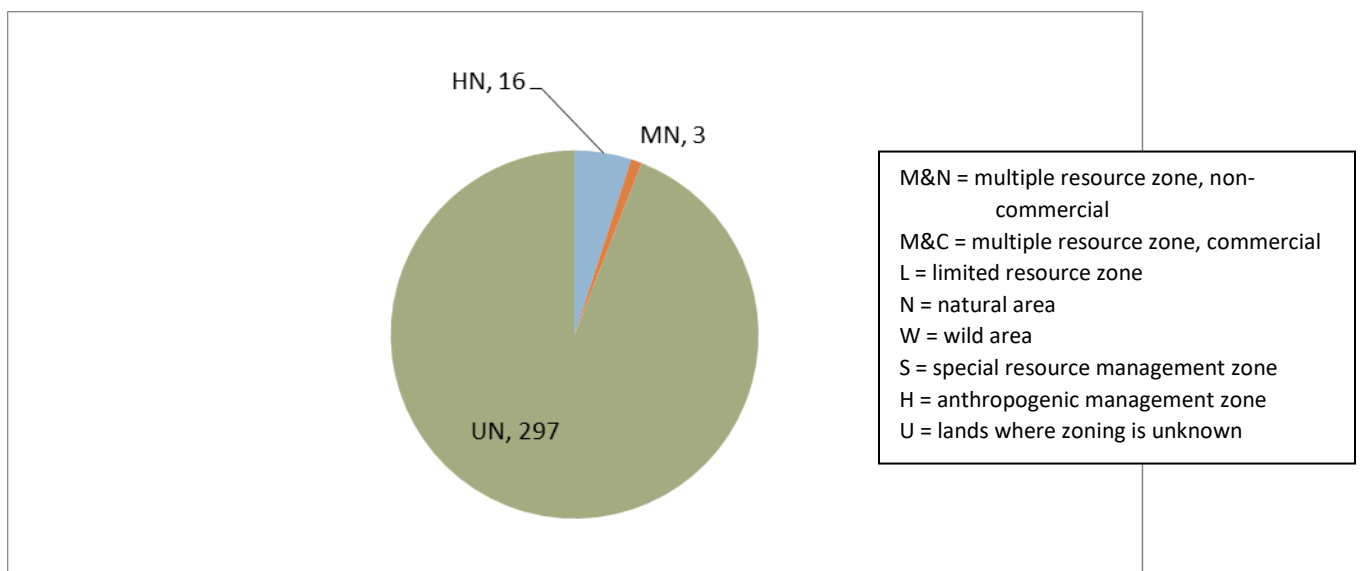


Figure 4. Acreage of state forest land in this LMU by management zone. Management zone is dictated by primary land use and land capability. Further descriptions of commerciality and zoning are found on

p. 54 of the 2016 SFRMP. The area of SFL is mostly multiple resource and commercially available. The only 'Limited' areas are due to extremely steep slopes.



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

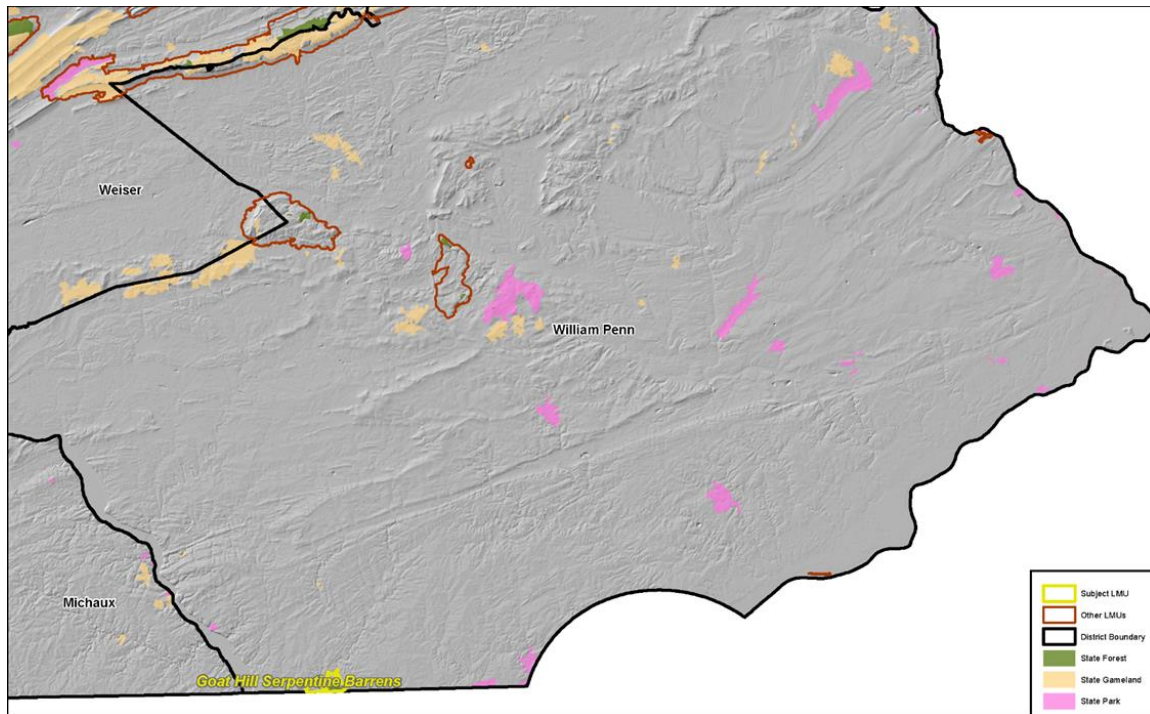
Typically forests in this region are even age. The new tracts of SFL tend to be two aged. This is due to heavy cutting while under previous private ownership. Residual trees from those harvests now create the dominant overstory trees which average 100-120 years old. Regeneration and stump sprouts from those harvest is creating the new stand of trees. Average age for the younger trees is 25-40 years.

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)
Undesignated	6
Total	6

Angelica Creek is adjacent to the Gibraltar Hill Tract. The Buck Hollow Tract forms part of the headwaters for the Hay Creek, which is the water source for Birdsboro.

Goat Hill Serpentine Barrens



Goat Hill Serpentine Barrens LMU



Overview

The Goat Hill LMU is approximately 1,875 acres in southwestern Chester County and southeastern Lancaster County, bordered to the south by the Maryland state line. It is comprised of public and private land ownership with about one third of the acreage being state forest land. Goat Hill is located in the Northern Piedmont region with sloping uplands that form long saddles and rounded hill tops dissected by small streams valleys.

The bedrock of this area is predominantly comprised of serpentinite, which in the 1800's was mined for its chromium and magnesite. The serpentinite was also cut into blocks to build barns and houses in the area, but due to the relatively fragile properties of the rock it was later deemed inadequate as a base building material. Some of the mining pits can still be seen throughout the area.

Serpentine barrens are a result of serpentine bedrock paired with shallow soils or simply exposed bedrock. This combination creates an unusual ecosystem of vegetation due to the lack of calcium and high amounts of magnesium and chromium in the rock. The dominant species that can be found on these barrens are black jack oak, post oak, pitch pine, green briar, and a myriad of warm season grasses. These species grow amongst many rare grasses and forbs that exclusively grow on these serpentine barren sites. There are also many species of wildlife that are dependent to the barrens sites that are nationally and globally rare. These barrens have a unique relationship with fire in that most of the plant species rely on repeated intervals of fire for them to propagate and survive. The sizes of these sites have been shrinking steadily since the early 1900's when wildfires started being suppressed and allowed the encroachment of non-barrens trees species.

Because of the unique characteristics of the serpentine barrens, the land is primarily used for recreation such as hiking, hunting, and biking. Along with state forest personnel, volunteers with the Friends of the State Line Serpentine Barrens help construct and maintain hiking trails throughout the barrens.

Priority Goals

- a) Maintain, restore, and promote grasslands for restoration.
- b) Monitor and protect known rare, threatened, and endangered species of all types.
- c) Restore the natural diversity of serpentine species, vegetation structure, patch variation, and community types.
- d) Control and try to manage invasive species particularly Japanese stilt grass, ailanthus, poison hemlock, and southern pine beetle.
- e) Partner with the Audubon society to improve monitoring of avian use.
- f) Maintain and improve the recreational opportunities within this LMU, such as the Rose Trail.
- g) Develop interpretive materials for the mining history and geology.
- h) Identify and acquire key tracts of land to add SFL to the Goat Hills LMU.

- i) Promote and utilize with the State Line Serpentine Barrens Friends group to assist in meeting management goals.
- j) Implement outreach programs to educate local government officials, landowners, and the public on the importance, management needs, land protection, and stewardship options for Goat Hill along with encouraging public use of Goat Hill.
- k) Promote research for the serpentine barren's ecosystem.

Profile

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

	Acres
State Forest Land	603
LMU Total	1882

Ecoregion: Piedmont Upland

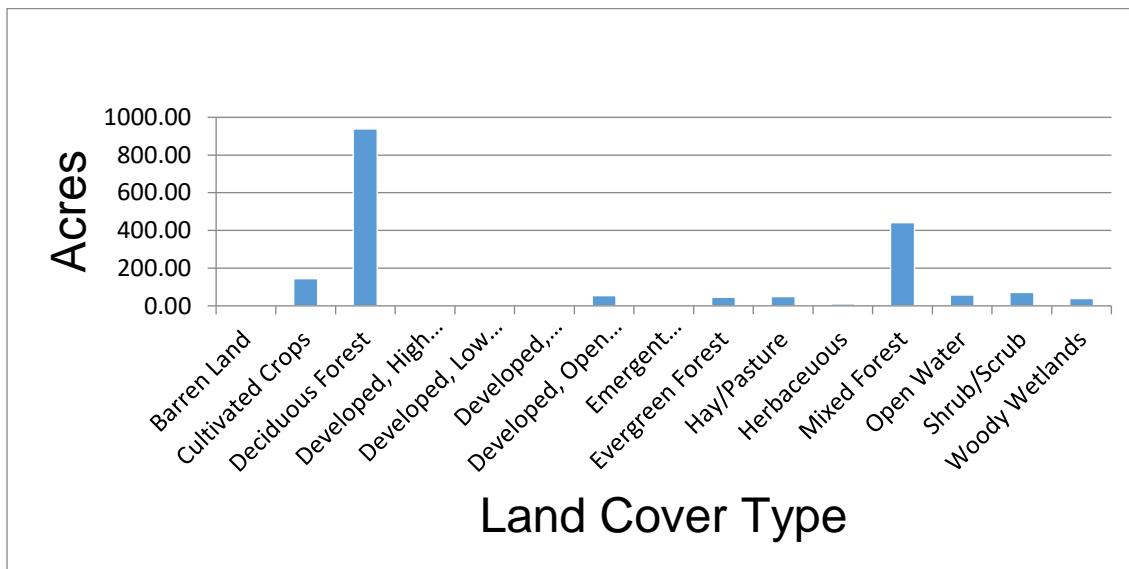


Figure 1. LMU acreage by land cover categories from the National Land Cover Dataset for the entire LMU.

The majority of the cover is deciduous forest. The mixed forest refers to the areas with high components of pitch pine and red cedar, indicators of the serpentine ecosystem.

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	1
Z3 - Administrative Road	1
Total	1

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	2
Biking	0
Equestrian	0
X-Skiing	0
ATV I	0
ATV II	0
Snowmobile/ Joint Use Road	0

The Rose Trail is the main loop trail blazed in yellow.

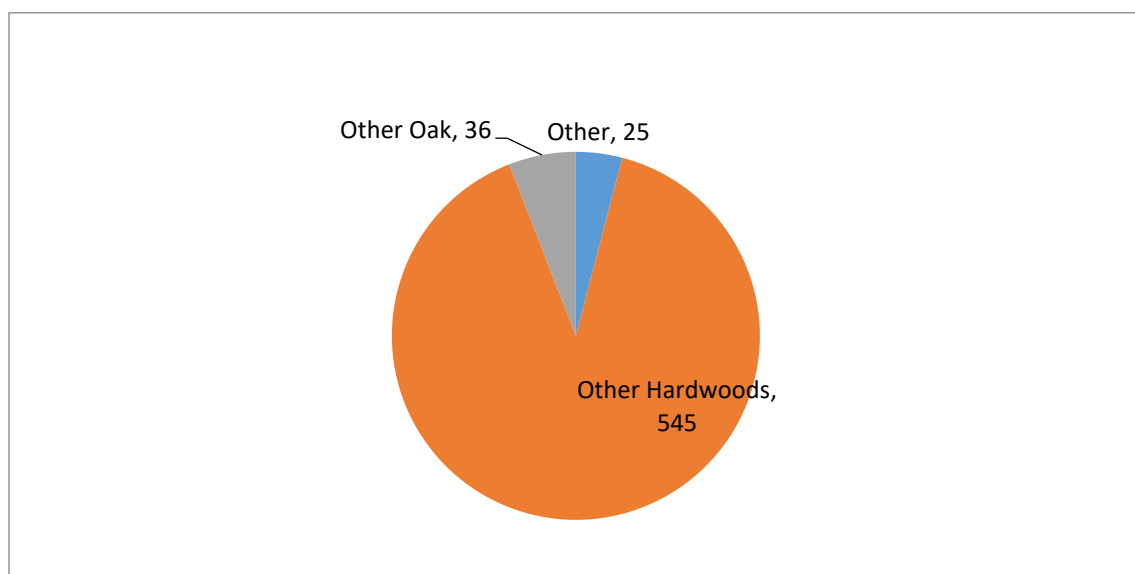


Figure 2. Acreage of state forest land in this LMU by aggregated forest type. The forest types are described on p. 108 of the 2016 SFRMP.

Other oak refers to stands dominated by southern red oak. Other is mostly herbaceous openings. Other hardwoods are a pitch pine- hardwood (post oak, red maple, sassafras) forest supported by the serpentine ecosystem.

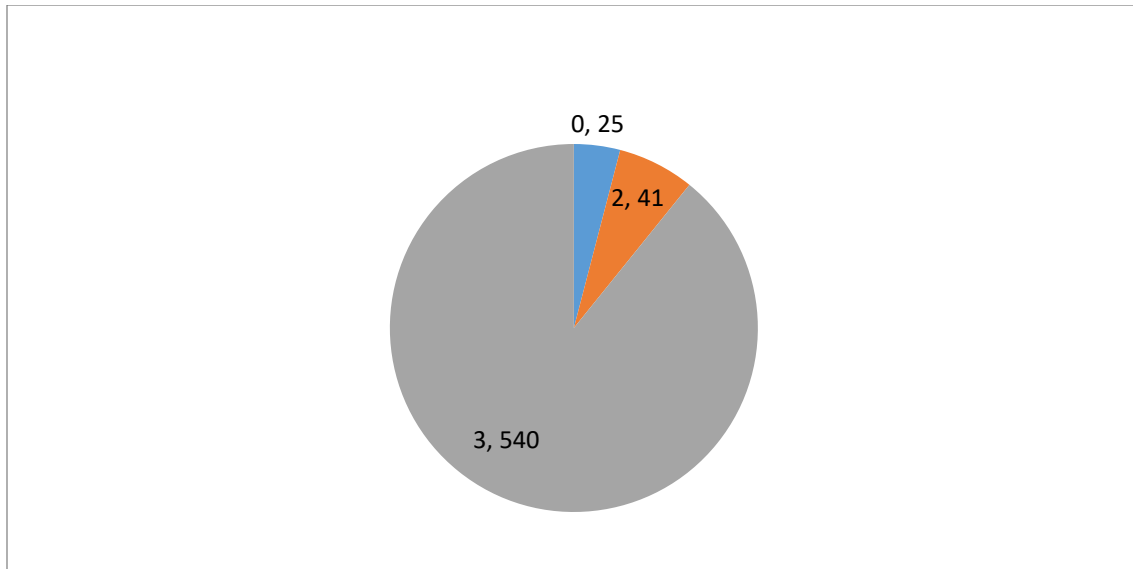


Figure 3. Acreage of state forest land in this LMU by site class. Site classes denote the potential quality of the growing site. “Site 0” indicates non-forested lands or forested lands where the vegetation has not yet been typed. Other site classes are described on p. 53 of 2016 SFRMP. The serpentine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

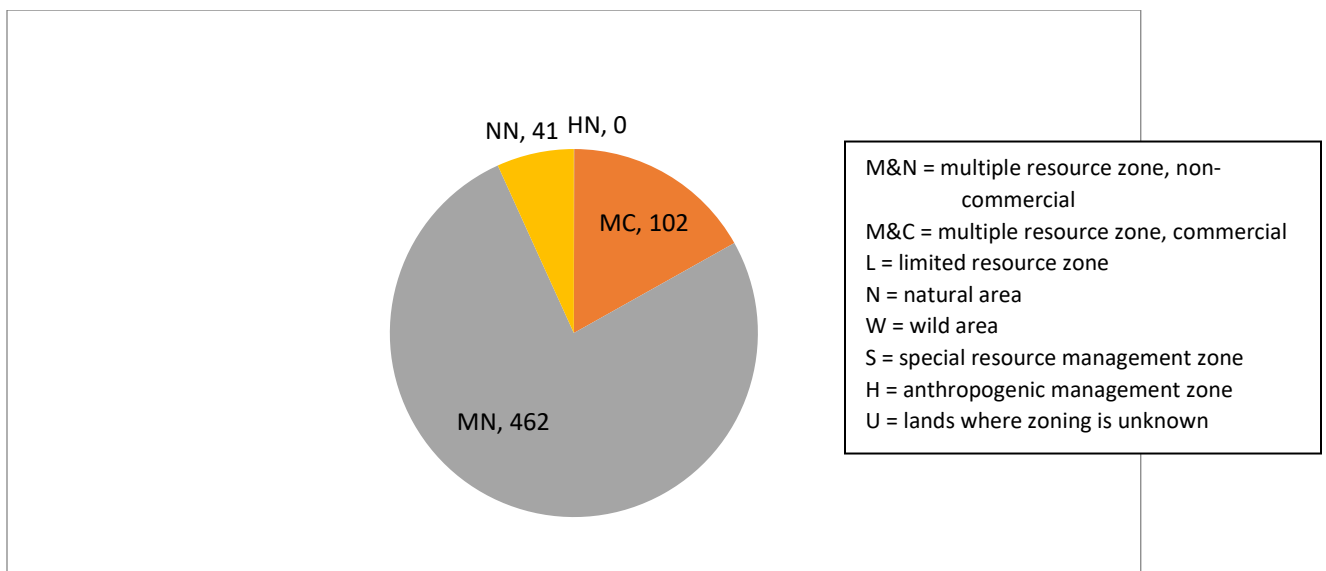


Figure 4. Acreage of state forest land in this LMU by management zone. Management zone is dictated by primary land use and land capability. Further descriptions of commerciality and zoning are found on p. 54 of the 2016 SFRMP.

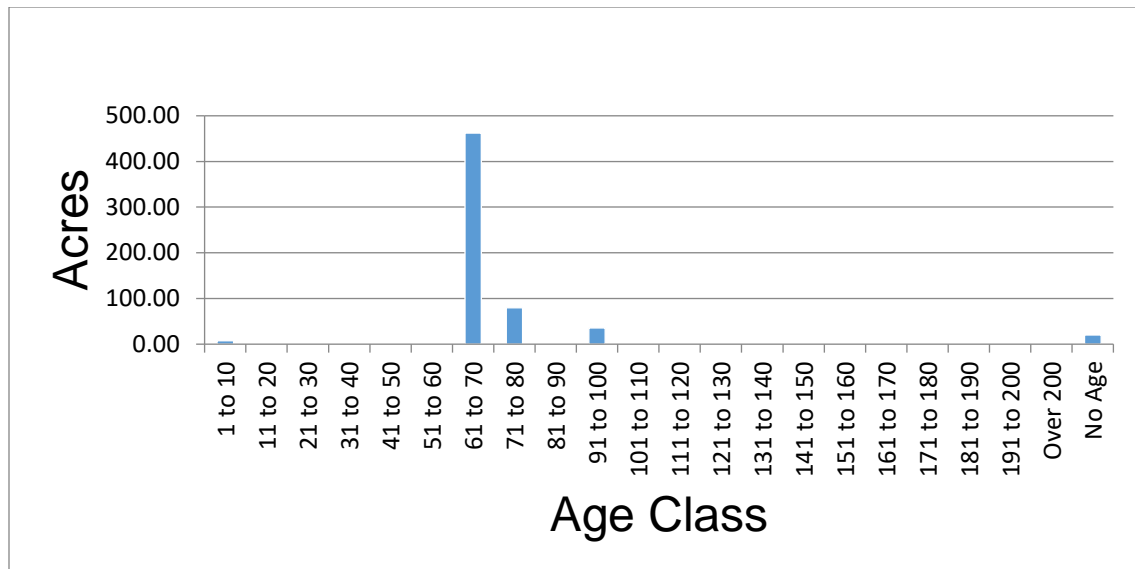


Figure 5. Acres of state forest land in this LMU by forest age classes.

Typically forests in this region are even age. The new tracts of SFL tend to be two aged. This is due to heavy cutting while under previous private ownership. Residual trees from those harvests now create the dominant overstory trees which average 100-120 years old. Regeneration and stump sprouts from those harvest are creating the new stand of trees. Average age for the younger trees are 25-40 years.

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)
Undesignated	1
Exceptional Value Waters	2
Scenic Rivers	6
Total	9

The Octoraro Creek is designated a scenic river.

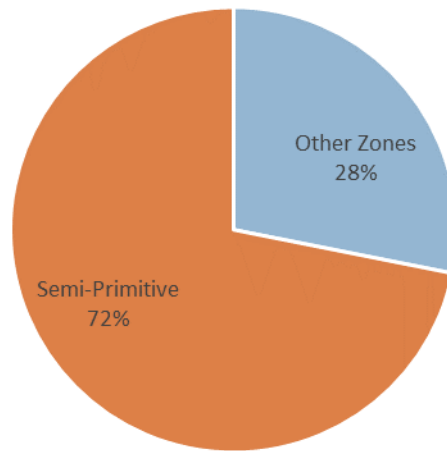
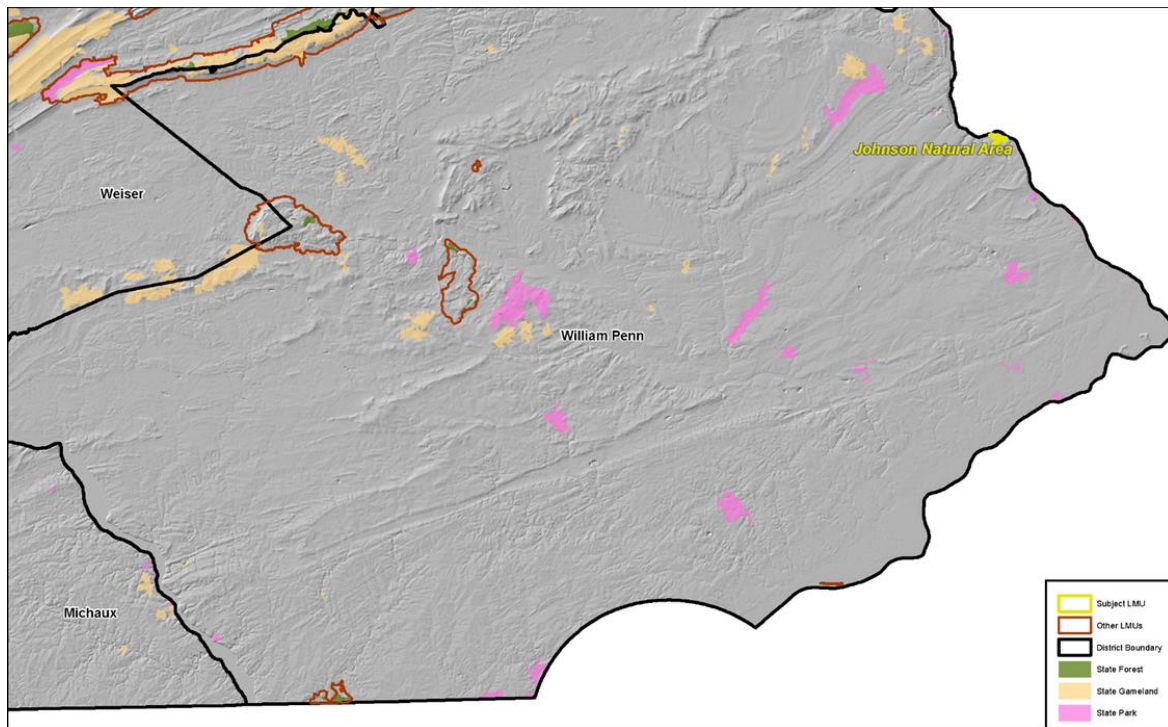


Figure 6. Acres of state forest land in this LMU by Recreation Opportunity Spectrum (ROS) classifications. ROS is an inventory system developed by the U.S. Forest Service, to characterize land by types of recreation experiences. ROS is described on p. 42 of the 2016 SFRMP. “Other Zones” refers to Semi-Developed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

Johnson Natural Area



Johnson Natural Area LMU



Overview

Located near New Hope, Pennsylvania in eastern Bucks County, this hidden gem is around twenty miles north of Philadelphia and fifteen miles northwest of where Pennsylvania meets New Jersey near Trenton.

Nestled amongst farmland, pastures, and the ever growing urban and residential areas is Pennsylvania DCNR's Johnson Tract. Unique in that not only does it encompass state forest land, but it also borders Delaware Canal State Park along the Delaware River, and is also a designated natural area named after its former owner David R. Johnson.

This fifty-six-acre wooded area is home to Laurel Run, a slow meandering stream that delineates the Johnson Tract before it drains into the Delaware River about half a mile to the east. Given the unique location of the natural area and its saturated ground, rich soils give way to a wide variety of tree species such as American beech; ash, sugar maple, and tulip poplar. These tree species are commonly found in northern Pennsylvania as compared to the southeastern corner of the state giving visitors a unique experience in their own backyard.

Priority Goals

- a) Continue ash treatments and maintain as a high priority.
- b) Create a public access point.
- c) Cooperate with Solebury public officials and Delaware Canal State Park managers to monitor and create more recreational use.
- d) Develop and implement an invasives management plan for habitat restoration.

Profile

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

	Acres
State Forest Land	56
LMU Total	253

Ecoregion: Gettysburg-Newark Lowland

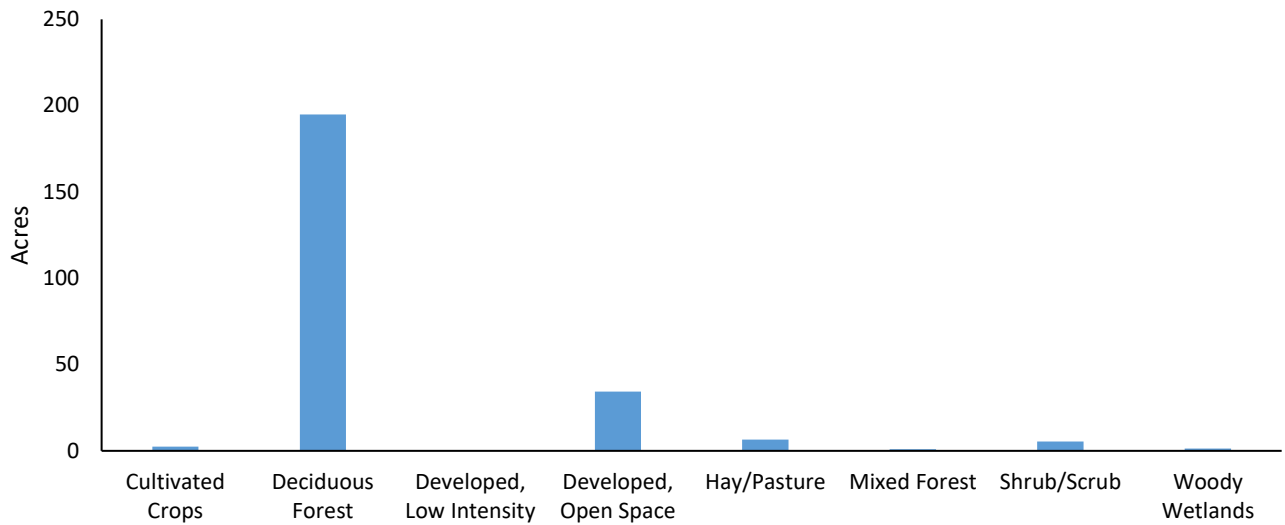


Figure 1. LMU acreage by land cover categories from the National Land Cover Dataset for the entire LMU.

The majority of land cover is deciduous forest.

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	1
Total	1

Laurel road bisects the Johnson tract.

Table 3. Miles of trails on state forest land in this LMU open to various types of recreational use.

At this time, there are no formal trails in this natural area.

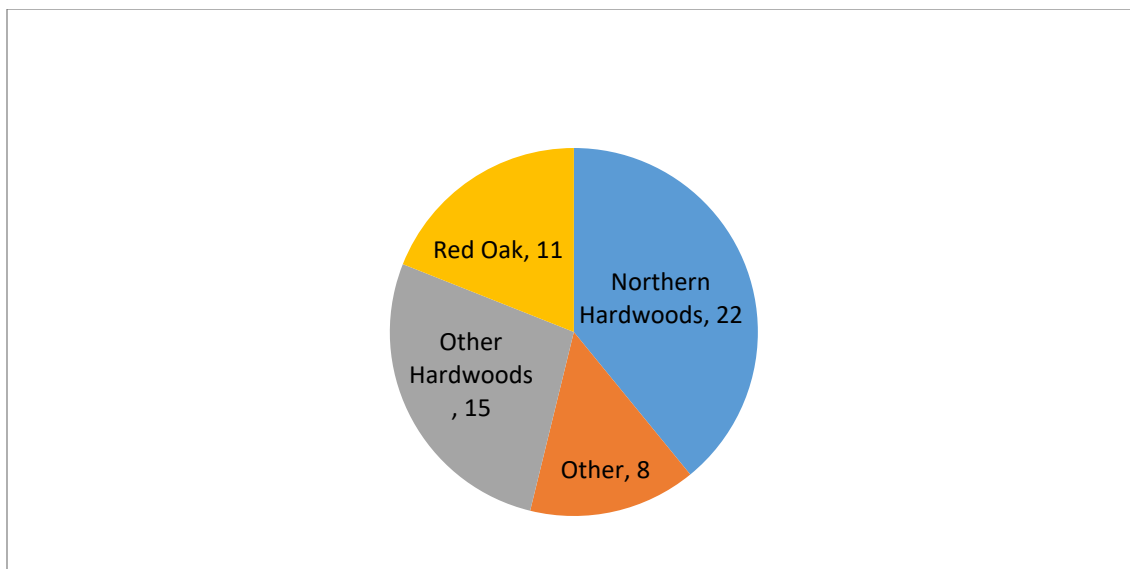


Figure 2. Acreage of state forest land in this LMU by aggregated forest type. The forest types are described on p. 108 of the 2016 SFRMP

One of the unique characteristics of this site is the northern hardwoods, which are not typically found in this region.

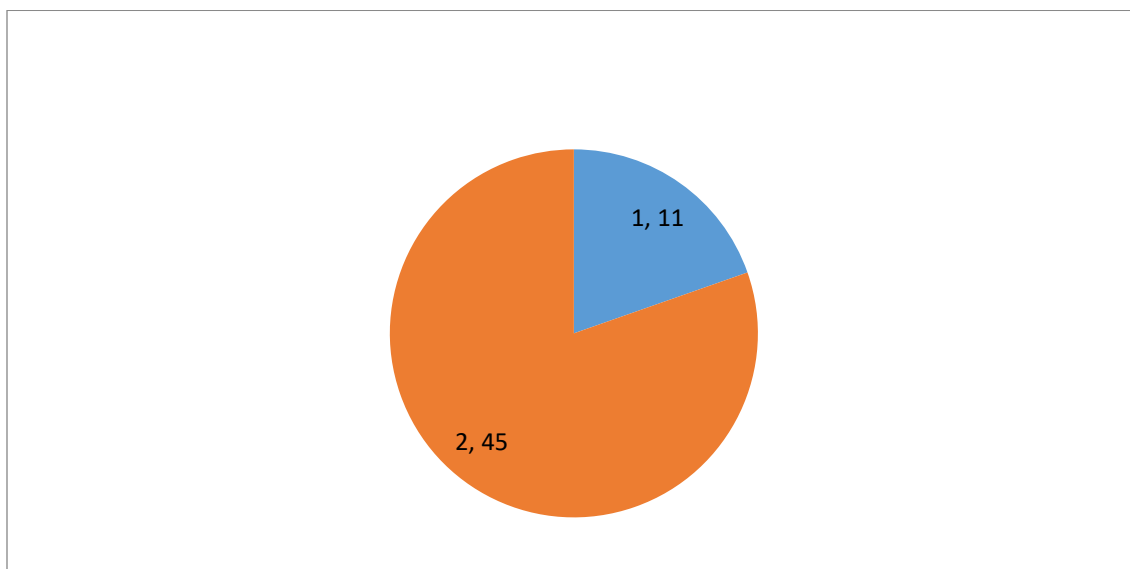


Figure 3. Acreage of state forest land in this LMU by site class. Site classes denote the potential quality of the growing site. “Site 0” indicates non-forested lands or forested lands where the vegetation has not yet been typed. Other site classes are described on p. 53 of 2016 SFRMP.

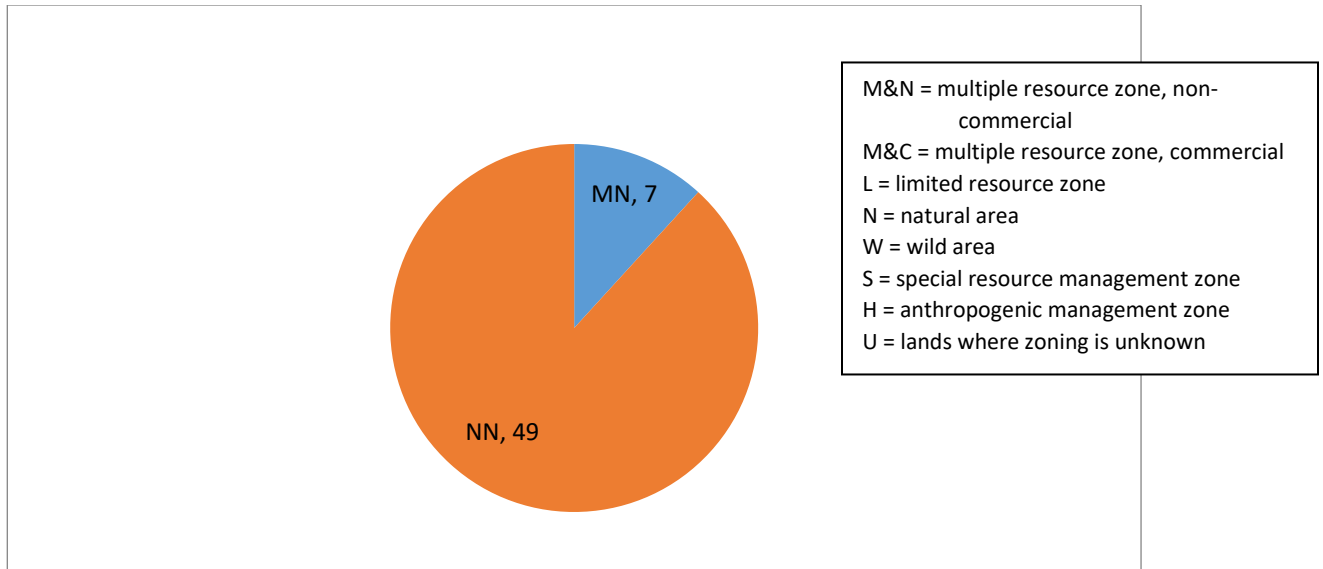


Figure 4. Acreage of state forest land in this LMU by management zone. Management zone is dictated by primary land use and land capability. Further descriptions of commerciality and zoning are found on p. 54 of the 2016 SFRMP.

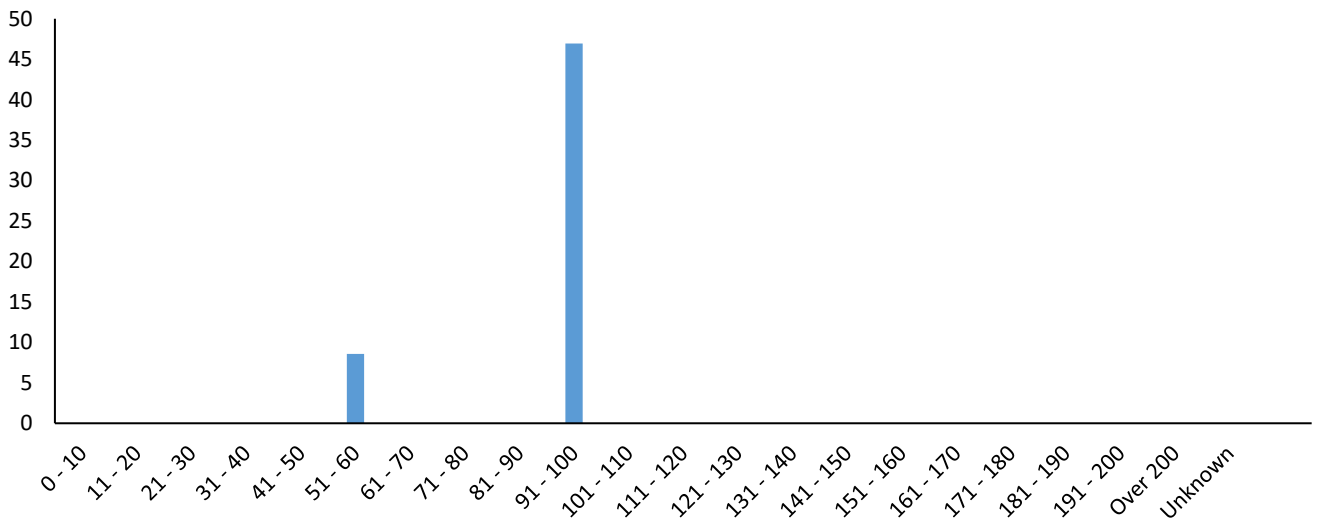


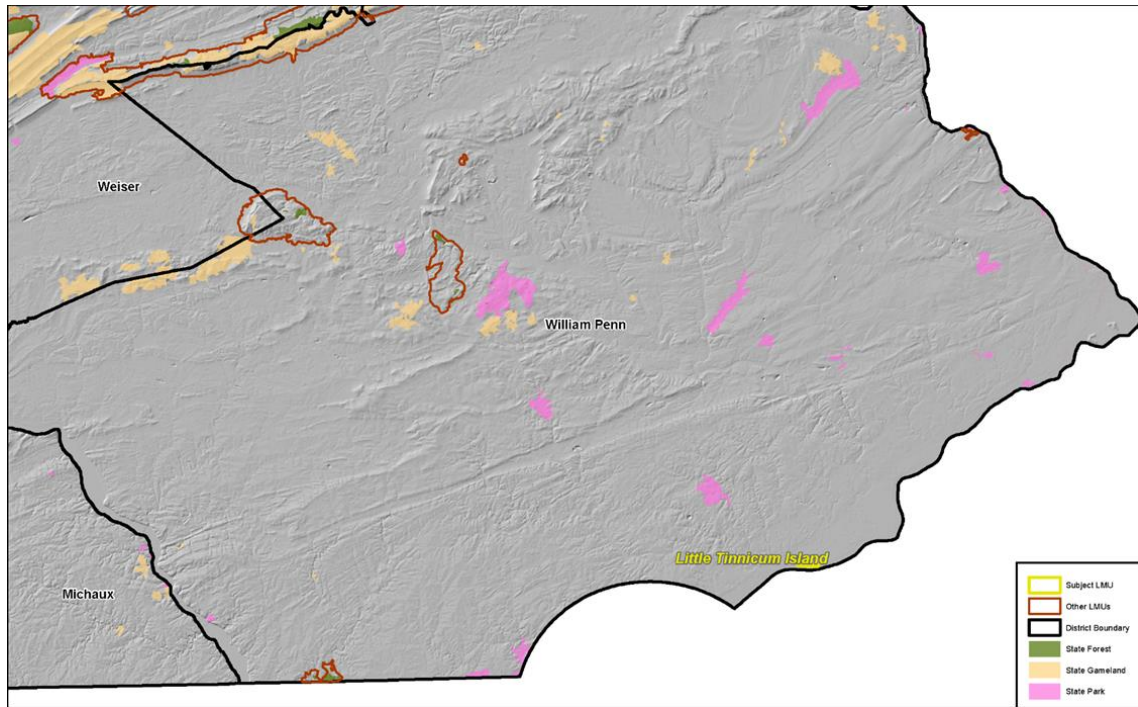
Figure 5. Acres of state forest land in this LMU by forest age classes.

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)
Undesignated	2
Total	2

Laurel Run is a tributary to the Delaware River.

Little Tinicum Island Natural Area



Little Tinicum Island LMU



Overview

Little Tinicum Island Natural Area is approximately 130 acres at high tide. Surrounded by urban development, the island is just 12 miles downstream from center city Philadelphia, 1 mile downstream from the Philadelphia International Airport, and less than 1 mile downstream from an oil refinery on the New Jersey side of the Delaware River.

It was formed 8,000 to 10,000 years ago when the Delaware River became a tidal estuary from the rising level of the Atlantic Ocean. The island was part of a deltaic marsh that extended along the river bed. Thousands of years later the marsh transformed into a chain of sandy marsh surrounded islands. Dikes were built on the island to raise crops and livestock before the American Revolution. From 1800 to 1870 the island was used as a boarding station by doctors to examine immigrants on boats anchored nearby. The dikes that are currently on the island were built by the Army Corps of Engineers to hold river sediments in order to deepen the channel. The land was purchased in 1982 using Coastal Energy Impact Funds and acquired by the Commonwealth because of the unique species it supports. It was deemed a natural area to be left undisturbed to allow natural succession to occur.

Active management options are limited in this LMU due to only having access by boat. Invasive species encroaching on the perimeter of the island have led to the deterioration of native plant and animal habitats. The flow of the river is continually building, eroding, and moving the island, which creates a unique habitat as new sand and mud flats are exposed while others erode away. A host of sensitive species, both plant and animal, are found on Little Tinicum Island. Efforts are being made to remove invasive species and promote native regeneration. Work with jurisdictional agencies and the PA Natural Heritage Program to develop a program to monitor state-listed wildlife and plant populations on Tinicum Island on a regular periodic basis (i.e., attempt to monitor all species once every 5-8 years).

Priority Goals

- a) Work with jurisdictional agencies and the PA Natural Heritage Program to develop a program to monitor state-listed wildlife and plant populations.
- b) Develop a vegetative management plan.
- c) Conduct management of high-threat invasive plants such as Phragmites, Japanese knotweed and Japanese Angelica Tree to better protect the tidal mudflat habitats as well as the interior river island forest.
- d) Work with TNC to develop a friend's group.
- e) Promote habitat for nesting birds, such as: ospreys, eagles, other shore birds.
- f) Promote legal recreational opportunities.
- g) Continue to organize trash cleanups with partnering organizations.
- h) Work with local officials and government agencies for access and cooperative management opportunities.
- i) Monitor the effects of the airport expansion and revisit the removal of the 1959 dredging pipes.
- j) Partner with Tinicum township to promote river access and recreation.

Profile

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

	Acres
State Forest Land	80
LMU Total	2345

Ecoregion: Deep Valleys

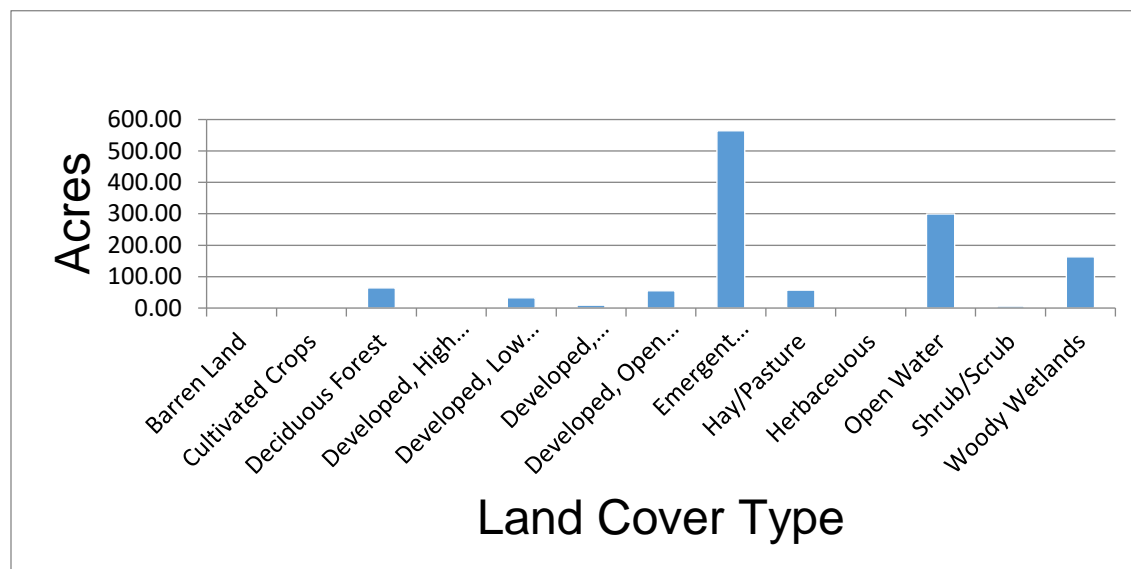


Figure 1. LMU acreage by land cover categories from the National Land Cover Dataset for the entire LMU.

This LMU captures the Little Tinicum Island and the John Heinz National Wildlife Refuge.

Table 2. 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	1

There is a trail posted and blazed on the berm on the upstream side of the island.

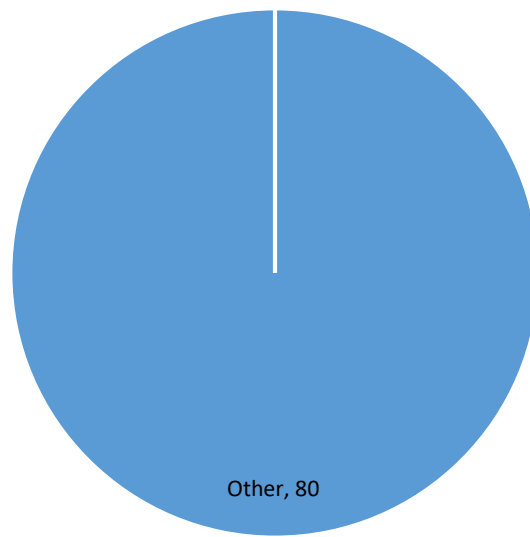


Figure 2. Acreage of state forest land in this LMU by aggregated forest type. The forest types are described on p. 108 of the 2016 SFRMP.

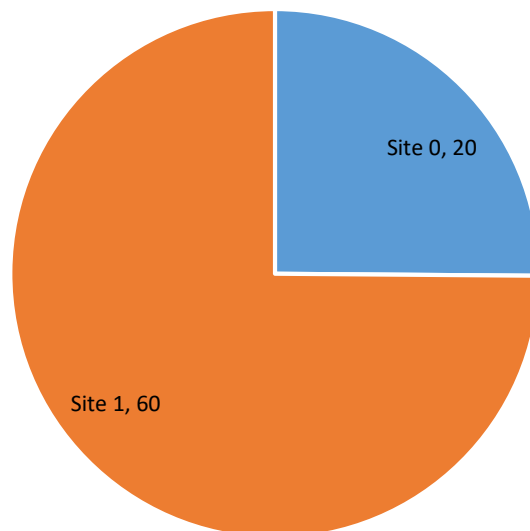


Figure 3. Acreage of state forest land in this LMU by site class. Site classes denote the potential quality of the growing site. “Site 0” indicates non-forested lands or forested lands where the vegetation has not yet been typed. Other site classes are described on p. 53 of 2016 SFRMP.

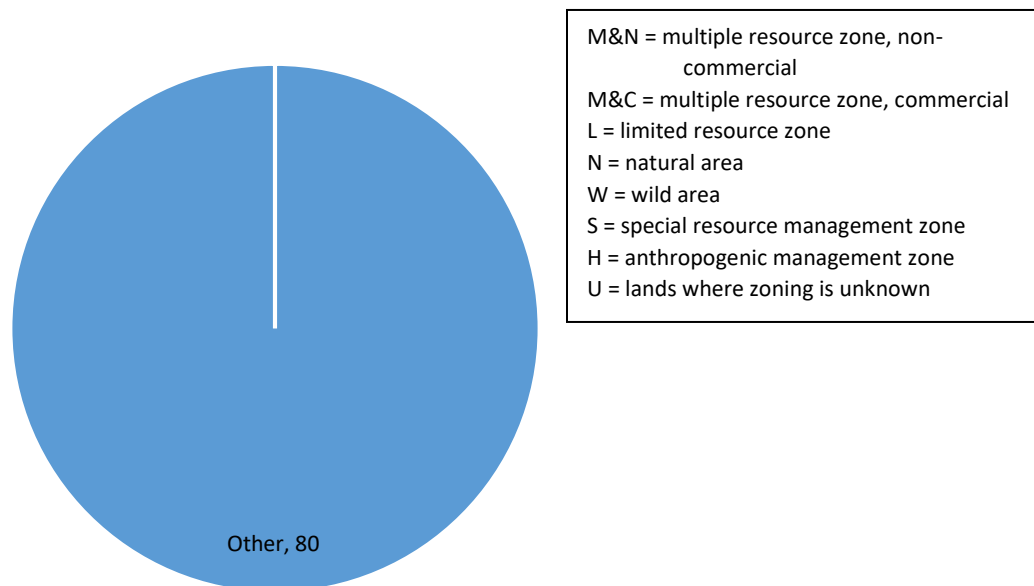


Figure 4. Acreage of state forest land in this LMU by management zone. Management zone is dictated by primary land use and land capability. Further descriptions of commerciality and zoning are found on p. 54 of the 2016 SFRMP.

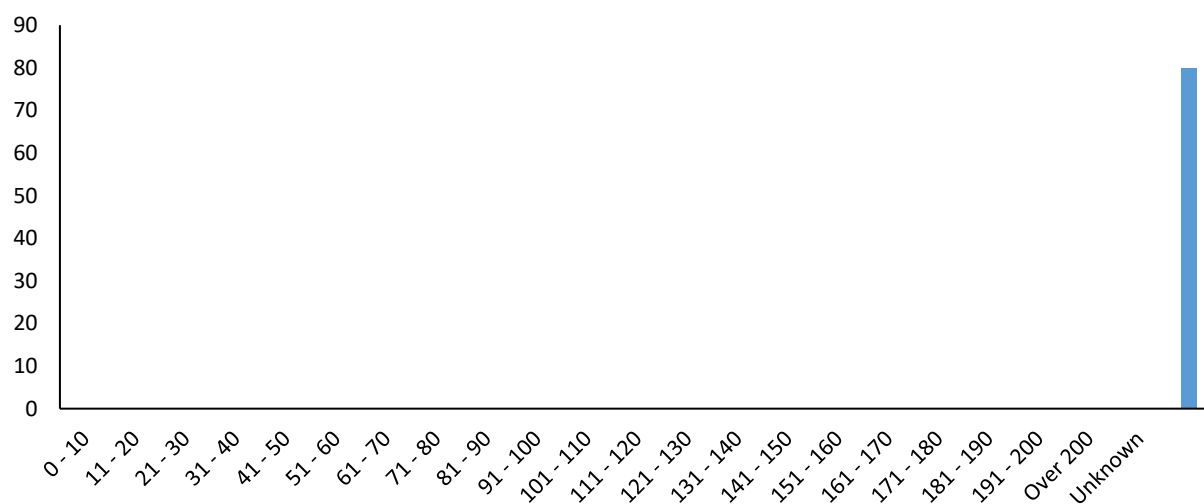


Figure 5. Acres of state forest land in this LMU by forest age classes.

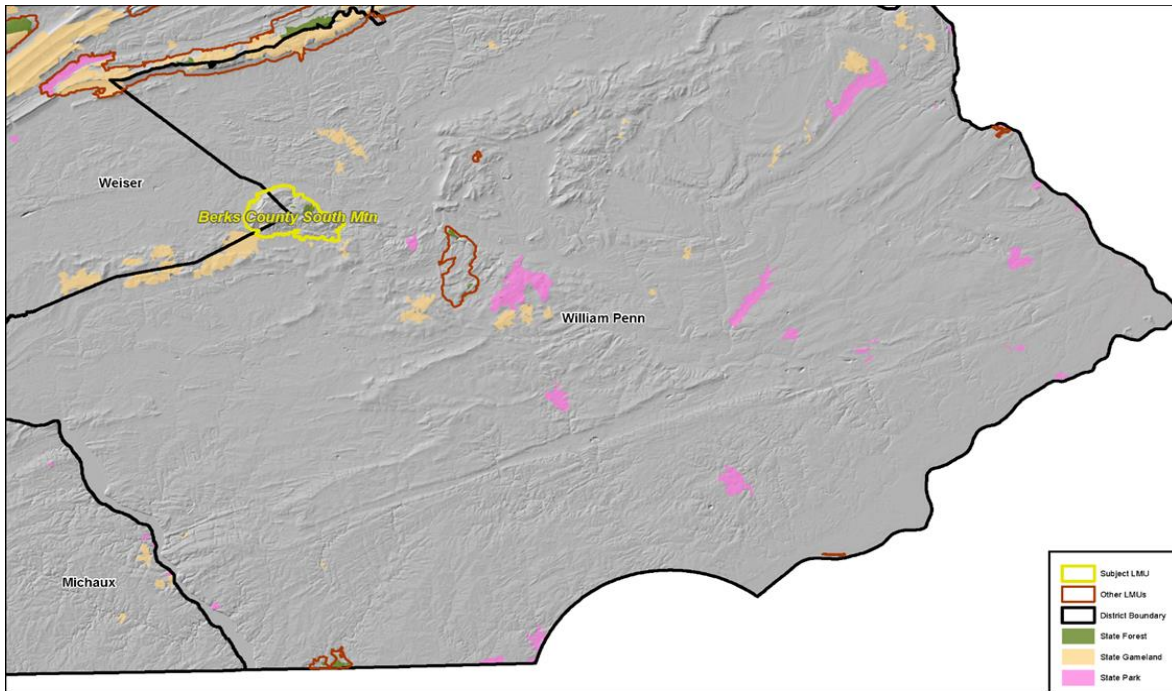
Age distribution is typically young, as the island is constantly changing. Due to previous dredging activities, some of the oldest trees are 50-60 years old.

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
Exceptional Value	0
High Quality	0
Perennial Cold Water	0
Warm Water Stream	0
Total	0

The island is located in the Delaware River. The Darby Creek is a large drainage from Delaware County that discharges into the river, just downstream of the island.

Berks South Mountain



Berks County South Mountain LMU



Overview

The Berks South Mountain LMU is approximately 17,000 acres in the region where Berks, Lancaster, and Lebanon Counties meet. The George W. Wertz Tract, one of the latest additions (2015) to the William Penn State Forest is located here, in addition to a small tract of State Game Lands. While there are mixed land uses, including agriculture and residential development, the forest cover is diverse, with the majority of the forests comprised of tulip poplar and oaks. Previous pasturing and farming on mountain ground have resulted in tulip poplar monocultures in some areas. Historically, this area supplied timber and charcoal to 3 large iron furnaces (Cornwall, Robesonia, and Berkshire). Resources such as timber, charcoal, and agricultural products from this area were an early target, as it was located near one of the first main rail lines in PA (from Reading to Harrisburg). After the logging of the 19th century, the area gave rise to many mountain resorts and a state hospital. After the era of resorts came to a close in the 1960's, larger properties became subdivided and subsequent residential development took place.

Timber is still actively managed throughout the landscape, albeit with unsustainable practices on many private land projects. This land is now home to at least 4 municipal water authority properties. The new Wertz Tract of the William Penn State Forest is home to one of the largest known populations of a Proposed PA plant species. Emerald ash borer was detected in western Pennsylvania in 2007. Berks county received its first positive detection in 2014. A large component of the District's ash management plan to save more than 200 trees is being implemented adjacent to Hospital Creek. The goal is to preserve at least 70 trees along the native trout stream for future seed after the emerald ash borer moves through.

Priority Goals

- a) Develop interpretive historically significant features of the landscape.
- b) Develop a recreation plan that includes picnic sites, trails, campsites and access points.
- c) Acquire adjacent and nearby lands to build on existing state forest land.
- d) Continue to treat ash and maintain as a high priority.
- e) Attempt to manage and control invasives for habitat restoration in particular: angelica tree, ailanthus, mile-a-minute, spotted lantern fly, and stilt grass.
- f) Focus timber management activity on transitioning ash salvage to a new species composition.
- g) Continue to develop a relationship with adjacent landowners and local municipalities.
- h) Protect and manage habitat for threatened and endangered species.

Profile

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

	Acres
State Forest Land	433
LMU Total	17091

Ecoregion: Reading Prong

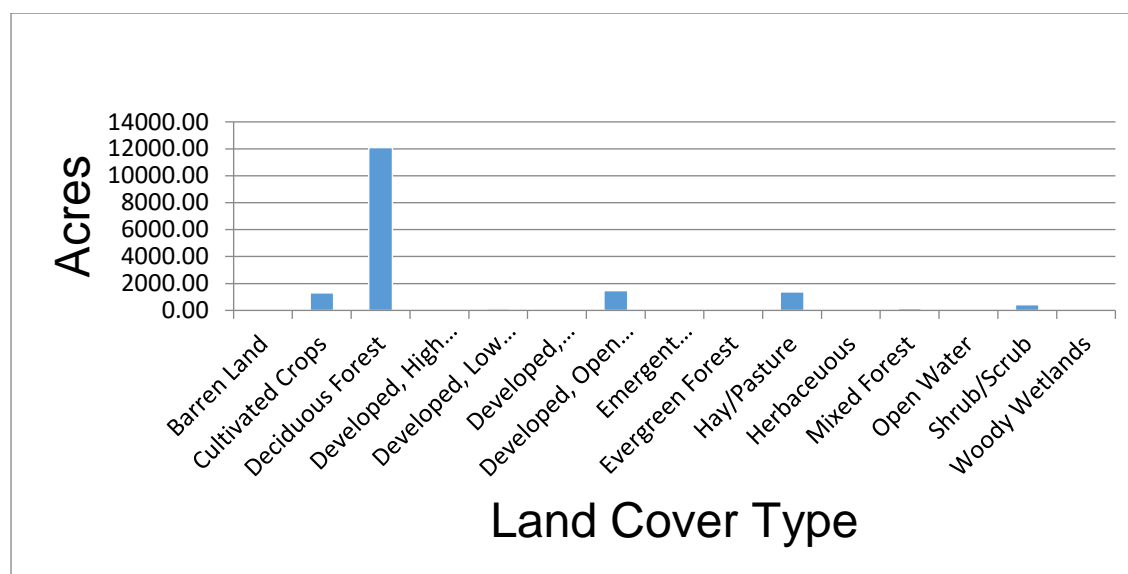


Figure 1. LMU acreage by land cover categories from the National Land Cover Dataset for the entire LMU.

The dominant land cover is deciduous forest with a small component of agricultural and developed space.

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.

Row Labels	Sum of Miles
Z1	3
Grand Total	3

Sportsman Road bisects the Wertz tract.

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	0.7
Biking	0.0

Equestrian	0.0
X-Skiing	0.7

A trail system is in the planning stage to connect remote areas of the tract.

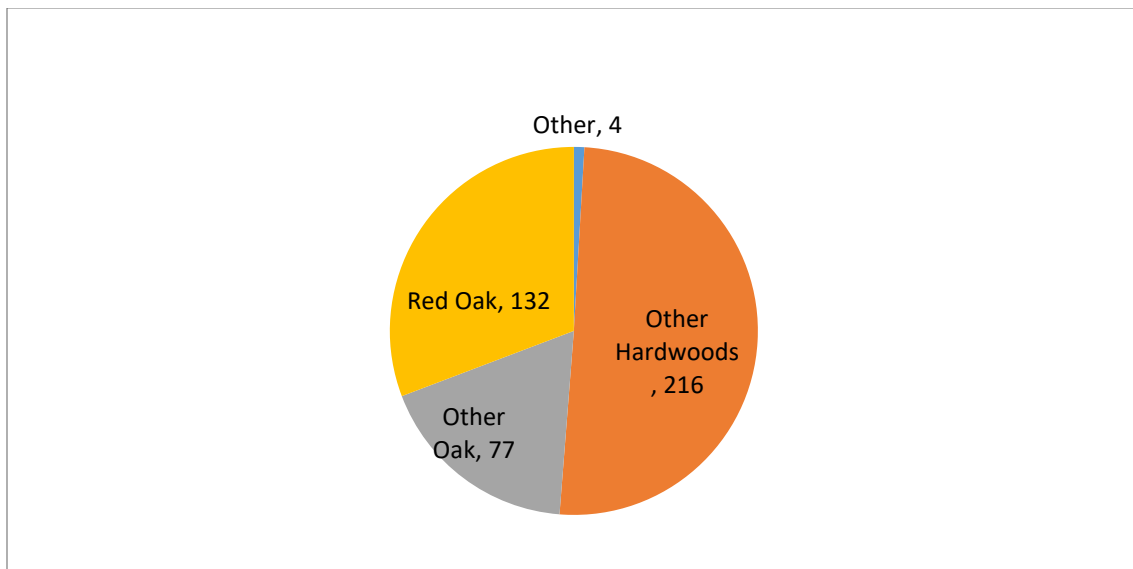


Figure 2. Acreage of state forest land in this LMU by aggregated forest type. The forest types are described on p. 108 of the 2016 SFRMP.

Other hardwoods in this case refers to stands dominated by tulip-poplar.

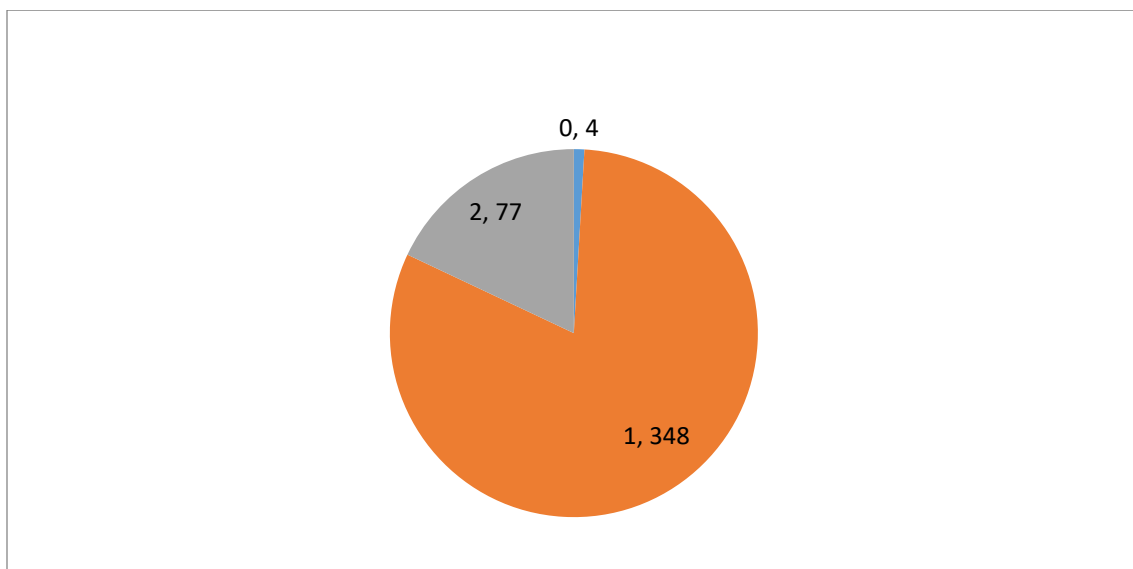


Figure 3. Acreage of state forest land in this LMU by site class. Site classes denote the potential quality of the growing site. “Site 0” indicates non-forested lands or forested lands where the vegetation has not yet been typed. Other site classes are described on p. 53 of 2016 SFRMP.

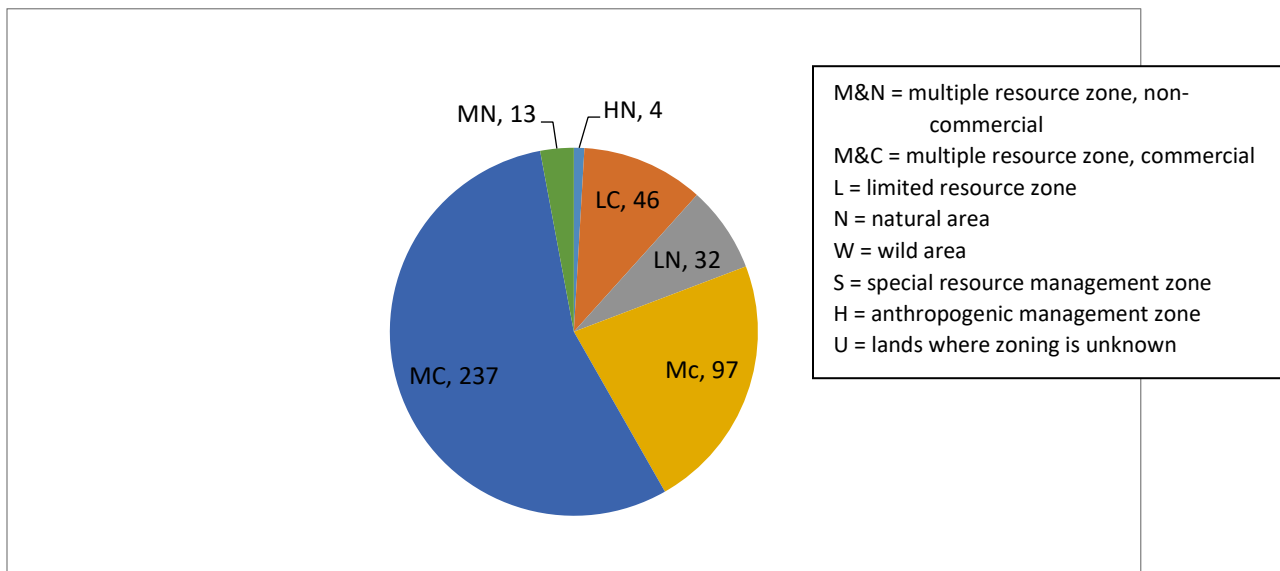


Figure 4. Acreage of state forest land in this LMU by management zone. Management zone is dictated by primary land use and land capability. Further descriptions of commerciality and zoning are found on p. 54 of the 2016 SFRMP.

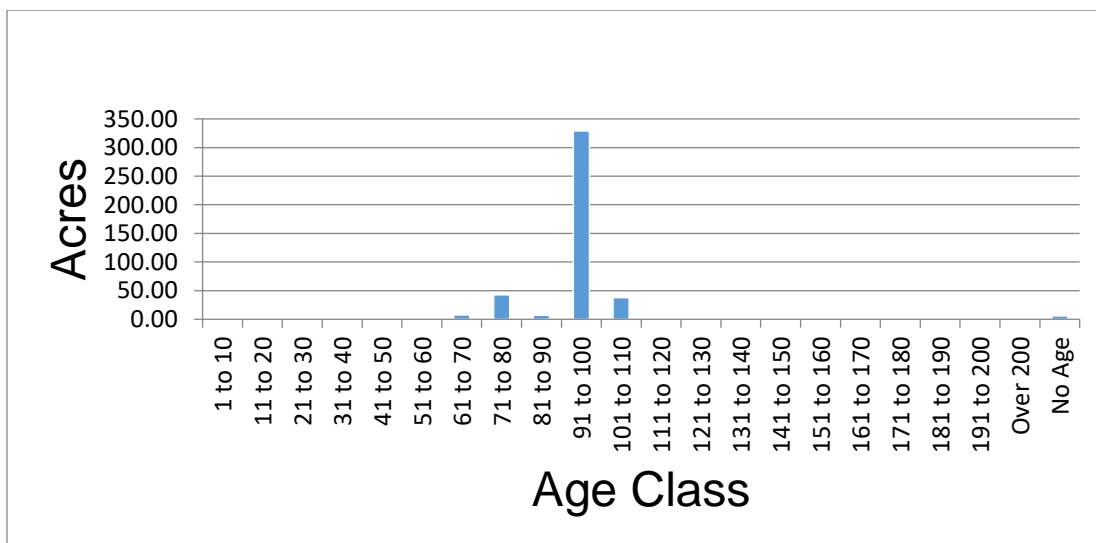


Figure 5. Acres of state forest land in this LMU by forest age classes.

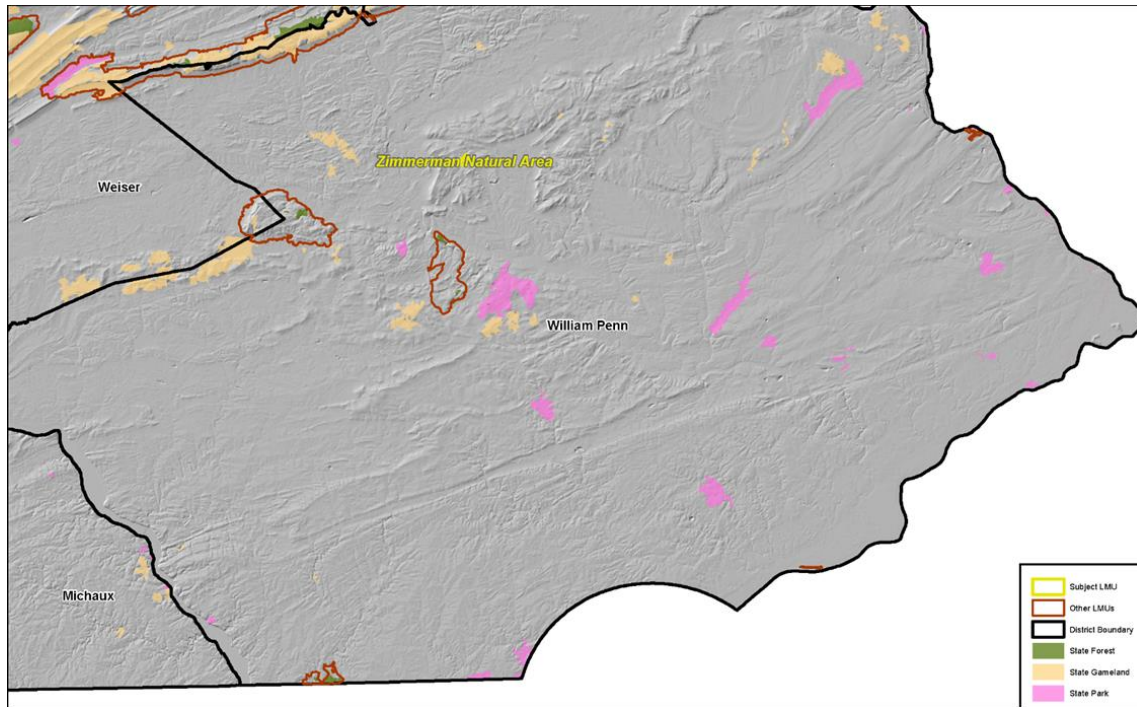
The age class distribution is primarily even aged. The younger stands were in some form of agriculture pre-World War II.

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)
Undesignated	16
High Quality Waters	9
Perennial Cold-Water Streams	1
Total	26

Hospital Creek is a high-quality stream on the Wertz Tract.

Zimmerman Natural Area



Zimmerman Natural Area LMU



Overview

The Ruth R. Zimmerman LMU is approximately 215 acres of forested wetland located in Alsace Township, Central Berks County. Within this diverse mature forest ecosystem LMU there are limited land uses, both private and state forested lands. The outlying areas bordering the unit consist of agricultural lands and residential development. In 1989, the Valley Forge Forest District received a 33-acre forested wetland tract of land as a gift from Ruth Zimmerman. Ruth Zimmerman saw how the land around her was being developed and wanted to preserve her land for future generations. The tract was originally used as a pastureland for grazing. Wetlands and rock outcroppings made the land unsuitable for any other purpose. The tract was originally a composition of oak-hickory mix. Today the tract still consists of tulip poplar, hickory, and a mix of oaks. Most of the outlying areas surrounding the tract within the LMU consist of a similar forest type and have wetland soils. The Zimmerman tract has been designated a natural area, allowing nature to take its course without human intervention, with the exception of managing invasive plants. A large component of the district's ash management plan is also being implemented within the tract. The goal is to preserve ash trees for future seed after the emerald ash borer moves through.

Priority Goals

- a) Acquire adjacent properties that further protect endangered species.
- b) Continue to treat ash and maintain as a high priority.
- c) Continue to monitor and treat barberry, multi-flora rose, and other non-native invasive plants.
- d) Improve the access point.
- e) Protect from illegal dumping.

Profile

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

	Acres
State Forest Land	34
LMU Total	214

Ecoregion: Reading Prong

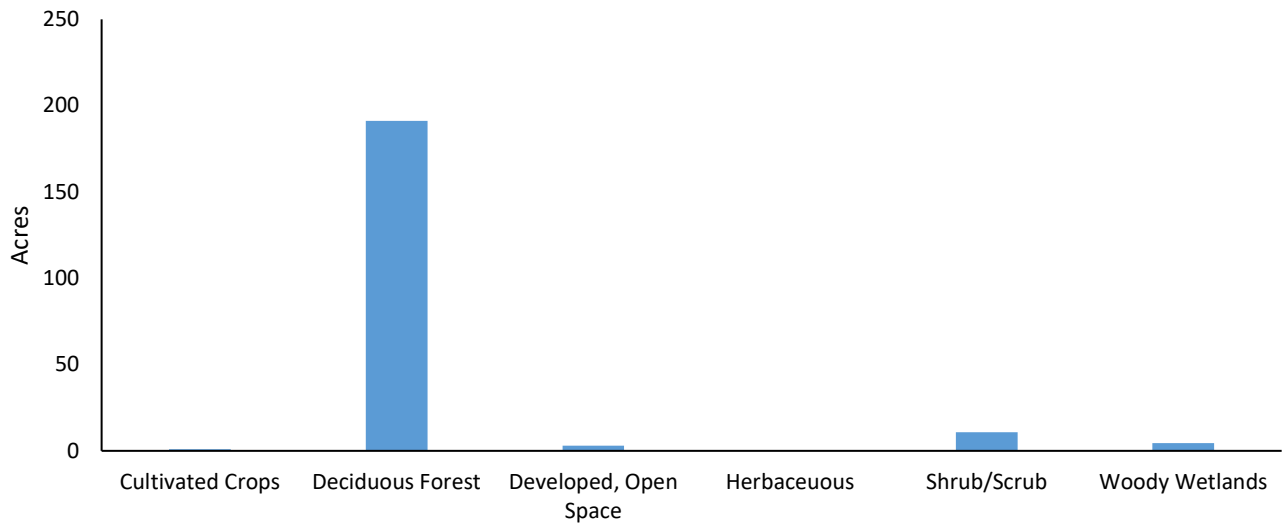


Figure 1. LMU acreage by land cover categories from the National Land Cover Dataset for the entire LMU.

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.

N/A. There are no roads on this tract.

Table 3. Miles of trails on state forest land in this LMU open to various types of recreational use.

There are no formal trails in this natural area.

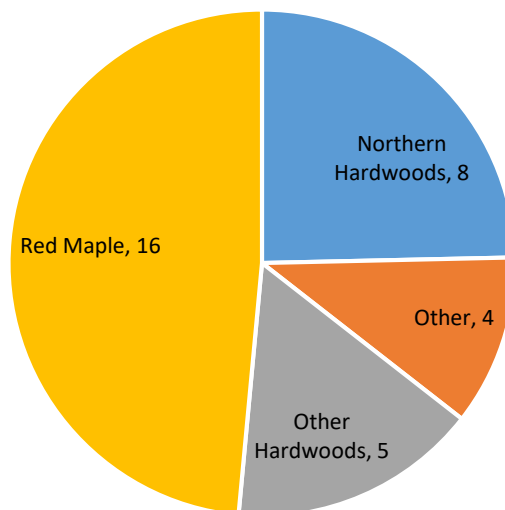


Figure 2. Acreage of state forest land in this LMU by aggregated forest type. The forest types are described on p. 108 of the 2016 SFRMP.

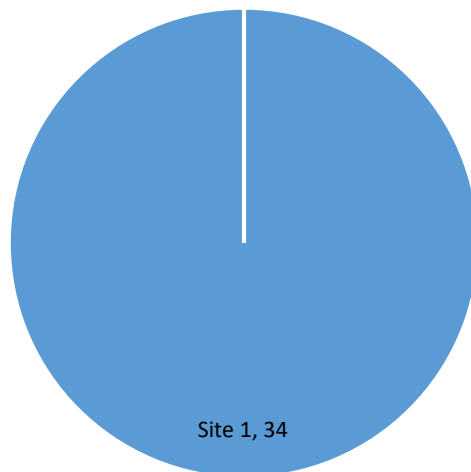


Figure 3. Acreage of state forest land in this LMU by site class. Site classes denote the potential quality of the growing site. "Site 0" indicates non-forested lands or forested lands where the vegetation has not yet been typed. Other site classes are described on p. 53 of 2016 SFRMP.

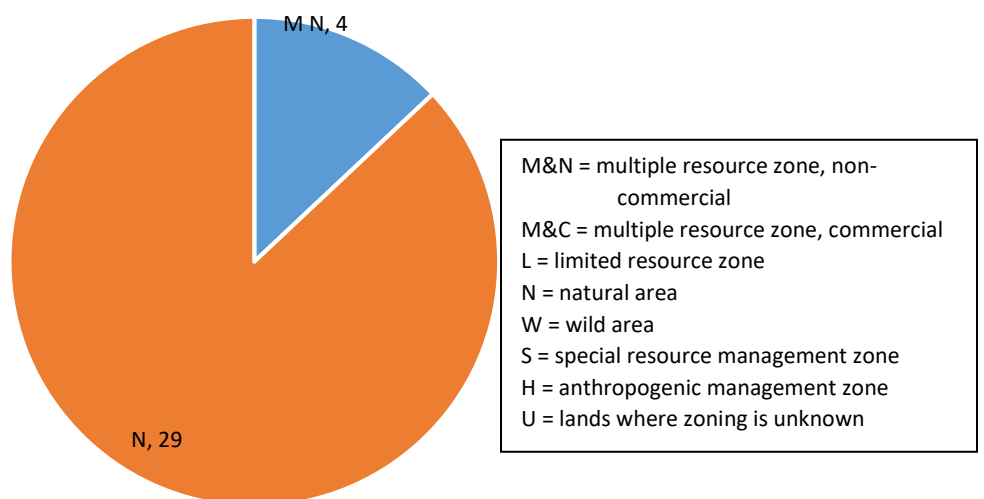


Figure 4. Acreage of state forest land in this LMU by management zone. Management zone is dictated by primary land use and land capability. Further descriptions of commerciality and zoning are found on p. 54 of the 2016 SFRMP.

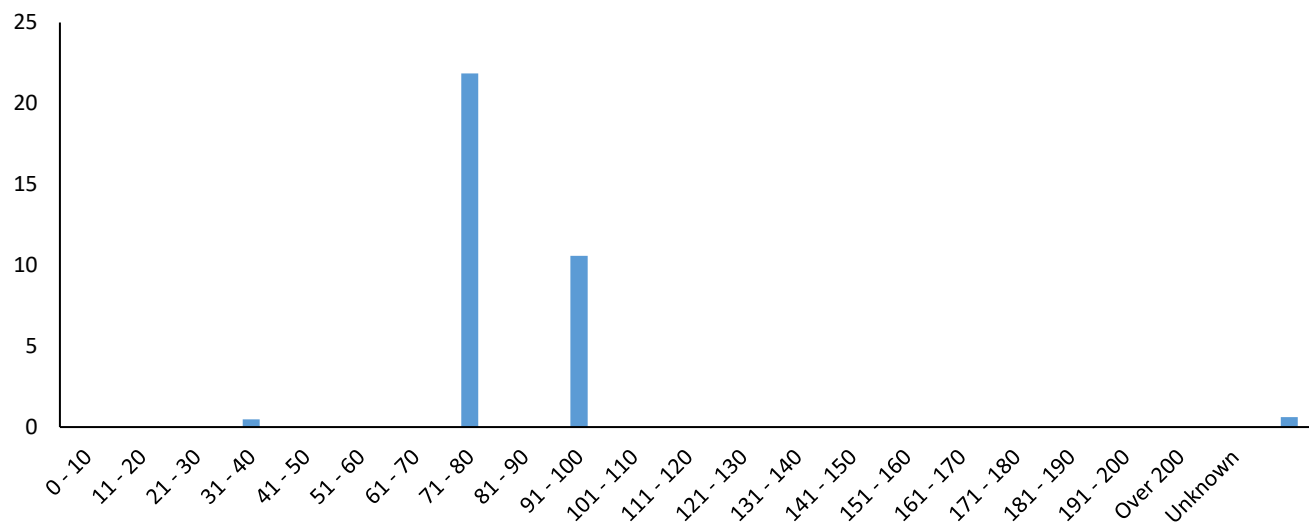


Figure 5. Acres of state forest land in this LMU by forest age classes.

The majority of this site was in agriculture production prior to 1940.

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)
Perennial Cold-Water Streams	0
Total	0

While not indicated, this area forms the headwaters of Antietam creek.

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 within 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.

Clearcut — 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 clearcuts, as with overstory removals on State Forest Lands, 10-20 square feet per acre of basal area must be reserved per acre. Clearcuts on State Forest Lands can be referred to as “clearcuts 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 clearcuts, 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 clearcut 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

William Penn State Forest Interpretive Goals:

- Encourage exploration and participation in low impact recreation within the William Penn State Forest.
- Create connections for sharing of information and resources between the state parks and forest to present a complete interpretive picture for residents, visitors, schools, and partners.
- Foster awareness for the value of natural, cultural, and historic resources within William Penn State Forest, for recreation and economic development.
- Promote stewardship to residents and visitors through development of opportunities to become engaged in conservation issues.
- Increase the public's knowledge of forestry and forest management practices.
- Increase volunteerism in the William Penn State Forest.
- Decrease vandalism to resources of natural, cultural, or historical value.