

**COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF  
CONSERVATION AND NATURAL RESOURCES BUREAU OF  
FORESTRY**

**INVENTORY MANUAL OF  
PROCEDURE FOR THE  
FOURTH  
STATE FOREST MANAGEMENT PLAN**

**PREPARED BY THE DIVISION OF FOREST ADVISORY SERVICES**

**With Assistance From**

**Forest Districts**

**Division of State Forest Management**

**Division of Forest Pest Management**

**Division of Forest Fire Protection**

**And**

**DCNR Ecosystem Management Advisory Committee**

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## INTRODUCTION

This Manual has been prepared to serve as a working guide for the inventory and subsequent management of State Forest lands. The inventory, which will serve as a basis for the revision of the State Forest Management Plans for the period of 2000-2014, consists of five phases:

- PHASE 1 - the delineation and classification of State Forests into various management zones and land classification units.
- PHASE 2 - the delineation of the Commonwealth into ecological units for inventory, planning and management.
- PHASE 3 - the measurement of primarily biological resources on inventory plots to provide specific data for State Forest management.
- PHASE 4 - the compilation of inventory information from other Bureau inventory efforts and external sources.
- PHASE 5 - the analysis of this information and modification of units (based on the analysis) in the development of State Forest Management Plans and future management decisions.

This inventory will be transitional in that the resources on State Forests will be inventoried continuously, based on ecological units, starting in the year 2001. The Bureau will use this inventory to collect basic information necessary to develop sound fourth-generation State Forest Management Plans and to test our data collection methods, analysis, and results in respect to newly developed ecological units. This information will be used to verify and/or refine our inventory procedures for the continuous forest inventory effort.

**PHASE ONE**  
**LAND CLASSIFICATION AND MANAGEMENT ZONING**

**INDEX**

	<u>PAGE</u>
PURPOSES	4
BASE MAPS / BASE COVERAGES	4
AERIAL PHOTOGRAPHS	5
PRINCIPLE POINTS / PHOTO EFFECTIVE AREAS	5
BOUNDARY INFORMATION / ADJACENT LAND USE	6
LAND CLASSIFICATION AND ZONING	7
DIGITAL MANAGEMENT MAPS / FILES	9
SUPRA MANAGEMENT AREAS	9
APPENDIX 1A - Management Zones	10
APPENDIX 1B -Land Classifications	15
APPENDIX 1C - Adjacent land Use	47
APPENDIX 1D - Sample photo delineation	48

**PHASE 1**  
**LAND CLASSIFICATION / MANAGEMENT ZONING**

**PURPOSES**

The purposes of land classification and management zoning of State Forest land are:

To provide up-to-date maps or spatial representations that reflect the management potential and land use capabilities of the State Forests, to show the locations of these classes, to provide a base for the historical record of management practices, and to assist current management analysis and decisions;

and

To stratify the forest into homogeneous units for a sound and efficient inventory.

The land classification and management zoning will be accomplished through a combination of reviewing existing maps, compartment files and digital base maps, aerial photo interpretation, and ground reconnaissance following the procedures outlined below.

**BASE MAPS / BASE COVERAGES**

Each District will be supplied with base maps or coverages at a scale of 1:15840 or 1 inch = 20 chains. These maps/coverages will show the current boundary line pattern as determined from actual survey records, together with major physical features such as roads, streams, rights-of-way, and county and township lines found on U.S.G.S. 7½-minute quadrangle sheets. The base maps will be compiled from digital coverage currently available in the Bureau's GIS network. Any details from either current photo revised 7½ -minute quadrangle sheets, ground reconnaissance (GPS surveys), or current photography not shown on these base maps should be added.

Boundary discrepancies or omissions that are known to exist between the base maps and the actual situation on the ground should be noted and brought to the attention of the Resource Planning Section.

All State Forest land within each District will be divided into compartments. A compartment will consist of a land record unit permanently identifiable on the ground. Physical features such as roads, trails, rights-of-way, and streams should be used as compartment boundaries. As a general rule, compartment acreage should be between 500 and 3000 acres. Compartments made up of isolated tracts may be smaller and some compartments, because of topography, etc., may be larger. Natural Areas and large Special Resource Management Zones should be designated as separate compartments (see Appendix 1A for management zones).

Compartment boundaries should, for the most part, remain the same as the last management period (1985-1999). Minor changes are permitted if there is a logical reason. Changes should be noted and brought to the attention of the Resource Planning Section. All compartment delineation lines should be placed on the base maps using a yellow highlighter and numbered accordingly.

All road, stream and trail designations should be placed on the base maps. The most restrictive management zone and land classification will apply when roads, trails, and streams have two or more potential land classifications. This will enable the vendor to automatically digitize aesthetic / buffer zone widths. See Appendices 1A and 1B for these designations.

Revised base maps should be sent to the Resource Planning Section upon completion. The Planning Section will review the base maps and make copies of the maps and return a copy to the Forest District. Revisions will be incorporated into the appropriate digital coverage.

## **AERIAL PHOTOGRAPHS**

The Planning Section will provide current aerial photographs and photo indexes (digital file) to the Forest Districts. The scale of the photographs will be 1:15840 or 1 inch = 20 chains. Since some photography will not necessarily be flown in a north-south flight line, a north arrow will be superimposed on those photos to aid the user in proper orientation.

Photos will be referenced using GPS (Global Positioning System) technology by the vendor. All photo centers (principle points) will be documented with differential GPS, recording the position of the exposure.

Photo indexes will be provided to the district as a digital export file. The digital index file will contain the exposure positions (latitude and longitude), exposure number, roll number, time and date of the exposures.

## **PHOTO PRINCIPLE POINTS / EFFECTIVE AREAS**

The photo flight lines will be flown so that the photo prints will have a forward overlap of approximately 60% and a side lap of approximately 30%. Photos will be trimmed to the 9 x 9-inch nominal size retaining the fiducial marks at the midpoints of each edge. Principle points should be located and marked on each photo; each principle point has been GPS referenced.

Principle points should be located and marked on each photo using the following procedure. Align both, opposite sets of fiducial marks with a straightedge and draw a light line near the center of the photograph. Make a fine needle or pin hole at the intersection of the two lines. Draw a circle on the back of each photo around the principle point. Conjugate principle points should be located (transferred) on the photos, pin-pricked and circled on the back of the photo. This will aid the interpreter with flight line direction, photo alignment, and will indicate three geo-referenced points on each photo.

The effective area of a photo includes all images closer to the center of that photograph than to the center of any other. It is the area in which objects can be viewed with the least relief displacement. Delineating the effective area assures that no areas are missed or observed on two different photographs. The effective area is determined by examining two consecutive photographs in one flight strip and two consecutive photographs in an adjacent flight strip. Pick an identifiable object that balances the forward overlap between two consecutive photos and at the same time balances the side lap between the two adjacent photographs. The identifiable point can be seen on all four photos and represents one-half the forward overlap and one-half the side lap on each photo. Continue, using the next photograph in each flight strip, balancing the forward and side lap until every photo in the flight strip has been examined. When four points have been located on each photo, the points must be connected with a black felt tip pen, such as the 0.4 mm “Sharpie” by the Sanford Corporation. These pens are specifically designed for use on non-porous surfaces. Effective Areas should be delineated for all photos containing State Forest lands.

**Note:** Corrections can be made by using acetone solvent to remove permanent marks.

### **BOUNDARY INFORMATION / ADJACENT LAND USE**

Boundaries of State Forest lands will be determined from the digital base coverage. Therefore, boundaries do not need to be placed on photos. However, districts should identify as many boundary points on the photos as is practical; locate corners or locations where boundaries cross roads or rights-of-way. These points can be circled and attributed as “BD” on the photo. This will serve for future district reference and can be used by the vendor to assist in digital take-off.

Land classification should be done on all delineated effective areas and include the entire effective area regardless of the State Forest boundary location. This will ensure that all State Forest lands have been classified and will give the Bureau an idea of adjacent land use. Land classification on private lands should be done through stereoscopic examination only. Make sure to zone all land classification units on State Forest lands.

Adjacent land use/cover will be determined on all photos adjacent to State Forest lands. Adjacent land use/cover will be delineated in the central office (Harrisburg). Land

use/cover classification is found in Appendix 1C. Private, interior holdings will be identified as to land use/cover on the photos.

## **LAND CLASSIFICATION AND ZONING**

All acreage of State Forest land will be assigned a management zone code. The management zone is an area that is subject to the same management criteria or restrictions. Descriptions and codes for the management zones are listed in Appendix 1A. The management zones are:

**Multiple Resource Management Zone**  
**Aesthetic/Buffer Management Zone**  
**Limited Resource Management Zone**  
**Natural Area Management Zone**  
**Wild Area Management Zone Special**  
**Resource Management Zone**  
**Anthropogenic Site Management Zone**

All acreage of State Forest land will also be assigned a land classification code. The land classification describes the dominant feature of an area. The land classification is the smallest unit of land that will be inventoried and represents some degree of homogeneity. Many land classification units are based on plant community types recognized in *Pennsylvania's Community Classification* (February 1999). Other types are based on specific anthropogenic use. The major land classification categories are:

### **Plant Community Types**

Terrestrial Forests  
Palustrine / Floodplain Forests  
Terrestrial Woodlands / Shrublands  
Palustrine Woodlands / Shrublands  
Terrestrial Herbaceous Areas  
Palustrine Herbaceous Areas  
Palustrine Complex

### **Aquatic System Types**

Lake or Pond  
Watercourse

### **Anthropogenic Types**

Roads  
Rights-of-Ways (R/W)  
Leased Areas  
Mineral Sites  
Recreational / Cultural Sites  
Trails

Subclasses have been established for most of the land classes to better describe the unit of land. See Appendix 1B for the complete classification list, descriptions and codes.

The land classification will be conducted through a combination of photo interpretation (stereoscopic examination) and field reconnaissance. Classification will be confined to the effective areas of the photographs. Land classes should be determined using photo interpretation through stereoscopic examination and verified through field reconnaissance. Management maps (1985-1999), compartment files, and USGS quadrangle maps should be helpful to the photo interpreter.

The objective of the field reconnaissance is to provide the photo interpreter with sufficient information on land use, operability, stocking, etc., to verify the classification of all areas of State Forest land. The more complete the field reconnaissance, the more accurate and useful will be the digital files, maps and inventory.

Each forest district should develop a method for field reconnaissance, however the method chosen must adequately cover the entire State Forest. District personnel should ensure that each individual is using similar thought processes to classify State Forest lands. It is often helpful for district personnel to use a “team approach” to conduct initial delineations. This should help “calibrate” district personnel. The following is one method of field reconnaissance that has proven to be effective:

The reconnaissance begins by driving roads, walking trails and finally, walking compass lines through blocks of land inadequately traversed by roads and trails. The daily route should be laid out in the office using the base maps and appropriate photographs. The route of travel should be followed on the aerial photographs, noting the land classifications along the route. The classifications listed in Appendix 1B will be used to classify all homogeneous areas that are apparent on the photographs. Be certain to visit all areas that appear to be different from an adjacent area. Visit all terrestrial herbaceous areas and palustrine wetlands.

When a photo has been adequately observed through field reconnaissance, the entire area of the delineated effective area will be classified using final stereoscopic examination and coding. The land classification lines must be drawn with a black felt tip pen, such as the 0.4 mm “Sharpie” by the Sanford Corporation. Coding for the units must also be indicated in ink. The coding will include a Management Zone and Land Classification for each unit except for linear Aesthetic / Buffer Management Zones (B). Linear Aesthetic / Buffer Management Zones will be produced by a vendor based on designations shown on the digital base map coverage. However, Management Zone coding must be included for frost pockets, fire hazard areas, and sensitive areas.

**Note:** Corrections can be made by using acetone solvent to remove permanent marks.

Seven and one-half minute quads can be helpful in identifying the boundaries of Limited Resource Management Zones (L) and some Anthropogenic Site Management Zones (H).

Upon completion of the photo interpretation of the forest, photos should be sent to the Resource Planning Section. Photos should be hand delivered to ensure their safety. The Planning Section will distribute the completed photo interpretation to a vendor who will transfer the information from the photographs to digital files. Photos will be returned to the districts upon completion of digitization.

### **DIGITAL MANAGEMENT MAPS / FILES**

Land classification lines, land classification and management zone codes, and any new physical features will be transferred to digital coverages. Proof maps using the digital coverages will be plotted and sent to the districts along with tabular data for verification, editing, and/or approval. Comments, place names, remarks, and so forth should be added to the proof maps and/or data. Record such things as area name, pipeline name, or some special identifying feature if desired.

Advanced exceptions to the management zoning will be considered upon submission of proper justification. Please note any exceptions on the digital coverage along with the justification for exception to the Resource Planning Section.

Return edited proof maps to the Resource Planning Section. The Planning Section will review the proof maps and send them back to the vendor for final digitizing. The Districts will receive the final coverages for use during the next State Forest management period.

### **SUPRA MANAGEMENT AREAS**

Some extensive areas of State Forest lands are managed to promote certain broad resources or values. These areas have discrete boundaries and usually encompass several management zones (e.g. Elk Management Area). These areas should be classified as "Supra Management Areas". Districts should identify these areas on the proof maps when editing for comments and place names.

Management of Supra Management Areas sometimes deviates slightly from normal operating procedures but management within these areas does not supercede management zone restrictions. For instance the "Elk Management Area" should be noted on base maps to allow future data queries and management options. In the case of the Elk Management Area, the Bureau's normal operating procedures apply except that herbaceous opening are promoted more heavily within the Multiple Resource Management Zone. Some Supra Management Areas will be identified and delineated by the Resource Planning Section and some by the Forest District. Some of these potential

areas include important bird areas, North Central High Mountain Area, recreational zoning, and so forth. Questions concerning these areas should be directed to the Resource Planning Section.

**APPENDIX 1A**  
**MANAGEMENT ZONES**

The following Management Zones and codes will be applied to State Forest lands:

<b><u>CODE</u></b>	<b><u>MANAGEMENT ZONES</u></b>
<b>M</b>	<b>MULTIPLE RESOURCE</b>
<b>B</b>	<b>AESTHETIC / BUFFER</b>
<b>L</b>	<b>LIMITED RESOURCE</b>
<b>N</b>	<b>NATURAL AREA</b>
<b>W</b>	<b>WILD AREA</b>
<b>S</b>	<b>SPECIAL RESOURCE</b>
<b>H</b>	<b>ANTHROPOGENIC SITE</b>

**MANAGEMENT ZONING**

Primary land use and land use capability will dictate the management zoning to be applied on State Forest lands. The entire State Forests will be zoned and the zones will be represented spatially on base map or in digital format. The State Forester, as part of the State Forest Resource Plans, will approve the zoning. All management efforts applied to a given area must be in accordance with the management zoning indicated on the map or digital files. Requests for variation from the management zoning as designated on the map/digital files must be submitted in writing to the Director, Bureau of Forestry, Department of Conservation and Natural Resources.

It is the policy of the Bureau to zone all State Forest lands according to its primary land use and to apply management practices that will protect and enhance the values for which the land was zoned. The following is a description of the management zones and the values that determine primary land use:

**MULTIPLE RESOURCE MANAGEMENT ZONE (M)** will be applied to areas of State Forests where timber, water, recreation, fauna, flora and minerals are the major values. This is the majority of lands within the State Forest system and is the least restrictive, most encompassing management zone. Appropriate forest community types within this zone are considered part of the commercial forest land base.

**AESTHETICS / BUFFER MANAGEMENT ZONE (B)** will be applied to areas where connectivity, aesthetics and water quality conservation are the primary values. These areas encompass a wide array of lands and are associated with linear features such as roads, trails, and streams or encompass significant features of State Forest lands. Appropriate forest community types within this zone are considered part of the commercial forest land base, however, timber harvest is excluded from certain areas (e.g. National Trails, Wilderness Trout Streams, National Scenic Trails, etc.). This management zone will include the following areas:

- a. Palustrine Wetlands and Frost Pockets. Wetlands or areas where a high water table exists and frost pockets will be zoned aesthetic/buffer management zone.
- b. Parks and Picnic Area. Picnic areas and high use areas near park boundaries will have a 300-foot aesthetic/buffer management zone surrounding them.
- c. Campsite Leases. An aesthetic/buffer management zone of 150 feet will be designated surrounding existing campsite buildings. These are not shown on base maps/coverage.
- d. Roads. Along state highways, county roads, maintained township roads and public-use State Forest Roads, an area of 300 feet on each side of the road will be designated as aesthetic/buffer management zone.
- e. Natural Areas. Natural Areas will be subjected to a 600-foot aesthetic/buffer management zone. Exceptions can be made when a road, pipeline or powerline serves as a boundary of the designated area; in this case, a 300-foot wide aesthetic/buffer management zone will apply.
- f. Fire Hazard Areas. Areas within safety strips or other areas of high forest fire hazard will be zoned as aesthetic/buffer management zone.
- g. Trails. Aesthetic/Buffer Management Zone width will vary depending on the trail classification. Following are the aesthetic/buffer management zone widths for the various trail classifications:
  - (1). National Scenic Trails such as the Appalachian Trail or other National Scenic trails yet to be established will have a 200-foot aesthetic/buffer management zone on both sides of this trail. Cutting for human safety only will be permitted within this zone.
  - (2). Designated State Forest hiking trails: will have a 100-foot aesthetic/buffer management zone on both sides of the trail. Cutting for human safety only will be permitted within this zone.

- h. Streamside Forests. Aesthetic/Buffer Management Zone width will vary depending on the stream classification and width of the riparian zone. The most restrictive management criteria will apply when streams have two or more classifications. A “stream” is described as having defined bed and banks regardless of water flow. The following are the minimum, aesthetic/buffer management zone widths for the various stream classifications:
- (1) Exceptional value waters: will have a 100-foot aesthetic/buffer management zone on both sides of the stream. Only salvage cutting will be permitted within this zone.
  - (2) High quality waters: will have a 100-foot aesthetic/buffer management zone on both sides of the stream.
  - (3) Perennial cold water streams: will have a 100-foot aesthetic/buffer management zone on both sides of the stream.
  - (4) Wilderness trout streams: will have a 200-foot aesthetic/buffer management zone on both sides of the stream. Only salvage cutting will be permitted within this zone.
  - (5) Warm water streams: will have a 100-foot aesthetic/buffer management zone on both sides of the stream.
  - (6) Wild rivers: The assigned stream corridor will be zoned aesthetic/buffer management zone. Only salvage cutting will be permitted within 200 feet of both sides of the stream.
  - (7) Scenic rivers: The assigned stream corridor will be zoned aesthetic/buffer management zone. Only salvage cutting will be permitted within 100 feet of both sides of the stream.
  - (8) Recreational rivers: will have a 100-foot aesthetic/buffer management zone on both sides of the stream.
  - (9) Modified recreational rivers: will have a 100-foot aesthetic/buffer management zone on both sides of the stream.
  - (10) Pastoral rivers: will have a 100-foot aesthetic/buffer management zone on both sides of the stream.
- i. Lakes, Ponds and Impoundments: will have a 100-foot aesthetic/buffer management zone around their perimeter.

- j. Sensitive areas: Certain areas of State Forest land near high use areas such as parks, reservoirs, or scenic drives can be designated for aesthetic/buffer zone management where the aesthetic values override other resource uses. Viewsheds from high-use vistas may be included.

**LIMITED RESOURCE MANAGEMENT ZONE (L)** will be applied to areas of State Forest lands where management alternatives are limited due to site quality or topographic constraints. Recreation, aesthetics, water, and soil retention are the primary values. Site or topography are inhibiting factors that restrict or prohibit management practices on these areas (e.g. recreational facilities such as picnic areas, parking lots, restrooms, etc. would typically not be placed on these areas). This zone is typically not part of the commercial forest land base. Timber harvesting is usually not practical.

**NATURAL AREA MANAGEMENT ZONE (N)** will be applied to those areas that have been designated or are pending designation by the department as State Forest Natural Areas. Natural Areas are defined as an area of unique scenic, historic, geologic or ecological value, which will be maintained in a natural condition by allowing physical and biological processes to operate, usually without direct human intervention. These 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. The guidelines governing the administration of Natural Areas are as follows:

- (1) No human habitation will be permitted, except that primitive type, backpack camping may be permitted in designated areas only.
- (2) Access for all but essential administrative activities will be restricted to foot travel and non-motorized watercraft, except in designated areas.
- (3) Buildings and other improvements will be restricted to the minimum required for public health, safety and interpretive aids.
- (4) Timber harvesting will not be permitted except as may be required for the maintenance of public safety.
- (5) Leases and mineral development are prohibited; however, subsurface oil and gas rights may be leased where no surface use or disturbance of any kind will take place on the Natural Area. New rights-of-way are prohibited except for designated utility corridors in the Bucktail Natural Area.

**WILD AREA MANAGEMENT ZONE (W)** will be applied to those areas that have been designated or are pending designation by the department as State Forest Wild Areas. 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. No development of a permanent nature will be permitted so as to retain the undeveloped character of the area and conserve ecological resources. The guidelines governing the administration of Wild Areas are as follows:

- (1) Campsite leases will be prohibited.
- (2) No new public access roads will be constructed. Existing roads will remain open only where there is a public need. All motorized conveyances or vehicles shall be prohibited with the exception of licensed vehicles, which may be operated only on open public roads.
- (3) Forest trail use will be restricted to foot travel, horseback riding and bicycling. Handicapped persons, in hand or electrically powered wheelchairs, or in other electrically powered vehicles adapted for this use, may operate such conveyances on designated trails.
- (4) Buildings and other improvements will be restricted to the minimum required for public health, safety and interpretive aids.
- (5) Leases, mineral development, and new rights-of-way will be prohibited; however, subsurface oil and gas rights may be leased where no surface use or disturbance of any kind will take place on the Wild Area.
- (6) Overnight camping will be limited to the backpack primitive type.

**SPECIAL RESOURCE MANAGEMENT ZONE (S)** will be applied to areas of State Forest lands that will be managed for specific values such as public plant sanctuaries, special wildlife management areas, certain recreation sites, vistas and reservoirs. These zones will have specific management recommendations or plans; recommendations will depend on the values that are being recognized. Forest community types within this zone are typically not part of the commercial forest land base, however timber harvesting will be allowed if specific management recommendations recognize timber harvesting as an appropriate management tool.

**ANTHROPOGENIC SITE MANAGEMENT ZONE (H)** applies to man-made structures or facilities such as roads, rights-of-ways, mineral sites, tower sites, leases, forest district buildings, and so forth. The primary value for this zone is human amenities.

## **APPENDIX 1B LAND CLASSIFICATIONS**

All acreage of State Forest land will be assigned a land classification code. The land classification describes the dominant feature of an area. The land classification is the smallest unit of land that will be inventoried and represents some degree of homogeneity. Subclasses have been established for forested land classes to better describe the unit of land. The following are the complete descriptions and codes for the land classifications. Many land classification units are based on plant community types recognized in *Pennsylvania's Community Classification* (1999). Scientific names are those used in the *Vascular Flora of Pennsylvania: Annotated Checklist and Atlas* (1993). Other types are based on specific anthropogenic use or aquatic systems. The land classifications by category are:

### **Plant Community Types**

#### **Terrestrial Forests:**

#### **2016 UPDATE**

<b>AD</b>	<b>Mixed Oak – Mixed Hardwood Forest</b>
<b>AH</b>	<b>Dry Oak – Heath Forest</b>
<b>AR</b>	<b>Red Oak – Mixed Hardwood Forest</b>
<b>BB</b>	<b>Northern Hardwood Forest</b>
<b>BC</b>	<b>Black Cherry – Northern Hardwood Forest (Allegheny Hardwoods)</b>
<b>CC</b>	<b>Red Maple Forest</b>
<b>CS</b>	<b>Sugar Maple – Basswood Forest</b>
<b>DB</b>	<b>Black Birch Forest</b>
<b>DD</b>	<b>Aspen / Grey (Paper) Birch</b>
<b>EO</b>	<b>Pitch Pine – Mixed Oak Forest</b>
<b>EV</b>	<b>Virginia Pine – Mixed Hardwood Forest</b>
<b>FF</b>	<b>Hemlock (White Pine) Forest</b>
<b>FA</b>	<b>Dry White Pine (Hemlock) – Oak Forest</b>
<b>FB</b>	<b>Hemlock (White Pine) – Northern Hardwood Forest</b>
<b>FR</b>	<b>Hemlock (White Pine) – Red Oak – Mixed Hardwood Forest</b>
<b>GB</b>	<b>Black Gum Ridgetop Forest</b>
<b>LB</b>	<b>Black Locust Forest</b>
<b>TM</b>	<b>Tuliptree – Maple Forest</b>
<b>PR</b>	<b>Red Pine – Mixed Hardwood Forest</b>
<b>PP</b>	<b>Pine Plantation</b>
<b>PS</b>	<b>Spruce Plantation</b>
<b>PH</b>	<b>Hardwood Plantation</b>
<b>PX</b>	<b>Mixed Species Plantation</b>

**MX Miscellaneous Forest Community Types**

- Serpentine Pitch Pine – Oak Forest
- Serpentine Virginia Pine – Oak Forest
- Sweet Gum/Oak Coastal Plain Forest
- Others

**Palustrine Forests** (includes Floodplain Forests):

- UT Black Spruce - Tamarack Peatland Forest
- UK Red Spruce Palustrine Forest
- UF Hemlock Palustrine Forest
- UB Hemlock – Mixed Hardwood Palustrine Forest
- UH Red Spruce – Mixed Hardwood Palustrine Forest
- UA Bottomland Oak – Hardwood Palustrine Forest
- UC Red Maple – Black Ash Palustrine Forest
- UG Red Maple – Black Gum Palustrine Forest
- SC Red Maple – Elm – Willow Floodplain Swamp
- SE Sycamore – (River Birch) – Box Elder Floodplain Forest
- SM Silver Maple Floodplain Forest
- SX Miscellaneous Palustrine/Floodplain Forest

**Terrestrial Woodlands / Shrublands:**

- O4 Sweetfern Savannah
- O5 Woodland
- O6 Orchards
- O7 Scrub / Shrub

**Palustrine Woodlands / Shrublands:**

- U2 Scrub / Shrub
- UX Palustrine Woodland

**Terrestrial Herbaceous Openings:**

- O1 Natural Herbaceous Area
- O2 Cultivated Herbaceous Area
- O3 Agriculture Herbaceous Area
- OM Miscellaneous Herbaceous Area

**Palustrine Herbaceous Openings:**

- U4 Emergent Wetland

**Palustrine Complex:**

- U3 Bog / Fen

**Non-Vegetated Openings:**

- O9 Rubble Land
- OX Miscellaneous Non-Vegetated Opening

## Aquatic System Types

### **Lake or Pond:**

- P1 Human-made Impoundment/Pond
- P2 Natural Lake or Pond

### **Watercourse:**

- S1 Exceptional value waters.
- S2 High Quality waters.
- S3 Perennial cold water streams.
- S4 Wilderness trout streams.
- S5 Warm water streams.
- S6 Wild rivers.
- S7 Scenic rivers.
- S8 Recreational rivers.
- S9 Modified recreational rivers.
- S0 Pastoral rivers.

## Anthropogenic Types

### **Roads:**

- Z1 Public-Use Road
- Z2 Drivable Trails
- Z3 Administrative Road

### **Rights - of - Ways (R/W):**

- Q1 Pipeline
- Q2 Poleline
- Q5 Underground Cable
- Q6 Antenna / Tower Site

### **Leased Areas:**

- L1 Special Lease Areas

### **Mineral Sites:**

- M1 Shale Pit, Borrow Pit, Quarry, Strip-mine, Spoils (not vegetated)
- M5 Compressor Site / Pump Station
- M6 Well Site (gas, oil, water)
- MX Miscellaneous Mineral Site

### **Recreational/Cultural Sites:**

- Y1 State Forest Facility, Forest Headquarters, District Office, Fire Tower, etc.
- Y2 Picnic Area
- Y3 Vista
- Y4 Historical / Archeological Site
- Y6 Designated Camping Area
- Y7 Access and/or Parking Area
- Y8 Miscellaneous

**Trails:**

- Y9 Leased Camp Site
- Y0 Leased Camp Site Colony
- T0 Designated National Scenic Trail
- T9 Designated State Forest Hiking Trail
- T8 Designated Local District Trail (Multi-Use)
- T7 Designated Local District Trail (Specific-Use)

## **PLANT COMMUNITY TYPES**

### **TERRESTRIAL FORESTS**

#### **2016 UPDATE**

Terrestrial Forests are uplands (non-wetlands) dominated by tree species that form at least 30% of the main tree canopy of the area. Terrestrial Forest communities will be classified using the following two character alphabetical system for forest community type, followed by a numerical digit for site, size and stocking class, followed by an alphabetical digit for commercial/noncommercial availability. Terrestrial forest communities should be a minimum of five acres or larger for delineation. However, unique forest communities less than five acres may be delineated.

**AD Mixed Oak - Mixed Hardwood Forest:** This type occurs on less acidic to somewhat calcareous, moderately dry soils. It is most often found on south and southwest-facing slopes. Dominant species include *Quercus alba* (white oak) and/or *Quercus montana* (chestnut oak), which either alone or in combination account for a greater percentage of overstory BA than *Quercus rubra* (northern red oak). Common trees typically include *Betula lenta* (sweet birch), *Carya cordiformis* (shellbark hickory), *Acer rubrum* (red maple), *Acer saccharum* (sugar maple), *Quercus velutina* (black oak), *Carya glabra* (pignut hickory), *Fraxinus americana* (white ash), and *Tilia americana* (basswood). Total cover by conifers does not exceed 25% of the overstory. Often advanced regeneration of *Pinus strobus* (Eastern white pine) is present in the understory, as well as several diagnostic species of shrubs, including *Cornus florida* (flowering dogwood), *Carpinus caroliniana* (hornbeam), *Corylus cornuta* (beaked hazelnut) and *Ostrya virginiana* (hop-hornbeam). Ericaceous shrubs are sparse, accounting for less than 30% of relative cover in the understory. When present, they may include *Vaccinium pallidum* (lowbush blueberry), *Vaccinium angustifolium* (low sweet blueberry), *Gaylussacia baccata* (black huckleberry) and *Kalmia latifolia* (mountain laurel). Herbaceous species may include *Smilacina racemosa* (false Solomon's-seal), *Uvularia sessilifolia* (sessile-leaved bellwort), *Asplenium platyneuron* (ebony spleenwort), *Desmodium spp.* (tick-trefoils), *Hieracium venosum* (rattlesnake weed), *Aralia nudicaulis* (wild sarsaparilla), *Carex pensylvanica* (sedge), *Carex communis* (sedge), *Eurybia macrophylla* (bigleaf aster) and *Lysimachia quadrifolia* (whorled loosestrife).

#### **Related types & their distinguishing features:**

AH – dominance of oak species in the overstory AND dominance of ericaceous shrubs in the understory (greater than 30% relative cover).

AR – dominance of *Quercus rubra* (northern red oak) in the overstory (greater than 40% of BA).

CS – dominance of *Acer saccharum* (sugar maple) and *Tilia americana* (basswood) in the

overstory (greater than 50% of BA).

FA – presence of *Pinus strobus* (white pine) and/or *Tsuga canadensis* (eastern hemlock) in the overstory (greater than 25% overstory cover).

EV – presence of *Pinus virginiana* (Virginia pine), sometimes with a mixture of other hard pines, in the overstory (greater than 25% overstory cover).

**Range:** Entire state, except Coastal Plain.

**AH Dry Oak - Heath Forest:** These forests occur on xeric to moderately dry, acidic sites, often on shallow or sandy soils and/or steep slopes. In this oak dominant community, the determining factor for this type is the ericaceous shrub layer, which is greater than 30% relative cover. The most characteristic tree species for this type are *Quercus montana* (chestnut oak), usually occurring with a mix of *Quercus velutina* (black oak), *Quercus coccinea* (scarlet oak), and/or *Quercus alba* (white oak). In the northern range, *Quercus rubra* (red oak) replaces *Quercus coccinea* (scarlet oak). Other tree species often include *Sassafras albidum* (sassafras), *Nyssa sylvatica* (black-gum), *Betula lenta* (sweet birch), *Acer rubrum* (red maple), *Carya glabra* (pignut hickory), *Pinus rigida* (pitch pine), *Pinus virginiana* (Virginia pine), and *Pinus strobus* (eastern white pine). Total cover by conifers does not exceed 25% of the overstory. *Castanea dentata* (American chestnut) stump sprouts are occasionally present. The shrub layer is dominantly ericaceous; common species typically include *Kalmia latifolia* (mountain laurel), *Kalmia angustifolia* (sheep laurel), *Gaylussacia baccata* (black huckleberry), *Vaccinium pallidum* (lowbush blueberry), *Vaccinium angustifolium* (low sweet blueberry), and in more open areas, *Comptonia perigrina* (sweet fern). Owing largely to the thick, resistant oak/ericad leaf litter, the herbaceous layer is generally sparse. Common constituents often include *Gaultheria procumbens* (teaberry), *Carex pensylvanica* (Pennsylvania sedge), *Carex communis* (a sedge), *Epigaea repens* (trailing arbutus), *Aralia nudicaulis* (wild sarsaparilla), *Pteridium aquilinum* (bracken fern), *Medeola virginiana* (Indian cucumber-root), *Melampyrum lineare* (cow-wheat) and *Cypripedium acaule* (pink lady's-slipper).

**Related types & their distinguishing features:**

AR – dominance of *Quercus rubra* (northern red oak) in the overstory (greater than 40% of BA) AND sparse ericaceous shrubs in the understory (less than 30% relative cover).

AD – dominance of *Quercus alba* (white oak) and/or *Quercus montana* (chestnut oak) AND sparse ericaceous shrubs in the understory (less than 30% relative cover).

EO – conifer component of overstory is greater than 25% with presence of *Pinus rigida* (pitch pine).

EV – conifer component of overstory is greater than 25% with presence of *Pinus virginiana*

(Virginia pine), sometimes with a mixture of other hard pines, in the overstory (greater than 25% of overstory cover).

**Range:** Entire state.

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

**Related types & their distinguishing features:**

AD – when the combined BA of *Quercus montana* (chestnut oak) and *Quercus alba* (white oak) exceeds the *Quercus rubra* (northern red oak) BA.

AH – dominance of oak species in the overstory AND dominance of ericaceous shrubs in the understory (greater than 30% relative cover).

FR – presence of *Pinus strobus* (white pine) and/or *Tsuga canadensis* (eastern hemlock) in the overstory (greater than 25% overstory cover).

**Range:** Entire state, although less common on the Un-glaciated Allegheny Plateau.

**BB Northern Hardwood Forest:** Dominant trees usually include *Fagus grandifolia* (American beech), *Acer rubrum* (red maple), *Acer saccharum* (sugar maple), *Prunus serotina* (black cherry), *Betula lenta* (sweet birch), *Betula alleghaniensis* (yellow birch), *Betula papyrifera* (paper birch), *Quercus rubra* (northern red oak), and *Fraxinus americana* (white ash). Individual species do not exceed 40% in this community, except for beech which may be found in nearly pure stands. This type may contain scattered *Pinus strobus* (eastern white pine) and/or *Tsuga canadensis* (eastern hemlock), but combined conifer cover does not exceed 25% of the overstory. *Rhododendron maximum* (rosebay) may be locally abundant. Other common shrubs may include *Hamamelis virginiana* (witch-hazel), *Acer pensylvanicum* (striped maple), *Viburnum lantanoides* (witch-hobble), *Ilex montana* (mountain holly), *Amelanchier laevis* (smooth serviceberry), *Amelanchier arborea* (shadbush), *Ostrya virginiana* (hophornbeam) and *Carpinus caroliniana* (hornbeam). The herbaceous layer is generally sparse and reflects a northern affinity; common components may include *Maianthemum canadense* (Canada mayflower), *Trientalis borealis* (starflower), *Thelypteris novaboracensis* (New York fern), *Polystichum acrostichoides* (Christmas fern), *Dryopteris intermedia* (evergreen wood-fern), *Lycopodium lucidulum* (shining clubmoss), *Mitchella repens* (partridge-berry), *Aralia nudicaulis* (wild sarsaparilla), and *Medeola virginiana* (Indian cucumber-root).

**Related types & their distinguishing features:**

BC – dominance of *Prunus serotina* (black cherry) in the overstory (greater than 40% of BA).

FB – presence of *Pinus strobus* (white pine) and/or *Tsuga canadensis* (eastern hemlock) in the overstory (greater than 25% overstory cover).

CC – dominance of *Acer rubrum* (red maple) in the overstory (greater than 40% of BA).

CS – dominance of *Acer saccharum* (sugar maple) and *Tilia americana* (basswood) in the overstory (greater than 50% of BA).

DB – dominance of *Betula lenta* (black birch) in the overstory (greater than 40% of BA).

AR – prevalence of *Liriodendron tulipifera* (tuliptree) and dominance of *Quercus rubra* (red oak) in the overstory (greater than 40% of BA).

**Range:** Glaciated NE, Glaciated NW, Pocono Plateau, Unglaciated Allegheny Plateau.

**BC Black Cherry - Northern Hardwood Forest:** (Allegheny Hardwoods). This type is characterized by at least 40% *Prunus serotina* (black cherry) BA in the dominant/codominant classes and is most characteristic of the Unglaciated Allegheny Plateau. Common associates may include *Acer rubrum* (red maple), *Acer saccharum* (sugar maple), *Betula lenta* (sweet birch), *Betula alleghaniensis* (yellow birch), *Fagus grandifolia* (American beech), and *Quercus spp.* (oaks), usually *Quercus rubra* (northern red oak). *Pinus strobus* (eastern white pine) and/or *Tsuga*

*canadensis* (eastern hemlock) may be present (at less than 25% overstory cover). Total conifer cover does not exceed 25% of the overstory. Shrubs typically include *Viburnum lantanoides* (witch hobble), *Acer pensylvanicum* (striped maple), *Rubus allegheniensis* (Allegheny blackberry), *Ilex montana* (mountain holly), *Hamamelis virginiana* (witch-hazel), and *Amelanchier arborea* (shadbush). Common herbaceous species may include *Dennstaedtia punctilobula* (hayscented fern), *Thelypteris novaboracensis* (New York fern), *Dryopteris intermedia* (common wood fern), *Lycopodium spp.* (ground pine), *Aster acuminatus* (wood aster), *Viola spp.* (violets), *Medeola virginiana* (Indian cucumber-root), *Uvularia sessilifolia* (sessile-leaved bellwort), *Brachyelytrum erectum* (long-awned wood grass), *Maianthemum canadense* (Canada mayflower), and *Oxalis acetosella* (common wood- sorrel).

#### **Related types & their distinguishing features:**

BB – BA of *Prunus serotina* (black cherry) in the overstory is less than 40%.

FB – presence of *Pinus strobus* (white pine) and/or *Tsuga canadensis* (eastern hemlock) in the overstory (greater than 25% of overstory cover).

AR – dominance of *Quercus rubra* (northern red oak) in the overstory (greater than 40% of BA).

**Range:** Glaciated NE, Glaciated NW, Unglaciated Allegheny Plateau.

**CC Red Maple Forest:** This is generally an early- to mid-succession type that is becoming increasingly common as red maple increases in Pennsylvania's forests. This type is seldom pure, but *Acer rubrum* (red maple) dominates the tree stratum with at least 40% of the overstory BA. Total conifer cover does not exceed 25% of the overstory. Associate species often include *Quercus spp.* (oaks), *Betula lenta* (sweet birch), *Liriodendron tulipifera* (tuliptree), *Carya spp.* (hickories), *Fraxinus americana* (white ash), *Prunus serotina* (black cherry), and other hardwoods. Because *Acer rubrum* (red maple) has such wide ecological amplitude, this type may occur from upper through the lower slopes. Accordingly, the associated species vary greatly. Some shrubs commonly present may include *Viburnum acerifolium* (maple-leaved viburnum), *Lindera benzoin* (spicebush), *Hamamelis virginiana* (witch-hazel), *Kalmia latifolia* (mountain laurel), *Gaylussacia baccata* (black huckleberry), and *Cornus florida* (flowering dogwood). More information is needed regarding the ecology and species composition of this community type.

#### **Related types & their distinguishing features:**

BB – BA of *Acer rubrum* (red maple) in the overstory is less than 40%.

DB – dominance of *Betula lenta* (black birch) in the overstory (greater than 40% of BA).

**Range:** Entire state.

**CS Sugar Maple - Basswood Forest:** This type is found on rich, rocky slopes and coves in central and southern Pennsylvania (although it may have occurred on less steep sites previous to extensive logging that left these inaccessible remnants as our only remaining examples). It is also found on dry, calcium-rich escarpments along the coast of Lake Erie and its tributaries. Aside from *Acer saccharum* (sugar maple) with ~35% of overstory BA and *Tilia americana* (basswood) with ~20% of overstory BA, other tree species typically present include *Quercus rubra* (northern red oak), *Fraxinus americana* (white ash), *Liriodendron tulipifera* (tuliptree), *Betula alleghaniensis* (yellow birch), and *Betula lenta* (sweet birch). Total conifer cover does not exceed 25% of the overstory. Shrubs include *Lindera benzoin* (spicebush), *Hamamelis virginiana* (witch-hazel). Coves and lower slopes in southern PA often contain *Asimina triloba* (pawpaw) and *Staphylea trifolia* (bladdernut). There is generally a rich vernal flora; species may include *Anemone quinquefolia* (wood anemone), *Cimicifuga racemosa* (black snakeroot), *Geranium maculatum* (wood geranium), *Caulophyllum thalictroides* (blue cohosh), *Allium tricoccum* (wild leek), *Hepatica nobilis* (liverleaf), *Sanguinaria canadensis* (bloodroot), *Erythronium americanum* (trout-lily), *Claytonia virginica* (spring-beauty), *Arisaema triphyllum* (jack-in-the-pulpit), *Mitella diphylla* (bishop's-cap), *Cardamine concatenata* (cut-leaved toothwort), and *Asarum canadense* (wild ginger). Other herbaceous species may include *Smilacina racemosa* (false Solomon's-seal), *Dryopteris marginalis* (evergreen wood fern), and *Botrychium virginianum* (rattlesnake fern).

**Related types & their distinguishing features:**

AD – when the combined BA of *Quercus montana* (chestnut oak) and *Quercus alba* (white oak) exceeds the *Quercus rubra* (northern red oak) BA.

FB – presence of *Pinus strobus* (white pine) and/or *Tsuga canadensis* (eastern hemlock) in the overstory (greater than 25% of overstory cover).

BB – combination of *Acer saccharum* (sugar maple) and *Tilia americana* (basswood) is not dominant in the overstory (less than 50% of BA).

**Range:** Glaciated NE, Great Lakes Region, Piedmont, Pittsburgh Plateau, Ridge and Valley, Unglaciated Allegheny Plateau.

**DB Black Birch Forest:** This is an early successional forest type which often originates as a nearly pure stand of *Betula lenta* (black/sweet birch). In areas south of Route 80 this community is the product of a drastic reduction of the original overstory canopy, mostly mixed oak, following

natural or man-made factors. When the overstory is removed, a black birch monoculture quickly colonizes the site and dominates the area into the pole stage. Beyond that size class, some speculate that the stand will eventually revert back to a mixed oak forest. Associated overstory species in this southern range often include *Quercus rubra* (northern red oak), *Quercus montana* (chestnut oak), and *Acer rubrum* (red maple). North of Route 80 this community can occur as nearly pure stands of *Betula lenta* (black birch) or either a mixture of mixed oak species or northern hardwood species with *Betula lenta* (black birch) occupying greater than 40% of the overstory BA. In certain cases, the BA of *Acer rubrum* (red maple) and *Betula lenta* (black birch) can be nearly equal, with greater than 40% of the BA occupied by both species in the overstory. In northern PA (north of I-80), these stands should be typed CC (Red Maple Forest) to favor the more desirable species in these forests. In southern PA (south of I-80), these stands should be typed DB (Black Birch Forest) to favor the more desirable species in these forests. Total conifer cover does not exceed 25% of the overstory. Other associates often include *Populus* spp. (aspens), *Prunus* spp. (cherries), *Quercus* spp. (oaks), *Sassafras albidum* (sassafras), *Fagus grandifolia* (beech) and *Betula alleghaniensis* (yellow birch). The shrub layer is quite variable, but may include *Hamamelis virginiana* (witch hazel), *Kalmia latifolia* (mountain laurel), *Acer pensylvanicum* (striped maple), *Comptonia peregrina* (sweet fern), *Gaylussascia bacatta* (black huckleberry) and several *Vaccinium* spp. (blueberries). Herbaceous species may include *Dennstaedtia punctilobula* (hayscented fern), *Dryopteris* spp. (wood ferns), *Carex* spp. (sedges), *Trientalis borealis* (star-flower), and *Viola* spp. (violets).

#### **Related types & their distinguishing features:**

BB – when NO single northern hardwood species occupies a majority of the stand’s overstory BA.

LB – when *Robinia pseudoacacia* (black locust) is the dominant overstory species.

DD – when *Populus grandidentata* (big-tooth aspen), *Betula papyrifera* (paper birch) or *Betula populifolia* (gray birch) are the dominant overstory species (greater than 40% of BA).

CC – dominance of *Acer rubrum* (red maple) in the overstory (greater than 40% of BA).

**Range:** Entire state

**DD Aspen / Gray (Paper) Birch:** This type is frequently mixed, but sometimes occurs in nearly pure stands of one of the named species. The birch may be *Betula papyrifera* (paper birch) on northern sites or *Betula populifolia* (gray birch) and *Betula lenta* (black birch) on southern sites. The *Betula lenta* (black birch) overstory component is less than 40% of the BA, otherwise it is a DB (Black Birch Forest). Aspen may be *Populus grandidentata* (big-toothed aspen), or *Populus tremuloides* (quaking aspen). Associates may include *Sassafras albidum* (sassafras), *Acer* spp. (maples), and *Prunus* spp. (cherry). This is an early succession forest type, commonly found on

former agricultural land and where there has been major disturbance resulting in areas of exposed mineral soil. Sometimes this type is present in areas of ice scour along stream banks. This type may also result from forestry practices that maintain an early successional stage.

**Related types & their distinguishing features:**

BB - when NO single northern hardwood species occupies a majority of the stand's overstory  
BA.  
DB – dominance of *Betula lenta* (black birch) in the overstory (greater than 40% of BA).

**Range:** Entire state.

**EO Pitch Pine – Mixed Oak Forest:** This community type generally occurs on acidic, sandy soils, often on ridgetops and dry southern exposures. Fire is an important factor in the establishment and persistence of *Pinus rigida* (pitch pine). In the absence of fire, pine is likely to decrease in favor of hardwood species. *Pinus rigida* (pitch pine), sometimes with a mixture of other pines, e.g. *Pinus strobus* (eastern white pine), *Pinus pungens* (table-mountain pine), *Pinus virginiana* (Virginia pine), and less often *Pinus echinata* (short-leaf pine) or *Pinus resinosa* (red pine), contribute over 25% of the overstory. Hardwood associates may include any of the dry-site oaks including *Quercus montana* (chestnut oak), *Quercus coccinea* (scarlet oak), *Quercus velutina* (black oak), and *Quercus alba* (white oak). Other tree species may include *Nyssa sylvatica* (black-gum), *Acer rubrum* (red maple), *Betula lenta* (sweet birch), and *Carya glabra* (pignut hickory). *Quercus ilicifolia* (scrub oak) may occur in more open areas; other shrubs include *Smilax spp.* (greenbrier), *Kalmia latifolia* (mountain laurel), *Gaylussacia baccata* (black huckleberry), *Parthenocissus quinquefolia* (Virginia creeper), and *Vaccinium angustifolium*, *Vaccinium pallidum* and *Vaccinium stamineum* (low-bush blueberries). The forest type sometimes grades into an open-canopy type, or contains gaps with an open canopy. The herbaceous layer is sparse, often with *Pteridium aquilinum* (bracken fern), *Aralia nudicaulis* (wild sarsaparilla), *Gaultheria procumbens* (teaberry), *Cypripedium acaule* (pink lady's-slipper), and various graminoids, including *Danthonia spicata* (poverty grass), *Deschampsia flexuosa* (common hairgrass), *Carex pennsylvanica* (Pennsylvania sedge), *Carex communis* (a sedge), and *Carex rosea* (a sedge).

**Related types & their distinguishing features:**

EV– overstory conifer cover is greater than 25%, with *Pinus virginiana* (Virginia pine) being the dominant conifer species in the overstory.

AH – overstory conifer cover does not exceed 25% AND dominance of oak species in the overstory AND dominance of ericaceous shrubs in the understory (greater than 30% relative cover).

**Range:** Glaciated NE, Piedmont, Pittsburgh Plateau, Pocono Plateau, Ridge and Valley, South Mountain.

**EV Virginia Pine – Mixed Hardwood Forest:** This community type most often occurs as a post-agricultural forest type on sand or silt loams. It may also occur on cleared and/or burned-over areas. *Pinus virginiana* (Virginia pine), sometimes with a mixture of other pines, e.g. *Pinus strobus* (eastern white pine), *Pinus rigida* (pitch pine), *Pinus pungens* (table-mountain pine), and less often *Pinus echinata* (short-leaf pine) contribute at least 25% of the overstory. Although this is typically a mixed type, some areas may be strongly dominated by hard pines (nearly pure stands). Hardwood associates vary; common associates may include *Quercus rubra* (northern red oak), *Quercus velutina* (black oak), *Quercus coccinea* (scarlet oak), *Quercus alba* (white oak), *Prunus serotina* (black cherry), *Acer rubrum* (red maple), *Betula lenta* (sweet birch), *Carya spp.* (hickory), *Sassafras albidum* (sassafras), and *Fraxinus americana* (white ash). Shrubs include *Smilax spp.* (greenbrier), *Juniperus virginiana* (red-cedar), *Rhus copallina* (shining sumac), *Rubus allegheniensis* (Allegheny blackberry), *Toxicodendron radicans* (poison-ivy), and *Parthenocissus quinquefolia* (Virginia creeper). Due to the thick litter, the herbaceous layer is usually sparse, often with *Chimaphila maculata* (pipsissewa), *Pteridium aquilinum* (bracken fern), *Aralia nudicaulis* (wild sarsaparilla), *Gaultheria procumbens* (teaberry), *Desmodium spp.* (tick-trefoil), *Galium spp.* (cleavers), and various graminoids.

**Related types & their distinguishing features:**

EO – overstory conifer cover is greater than 25%, with *Pinus rigida* (pitch pine), or other hard pines being the dominant conifer species in the overstory.

**Range:** Piedmont, Ridge and Valley.

**FF Hemlock (White Pine) Forest:** *Tsuga canadensis* (eastern hemlock), *Pinus strobus* (eastern white pine), or more often a combination of the two dominates these forests. Conifer cover exceeds 75% of the overstory. Associate species include a variety of northern hardwoods and oaks. Typical representatives, when present, include *Quercus rubra* (red oak), *Quercus velutina* (black oak), *Fagus grandifolia* (American beech), *Betula lenta* (black birch), *Betula alleghaniensis* (yellow birch), *Acer saccharum* (sugar maple), *Acer rubrum* (red maple), , and *Liriodendron tulipifera* (tuliptree); except in the northern counties where tuliptree is uncommon. Representative shrubs may include *Rhododendron maximum* (rosebay), *Viburnum lantanoides* (witch-hobble), *Viburnum acerifolium* (maple-leaved viburnum), and *Hamamelis virginiana* (witch-hazel). Typical herbs and creeping shrubs may include *Maianthemum canadense* (Canada

mayflower), *Mitchella repens* (partridge-berry), *Lycopodium spp.* (ground pine), *Gaultheria procumbens* (teaberry), *Thelypteris novaboracensis* (New York fern), *Medeola virginiana* (Indian cucumber root), and *Polystichum acrostichoides* (Christmas fern).

#### **Related types & their distinguishing features:**

FR – presence of *Pinus strobus* (white pine) and/or *Tsuga canadensis* (eastern hemlock) in the overstory (greater than 25%) AND *Quercus rubra* (red oak) is the dominant hardwood species in the overstory.

FA – presence of *Pinus strobus* (white pine) and/or *Tsuga canadensis* (eastern hemlock) in the overstory (greater than 25%) AND the combined BA of *Quercus montana* (chestnut oak) and *Quercus alba* (white oak) exceeds the *Quercus rubra* (northern red oak) BA. Oak species comprise greater than 50% of the overstory BA.

FB - presence of *Pinus strobus* (white pine) and/or *Tsuga canadensis* (eastern hemlock) in the overstory (greater than 25%) AND northern hardwood species are dominant in the overstory.

**Range:** Glaciated NE, Glaciated NW, Pocono Plateau, Unglaciated Allegheny Plateau.

**FA Dry White Pine (Hemlock) - Oak Forest:** This type occurs on fairly dry sites, often with 25% or more of the forest floor covered by rocks, boulders and/or exposed bedrock. The canopy may be somewhat open and tree growth somewhat suppressed. The tree stratum is dominated by a mixture of *Pinus strobus* (eastern white pine), or occasionally *Tsuga canadensis* (eastern hemlock), and a mixture of dry-site hardwoods, predominantly oaks. Conifers contribute between 25% and 75% of the overstory. The oak species most often associated with this type are *Quercus montana* (chestnut oak), and *Quercus alba* (white oak), although *Quercus velutina* (black oak), *Quercus coccinea* (scarlet oak), or *Quercus rubra* (northern red oak) may also occur. Other associated trees may include *Nyssa sylvatica* (black-gum), *Betula lenta* (sweet birch), *Fraxinus americana* (white ash), *Prunus serotina* (black cherry), and *Castanea dentata* (American chestnut) sprouts. There is often a heath-dominated shrub layer with *Kalmia latifolia* (mountain laurel) being especially important; *Gaylussacia baccata* (black huckleberry), *Vaccinium spp.* (blueberries), and *Kalmia angustifolia* (sheep laurel) are also common. Other shrubs, like *Cornus florida* (flowering dogwood), *Hamamelis virginiana* (witch hazel), *Viburnum acerifolium* (maple-leaved viburnum) may also occur on less acidic sites. There is typically a sparse herbaceous layer with a northern affinity; *Aralia nudicaulis* (wild sarsaparilla), *Pteridium aquilinum* (bracken fern), *Maianthemum canadense* (Canada mayflower), *Gaultheria procumbens* (teaberry), *Trientalis borealis* (star-flower), and *Medeola virginiana* (Indian cucumber root) are typical. The successional status of this type seems variable, in some cases, especially on harsher sites, it appears relatively

stable, and in other cases it appears to be transitional.

**Related types & their distinguishing features:**

AD – when the combined BA of *Quercus montana* (chestnut oak) and *Quercus alba* (white oak) exceeds the *Quercus rubra* (northern red oak) BA AND less than 25% conifer cover in the overstory.

FF – overstory is dominated by conifer species (greater than 75% cover).

FB – presence of *Pinus strobus* (white pine) and/or *Tsuga canadensis* (eastern hemlock) in the overstory (greater than 25% of overstory cover) AND northern hardwood species are dominant in the overstory.

FR – presence of *Pinus strobus* (white pine) and/or *Tsuga canadensis* (eastern hemlock) in the overstory (greater than 25%) AND *Quercus rubra* (red oak) is the dominant hardwood species in the overstory.

**Range:** Most typical of the Ridge and Valley, also occurs on South Mountain, Glaciated NE, Glaciated NW, Pittsburgh Plateau.

**FB Hemlock (White Pine) - Northern Hardwood Forest:** Any of the three named components may be dominant; at least two are present in some amount. Conifers contribute between 25% and 75% of the overstory cover. Characteristic hardwood species include *Fagus grandifolia* (American beech), *Acer saccharum* (sugar maple), *Acer rubrum* (red maple), *Betula lenta* (sweet birch), and *Betula alleghaniensis* (yellow birch). The conifer component may be *Pinus strobus* (eastern white pine), *Tsuga canadensis* (eastern hemlock), or a combination of the two. These forests occur mostly on mesic sites, often north-facing, sometimes rocky and steep. This type is fairly widespread in northern Pennsylvania. *Rhododendron maximum* (rosebay) may be locally abundant. Other common shrubs may include *Hamamelis virginiana* (witch-hazel), *Acer pensylvanicum* (striped maple), and *Viburnum spp.* (Viburnums). The herbaceous layer is generally sparse and reflects a northern affinity; common components may include *Maianthemum canadense* (Canada mayflower), *Trientalis borealis* (star-flower), *Thelypteris novaboracensis* (New York fern), *Medeola virginiana* (Indian cucumber-root), *Lycopodium lucidulum* (shining clubmoss), *Mitchella repens* (partridge-berry), and *Clintonia borealis* (bluebead lily). There is often a rich bryophyte layer.

**Related types & their distinguishing features:**

BB – less than 25% conifer cover in the overstory.

FF – overstory is dominated by conifer species (greater than 75% cover).

FR – presence of *Pinus strobus* (white pine) and/or *Tsuga canadensis* (eastern hemlock) in the overstory (greater than 25%) AND *Quercus rubra* (red oak) is the dominant hardwood species in the overstory.

**Range:** Entire state except the Coastal Plain, Piedmont, and South Mountain.

**FR Hemlock (White Pine) - Red Oak – Mixed Hardwood Forest:** This type is similar to the “Red oak - mixed hardwood forest” type but with *Tsuga canadensis* (eastern hemlock) and/or *Pinus strobus* (eastern white pine) contributing between 25% and 75% of the overstory cover. Conifers may be scattered, locally abundant, may dominate the subcanopy, or may occur as a relict supra-canopy (*Pinus strobus*), or in large former canopy gaps (*Pinus strobus*). *Quercus rubra* (northern red oak) is usually present, often dominant/codominant, most often with *Acer rubrum* (red maple), *Quercus velutina* (black oak), *Q. alba* (white oak), *Carya tomentosa* (mockernut hickory), *Betula lenta* (black birch), *Fraxinus americana* (white ash), *Fagus grandifolia* (American beech), and/or *Liriodendron tulipifera* (tuliptree). Shrubs may include *Viburnum acerifolium* (maple-leaved viburnum), *Rhododendron periclymenoides* (pinxter-flower), *Rhododendron maximum* (rosebay), *Amelanchier laevis* (smooth serviceberry), *A. arborea* (shadbush), *Carpinus caroliniana* (hornbeam), *Ostrya virginiana* (hop-hornbeam), *Hamamelis virginiana* (witch-hazel), and *Lindera benzoin* (spicebush). Herbaceous species may include *Smilacina racemosa* (false Solomon’s-seal), *Polygonatum biflorum* (Solomon’s seal), *Gaultheria procumbens* (teaberry), *Maianthemum canadense* (Canada mayflower), and *Podophyllum peltatum* (may-apple).

**Related types & their distinguishing features:**

AR – less than 25% conifer cover in the overstory AND dominance of *Quercus rubra* (northern red oak) in the overstory (greater than 40% of BA).

FF – overstory is dominated by *Tsuga canadensis* (eastern hemlock) and *Pinus strobus* (eastern white pine) with greater than 75% cover.

**Range:** Entire state except the Coastal Plain.

**GB Black Gum Ridgetop Forest:** This type occurs on fairly dry ridgetops. The canopy may be somewhat open; tree growth is somewhat suppressed. These ridgetops may have been exposed to repeated fires. *Nyssa sylvatica* (black gum) is the dominant species; *Betula lenta* (black birch), *Sassafras albidum* (sassafras), *Acer rubrum* (red maple), *Quercus montana* (chestnut oak), *Quercus velutina* (black oak), and *Quercus rubra* (northern red oak) are often present. *Pinus rigida* (pitch pine) and *Pinus pungens* (table mountain pine) may be occasional components of the

canopy, but never exceed more than 25% of the composition. The shrub layer is dominantly ericaceous; common species may include *Kalmia latifolia* (mountain laurel), *Gaylussacia baccata* (black huckleberry), *Vaccinium spp.* (blueberry), and *Hamamelis virginiana* (witch-hazel). The herbaceous layer is generally sparse. Common constituents often include *Carex pensylvanica* (Pennsylvania sedge), *Carex communis* (a sedge), *Epigaea repens* (trailing arbutus), *Gaultheria procumbens* (teaberry), *Aralia nudicaulis* (wild sarsaparilla), and *Pteridium aquilinum* (bracken fern).

**Related types & their distinguishing features:**

AH – dominance of oak species in the overstory.

EO – overstory conifer cover is greater than 25%, with *Pinus rigida* (pitch pine), or other hard pines being the dominant conifer species in the overstory.

CC – dominance of *Acer rubrum* (red maple) in the overstory (greater than 40% of BA).

DB – dominance of *Betula lenta* (black birch) in the overstory (greater than 40% of BA).

**Range:** Ridge and Valley.

**LB Black Locust Forest:** This community type usually occurs on highly disturbed sites or in small woodlots in an agricultural or suburban matrix. *Robinia pseudoacacia* (black locust) is the dominant tree. Typical associates may include *Acer rubrum* (red maple), *Sassafras albidum* (sassafras), various oaks (*Quercus spp.*), or *Prunus serotina* (black cherry). Total conifer cover does not exceed 25% of the overstory. *Toxicodendron radicans* (poison ivy) is commonly abundant. Exotic species usually predominate; often including *Lonicera japonica* (Japanese honeysuckle), *Ailanthus altissima* (tree-of-heaven), *Lonicera morrowii* (Morrow's honeysuckle), *Berberis thunbergii* (Japanese barberry), *Alliaria petiolata* (garlic-mustard), *Polygonum perfoliatum* (mile-a-minute), *Microstegium vimineum*, (stilt grass), *Poa pratensis* (Kentucky bluegrass), *Dactylis glomerata* (orchard grass), and *Holcus lanatus* (velvet grass).

**Related types & their distinguishing features:**

DB – dominance of *Betula lenta* (black birch) in the overstory (greater than 40% of BA).

CC – dominance of *Acer rubrum* (red maple) in the overstory (greater than 40% of BA).

**Range:** Piedmont, Pittsburgh Plateau, Ridge and Valley.

**TM Tuliptree - 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 BA 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 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 vernal 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), *Claytonia virginica* (spring-beauty), etc.

#### **Related types & their distinguishing features:**

AR – dominance of *Quercus rubra* (northern red oak) in the overstory (greater than 40% of BA)

**AND** sparse ericaceous shrubs in the understory (less than 30% relative cover).

CC – dominance of *Acer rubrum* (red maple) in the overstory (greater than 40% of BA).

BB – when NO single northern hardwood species occupies a majority of the stand's overstory BA.

**Range:** Piedmont, Pittsburgh Plateau, Ridge and Valley.

**PR Red Pine – Mixed Hardwood Forest:** Remnant native *Pinus resinosa* (red pine) usually in association with northern hardwoods.

**Range:** Glaciated Northeast

**PP Pine Plantation:** Pine plantations (>50% pines). Plantings that are more than fifty-percent hardwood, or over-topped by hardwoods will be considered one of the above types.

**PS Spruce Plantation:** *Picea spp.* (spruce) or *Larix spp.* (larch) plantations (>50% spruce or larch). Plantings that are more than fifty- percent hardwood, or over- topped by hardwoods will be considered one of the above types.

**PH Hardwood Plantation:** Hardwood plantations (>50% hardwoods). Plantings must be pure; if mixed with other hardwoods the stand will be considered one of the above types.

**PX Mixed Species Plantation:** Mixed species plantations. Plantings can be any combination or percentage. However it must be a pure plantation; if mixed with other hardwoods the stand will be considered one of the above types.

**MX Miscellaneous Forest Community Types:** This code is intended to cover a variety of forest community types. It should be used for forest communities whose composition is such that they do not qualify for any other forest community type. However, most upland forest communities on State Forest lands will fall into one of the forest community types described above. This classification, as with any classification system, is an artificial scheme to categorize vegetative patterns in the landscape. Forests (unfortunately or fortunately) do not adhere to our attempts to classify them. Following are some examples of forest community types covered by this code.

**Serpentine Pitch Pine - Oak Forest:** This community type is part of the “Serpentine barren complex.” It occurs in areas underlain by serpentine bedrock where soil development has proceeded far enough to support forest vegetation, but not so far as to override the influence of serpentine chemistry on species composition. Fire is an important factor in the establishment and persistence of *Pinus rigida* (pitch pine). In the absence of fire, pine is likely to decrease in favor of hardwood species. Characteristic overstory species often include *Quercus stellata* (post oak), *Q. marilandica* (blackjack oak), *Pinus rigida* (pitch pine), *Sassafras albidum* (sassafras), *Juniperus virginiana* (red-cedar), *Nyssa sylvatica* (black-gum), *Populus grandidentata* (large-toothed aspen), and *Robinia pseudoacacia* (black locust) which is generally invasive in these systems. The shrub layer is often dominated by an impenetrable tangle of *Smilax rotundifolia* (greenbrier) and *S. glauca* (catbrier). *Q. prinoides* (chinquapin oak) often occurs in the understory and in openings; *Quercus ilicifolia* (scrub oak) is frequently present in openings. Low shrub species may include *Vaccinium pallidum* (lowbush blueberry), *V. stamineum* (deerberry), and *Gaylussacia baccata* (black huckleberry). Herbaceous species may include *Pteridium aquilinum* (bracken fern), *Aralia nudicaulis* (wild sarsaparilla), and a variety of graminoids.

**Related types:** The “Serpentine Virginia pine - oak forest” type also occurs on serpentinite-derived soils and shares many species with this type. The Virginia pine type is dominated by a mixture of *Pinus virginiana* (Virginia pine) and various *Quercus spp.* (oaks). *Pinus virginiana* produces denser shade and thicker litter than does *P. rigida*. Herbaceous and shrub growth under *P. virginiana* is generally sparse. The fire ecology of the two species is also vastly different. For a more detailed explanation of the ecology of serpentine barrens, see the description of the “Serpentine barren complex.”

**Range:** Piedmont.

**Serpentine Virginia Pine - Oak Forest:** This community type is part of the “Serpentine barren complex.” It occurs in areas underlain by serpentine bedrock, where soil development has proceeded far enough to support forest vegetation, but not so far as to override the influence of serpentine chemistry on species composition. Characteristic overstory species, when present, include *Quercus stellata* (post oak), *Q. marilandica* (blackjack oak), *Pinus virginiana* (Virginia pine), *Sassafras albidum* (sassafras), *Prunus serotina* (black cherry), *Juniperus virginiana* (red-cedar), *Nyssa sylvatica* (black-gum), *Robinia pseudoacacia* (black locust), and *Acer rubrum* (red maple). The shrub layer may be quite sparse under the dense shade and heavy litter of *Pinus virginiana* (Virginia pine), where the canopy is more open there may be an impenetrable tangle of *Smilax rotundifolia* (greenbrier) and *S. glauca* (catbrier). Other shrub species may include *Vaccinium pallidum* (lowbush blueberry), *V. stamineum* (deerberry), and *Gaylussacia baccata* (black huckleberry). *Q. prinoides* (chinquapin oak) may be present in the understory or in openings. *Q. ilicifolia* (scrub oak) may also occur in openings. Herbaceous cover is also low; species often include *Pteridium aquilinum* (bracken fern) and *Aralia nudicaulis* (wild sarsaparilla).

**Related types:** The “Serpentine pitch pine - oak forest” type also occurs on serpentinite-derived soils and shares many species with this type. The pitch pine type is dominated by a mixture of *Pinus rigida* (pitch pine) and various *Quercus spp.* (oaks). *Pinus virginiana* (Virginia pine) produces denser shade and thicker litter than does *P. rigida*. Herbaceous and shrub growth under *P. virginiana* is generally sparse. The fire ecology of the two species is also vastly different. For a more detailed explanation of the ecology of serpentine barrens, see the description of the “Serpentine barren complex.”

**Range:** Piedmont.

**Sweet Gum / Oak Coastal Plain Forest:** This type is restricted to the level, sandy soils of the Coastal Plain the adjacent Piedmont; characteristic species include, *Liquidambar styraciflua* (sweet-gum) usually a dominant, *Quercus falcata* (southern red oak), *Q. phellos* (willow oak), *Q. alba* (white oak), *Fagus grandifolia* (American beech), *Acer rubrum* (red maple), *Smilax rotundifolia* (greenbrier), *Leucothoe racemosa* (fetterbush), *Lyonia mariana* (stagger-bush), *Clethra alnifolia* (sweet pepper-bush), *Kalmia latifolia* (mountain laurel), and sometimes *Ilex opaca* (American holly). Not much of this type remains in Pennsylvania, and what there is tends to be badly degraded.

**Related types:** The predominance of *Liquidambar styraciflua* (sweet gum), *Quercus phellos* (willow oak), *Lyonia mariana* (stagger-bush), and other coastal plain species makes this community type easily distinguishable from other terrestrial forest types in Pennsylvania. The “Red maple - magnolia Coastal Plain palustrine forest” is a palustrine forest type also characteristic of Pennsylvania’s Coastal Plain. The difference in hydrology and associated species clearly differentiates the two.

**Range:** Coastal Plain, Piedmont.

**Others:** Many other minor forest community types exist in Pennsylvania. If a type exists that is extensive and should be recognized and delineated, it should be brought to the attention of the Resource Planning Section for inclusion in the Manual.

## **PALUSTRINE (FLOODPLAIN) FORESTS**

### **2016 UPDATE**

Palustrine Forests are wetlands dominated by tree species that form at least 30% of the main tree canopy of the area. Palustrine Forest communities will be classified using the following two character alphabetical system for forest community type, followed by a numerical digit for site, size and stocking class, followed by an alphabetical digit for commercial/noncommercial availability. Palustrine forest communities should be a minimum of one acre or larger for delineation.

### **CODE**

### **FOREST COMMUNITY TYPE**

**UT Black Spruce - Tamarack Peatland Forest :** This describes a group of wetland forests found in glacially formed, ice-block depressions of small watersheds of the glaciated regions of Pennsylvania. These wetlands are dominated by a mixture of black spruce (*Picea mariana*) and tamarack (*Larix laricina*). The substrate is deep, poorly decomposed peat. There is generally very little groundwater or surface water enrichment in these systems except at the interface with uplands, leading to trees of small stature (< 40 ft.) in the inner portions of the wetland. Other trees that may occur include gray birch (*Betula populifolia*), red maple (*Acer rubrum*), Eastern hemlock (*Tsuga canadensis*), eastern white pine (*Pinus strobus*), and quaking aspen (*Populus tremuloides*). Hemlock and white pine often occur as a taller fringe at the outer edge of the wetland where organic soils give way to mineral; at this interface there is more nutrient input from surface and groundwater from the surrounding uplands.

Shrub species may include swamp azalea (*Rhododendron viscosum*), leatherleaf (*Chamaedaphne calyculata*), mountain holly (*Ilex mucronata*), winterberry (*Ilex verticillata*), and highbush blueberry (*Vaccinium corymbosum*). The sedge, *Carex trisperma*, is often dominant along with a carpet of sphagnum mosses. Other species may include star-flower (*Trientalis borealis*), cinnamon fern (*Osmunda cinnamomea*), violets (*Viola spp.*), creeping snowberry (*Gaultheria hispidula*), and goldthread (*Coptis trifolia*). Sphagnum occurs throughout. (Davis T. 2011. Pennsylvania Natural Heritage Program. Black Spruce – Tamarack Peatland Forest Factsheet. Available from: <http://www.naturalheritage.state.pa.us/Community.aspx?=16027> Date Accessed: March 17, 2015).

**Related types:** Where the site is less than 30% stocked with trees, this type becomes the “Black spruce - tamarack palustrine woodland.” The open canopy of the woodland type allows for a much more extensive shrub layer—usually dominated by *Chamaedaphne calyculata* (leatherleaf)—and a herbaceous layer more typical of open bogs.

**Range:** Glaciated NE, Glaciated NW, Pocono Plateau.

**UK Red Spruce Palustrine Forest:** This type occurs on shallow organic soils or mineral soils with a substantial accumulation of organic matter. Red spruce (*Picea rubens*) is always present, usually dominant or codominant. Other tree species include eastern white pine (*Pinus strobus*), Eastern hemlock (*Tsuga canadensis*), tamarack (*Larix laricina*), red maple (*Acer rubrum*), gray birch (*Betula populifolia*), yellow birch (*B. alleghaniensis*), blackgum (*Nyssa sylvatica*), and occasionally balsam fir (*Abies balsamea*). Rosebay (*Rhododendron maximum*) is common and often forms a dense understory. Other shrub species that may be present include witherod (*Viburnum cassinoides*), winterberry (*Ilex verticillata*), highbush blueberry (*Vaccinium corymbosum*), and mountain holly (*Ilex mucronata*). There is usually a pronounced hummock and hollow microtopography. Characteristic herbs occurring on hummocks may include cinnamon fern (*Osmunda cinnamomea*), violets (*Viola* spp.), partridge-berry (*Mitchella repens*), Canada mayflower (*Maianthemum canadense*), goldthread (*Coptis trifolia*), dewdrop (*Dalibarda repens*), bunchberry (*Cornus Canadensis*), rough-leaved aster (*Eurybia radula*), *Carex trisperma* and other sedge species. The bryophyte layer is usually well developed on the hummocks and dominated by sphagnum while the pools are flooded or bare leaf and needle litter. (Eichelberger, B. 2011. Pennsylvania Natural Heritage Program. Red Spruce Palustrine Forest Factsheet. Available from: <http://www.naturalheritage.state.pa.us/Community.aspx?=16031> Date Accessed: March 17, 2015).

**Related types:** Where the site is less than 30% stocked with tress, this type becomes the “Red spruce palustrine woodland,” where dominance is shared with hardwoods (where total conifer cover is less than 75% of the canopy) this becomes the “Red spruce - mixed hardwood palustrine forest.”

**Range:** Glaciated NE, Pocono Plateau.

**UF Hemlock Palustrine Forest:** These are wetland forests dominated or co-dominated by Eastern hemlock (*Tsuga canadensis*). The canopy may also contain a mixture of other conifers, including red spruce (*Picea rubens*), tamarack (*Larix laricina*), and eastern white pine (*Pinus strobus*). Hardwoods may contribute up to 25% of the canopy; common species include red maple (*Acer rubrum*), yellow birch (*Betula alleghaniensis*), and black ash (*Fraxinus nigra*). There is generally a pronounced hummock and hollow microtopography. This community type may occur as a zone around a wetter community type of a more northern affinity. It may also occur in basins or on slopes fed by groundwater seepage. Rosebay (*Rhododendron maximum*) is often present, sometimes quite dense. Witherod (*Viburnum cassinoides*), swamp azalea (*Rhododendron viscosum*), winterberry (*Ilex verticillata*), and

highbush blueberry (*Vaccinium corymbosum*) are also commonly associated with this type. Herbs may include cinnamon fern (*Osmunda cinnamomea*), skunk-cabbage (*Symplocarpus foetidus*), sensitive fern (*Onoclea sensibilis*), partridge-berry (*Mitchella repens*), Canada mayflower (*Maianthemum canadense*), goldthread (*Coptis trifolia*), violets (*Viola* spp.), dewdrop (*Dalibarda repens*), star-flower (*Trientalis borealis*), and various grasses and sedges. There may be a strong bryophyte component, usually dominated by sphagnum moss (*Sphagnum* spp.).

This community probably often represents an older stage of the Hemlock – Mixed Hardwood Palustrine Forest. The trees tend to be larger, and the canopy more closed. The understory consists of similar species, but more sparse, sometimes absent in large patches.

(Eichelberger, B. 2011. Pennsylvania Natural Heritage Program. Hemlock Palustrine Forest Factsheet. Available from: <http://www.naturalheritage.state.pa.us/Community.aspx?=16028> Date Accessed: March 17, 2015).

**Related types:** Where total conifer cover is less than 75% of the canopy, this type becomes the “Hemlock - Mixed Hardwood Palustrine Forest.”

**Range:** Great Lakes Region, Glaciated NE, Glaciated NW, Pittsburgh Plateau, Pocono Plateau, Ridge and Valley, Unglaciated Allegheny Plateau.

**UB Hemlock – Mixed Hardwood Palustrine Forest:** This describes a group of wetland forests that are dominated by a mixture of conifers and hardwood species. The substrate is usually mineral soil or muck over mineral soil. There is generally some groundwater enrichment in these systems. Eastern hemlock (*Tsuga canadensis*) contributes between 25% to 75% of the canopy. Other conifer species that may occur with hemlock include eastern white pine (*Pinus strobus*), red spruce (*Picea rubens*), and tamarack (*Larix laricina*). The most common hardwood species are yellow birch (*Betula alleghaniensis*), red maple (*Acer rubrum*), black ash (*Fraxinus nigra*), blackgum (*Nyssa sylvatica*), and gray birch (*Betula populifolia*). Rosebay (*Rhododendron maximum*) often forms a dense understory; other shrubs may include highbush blueberry (*Vaccinium corymbosum*), winterberry (*Ilex verticillata*), swamp azalea (*Rhododendron viscosum*), and witherod (*Viburnum cassinoides*). Herbaceous species may include cinnamon fern (*Osmunda cinnamomea*), sedges (e.g., *Carex trisperma*, *Carex prasina*, *Carex leptalea*), violets (*Viola* spp.), skunk-cabbage (*Symplocarpus foetidus*), false hellebore (*Veratrum viride*), sensitive fern (*Onoclea sensibilis*), partridge-berry (*Mitchella repens*), gold-thread (*Coptis trifolia*), Canada mayflower (*Maianthemum canadense*), crested wood fern (*Dryopteris cristata*), and purple-stemmed aster (*Symphotrichum puniceum*). The bryophyte layer is usually well developed and may be dominated by sphagnum. (Davis T. 2011. Pennsylvania Natural Heritage Program. Hemlock – Mixed Hardwood Palustrine Forest

Factsheet. Available from: <http://www.naturalheritage.state.pa.us/Community.aspx?=16029>  
Date Accessed: March 17, 2015)

**Related types:** Where the conifer component is less than 25% of the canopy, see the “Broadleaf palustrine forests” section, and where the conifer component is greater than 75%, see the “Hemlock palustrine forest” type under “Coniferous palustrine forests.”

**Range:** Glaciated NE, Glaciated NW, Pocono Plateau, Ridge and Valley, Unglaciated Allegheny Plateau.

**UH Red Spruce - Mixed Hardwood Palustrine Forest:** This describes a group of wetland forests that are dominated by a mixture of conifers and hardwood species. The substrate is usually shallow organic matter over mineral soil. There is generally some groundwater enrichment in these systems. Red spruce (*Picea rubens*), sometimes in combination with other conifers, contributes between 25% and 75% of the canopy. Other conifer species that may occur include Eastern hemlock (*Tsuga canadensis*), eastern white pine (*Pinus strobus*), and tamarack (*Larix laricina*). The most common hardwood species are yellow birch (*Betula alleghaniensis*), red maple (*Acer rubrum*), black ash (*Fraxinus nigra*), and occasionally blackgum (*Nyssa sylvatica*).

The Red Spruce Mixed Hardwood Palustrine Forest often exhibits a dense cover of hardwood shrub species including mountain holly (*Ilex mucronata*), highbush blueberry (*Vaccinium corymbosum*), winterberry (*Ilex verticillata*), swamp azalea (*Rhododendron viscosum*), and witherod (*Viburnum cassinoides*). Herbaceous and creeping shrub species may include goldthread (*Coptis trifolia*), cinnamon fern (*Osmunda cinnamomea*), sensitive fern (*Onoclea sensibilis*), royal fern (*Osmunda regalis*), marsh fern (*Thelypteris palustris*), sedges (*Carex disperma*, *Carex folliculata*, and *Carex trisperma*), violets (*Viola* spp.), creeping snowberry (*Gaultheria hispidula*), Canada mayflower (*Maianthemum canadensis*), asters, and grasses such as slender mannagrass (*Glyceria melicaria*). The bryophyte layer is usually well developed and dominated by sphagnum. (Eichelberger, B. 2011. Pennsylvania Natural Heritage Program. Red Spruce – Mixed Hardwood Palustrine Forest Factsheet. Available from: <http://www.naturalheritage.state.pa.us/Community.aspx?=16030> Date Accessed: March 17, 2015).

**Related types:** Where the conifer component is less than 25% of the canopy, see the “Broadleaf palustrine forests” section, and where the conifer component is greater than 75%, see the “Red spruce palustrine forest” type under “Coniferous Palustrine Forests.”

**Range:** Glaciated NE, Pocono Plateau, Ridge and Valley, Unglaciated Allegheny Plateau.

**UA Oak – Mixed Hardwood Palustrine Forest (formerly Bottomland Oak - Hardwood Palustrine Forest):** The Oak – Mixed Hardwood Palustrine Forest community occurs in seasonally inundated depressions and floodplains of smaller tributaries in flat-bottomed valleys throughout Pennsylvania. It is found on sandy loams or clay soils of glacial lakeplains, or on soils with impermeable subsoils in unglaciated regions. There is generally some layer that impedes drainage.

This community is characterized by a closed canopy forest, dominated by pin oak (*Quercus palustris*) and swamp white oak (*Quercus bicolor*). Associate canopy species may include red maple (*Acer rubrum*), blackgum (*Nyssa sylvatica*), black ash (*Fraxinus nigra*), American elm (*Ulmus americana*), green ash (*Fraxinus pennsylvanica*), and bitternut hickory (*Carya cordiformis*). The understory vegetation is generally sparse, but varies considerably depending on site hydrology and light availability. Under more open canopies, the shrub layer often contains buttonbush (*Cephalanthus occidentalis*), winterberry (*Ilex verticillata*), arrow-wood (*Viburnum recognitum*), spicebush (*Lindera benzoin*), and highbush blueberry (*Vaccinium corymbosum*). The sparse herbaceous layer may include sedges (*Carex intumescens*, *Carex lurida*, *Carex crinita*, *Carex bromoides*), skunk-cabbage (*Symplocarpus foetidus*), turtlehead (*Chelone glabra*), jewelweed (*Impatiens* spp.), tearthumb (*Persicaria sagittata*), clear weed (*Pilea pumila*), rice cutgrass (*Leersia oryzoides*), sensitive fern (*Onoclea sensibilis*), stout woodreed (*Cinna arundinacea*), marsh fern (*Thelypteris palustris*), cinnamon fern (*Osmunda cinnamomea*), beggar-ticks (*Bidens frondosa*), water-pepper (*Persicaria punctata*), floating mannagrass (*Glyceria septentrionalis*), fowl mannagrass (*Glyceria striata*), slender mannagrass (*Glyceria melicaria*), bugleweed (*Lycopus uniflorus*), clearweed (*Pilea pumila*), false nettle (*Boehmeria cylindrica*), and other species tolerant of lower light conditions. These wetlands may also contain a substantial bryophyte layer that includes several peat moss (*Sphagnum* spp.) species or may be completely devoid of vegetation altogether (in dense shade and/or where seasonal flooding occurs). (Zimmerman, E. 2011. Pennsylvania Natural Heritage Program. Oak – Mixed Hardwood Palustrine Forest Factsheet. Available from: <http://www.naturalheritage.state.pa.us/Community.aspx?=16019> Date Accessed: March 17, 2015).

**Related types:** This community types is distinguished from the various red maple palustrine forest types by a dominance of *Quercus palustris* (pin oak), and/or *Q. bicolor* (swamp white oak).

**Range:** Piedmont, Pittsburgh Plateau, Ridge and Valley.

**UC Red Maple - Black Ash Palustrine Forest:** These are palustrine forests enriched by groundwater, varying from circumneutral to calcareous. The substrate can be muck or

mineral soil with or without a thin layer of organic matter. Calciphiles are often present. The dominant trees are usually red maple (*Acer rubrum*) and black ash (*Fraxinus nigra*). Associates may include swamp white oak (*Quercus bicolor*), blackgum (*Nyssa sylvatica*), and American elm (*Ulmus americana*). Common understory species often include meadow-sweets (*Spiraea latifolia*, *S. alba*), winterberry (*Ilex verticillata*), and alders (*Alnus serrulata* or *A. incana* ssp. *rugosa*). Alder-leaved buckthorn (*Rhamnus alnifolia*) and poison sumac (*Toxicodendron vernix*) may be present in the more calcareous sites. Common herbs may include royal fern (*Osmunda regalis*), tussock sedge (*Carex stricta*), a sedge (*Carex leptalea*), skunk-cabbage (*Symplocarpus foetidus*), violets (*Viola* spp.), water avens (*Geum rivale*), and sensitive fern (*Onoclea sensibilis*). Many calciphilic species associated with this type have moderate to high light requirements, and thus are found in openings. These species may include hemlock-parsley (*Conioselinum chinense*), spreading globe-flower (*Trollius laxus*), sedges (*Carex interior*, *C. flava*, *C. lacustris*, *C. laevivaginata*), small yellow lady's-slipper (*Cypripedium parviflorum* var. *parviflorum*), showy lady's-slipper (*Cypripedium reginae*), and downy willow-herb (*Epilobium strictum*). (Eichelberger, B. 2011. Pennsylvania Natural Heritage Program. Red Maple – Black Ash Palustrine Forest Factsheet. Available from: <http://www.naturalheritage.state.pa.us/Community.aspx?=16022> Date Accessed: March 17, 2015).

**Related types:** The much more common “Red maple - black-gum palustrine forest” is not generally influenced by calcareous waters, and lacks the *Fraxinus nigra* (black ash) and herbaceous calciphiles that characterize this type.

**Range:** Glaciated NE, Glaciated NW, Piedmont, Ridge and Valley.

**UG Red maple - Black Gum Palustrine Forest:** The canopy is dominated by red maple (*Acer rubrum*) and/or blackgum (*Nyssa sylvatica*). Other trees, including yellow birch (*Betula alleghaniensis*), eastern white pine (*Pinus strobus*), Eastern hemlock (*Tsuga canadensis*), swamp white oak (*Quercus bicolor*), pin oak (*Quercus palustris*), or black willow (*Salix nigra*), may also occur. The shrub layer is variable and may include highbush blueberry (*Vaccinium corymbosum*), winterberry (*Ilex verticillata*), alder (*Alnus* spp.), and dogwoods (*Cornus* spp.). Herbs include skunk-cabbage (*Symplocarpus foetidus*), violets (*Viola* spp.), cinnamon fern (*Osmunda cinnamomea*), sedges (*Carex* spp.), and sensitive fern (*Onoclea sensibilis*). **Related types:** The “Red maple - black ash palustrine forest” occurs under the influence of more calcareous waters, and is characterized by the presence of *Fraxinus nigra* (black ash) on most sites and herbaceous calciphiles on some sites. (Eichelberger, B. 2011. Pennsylvania Natural Heritage Program. Red Maple – Black-gum Palustrine Forest Factsheet. Available from: <http://www.naturalheritage.state.pa.us/Community.aspx?=16023> Date Accessed: March 17,

2015).

**Range:** Entire state.

**SC Red Maple – Elm - Willow Floodplain Swamp:** This palustrine forest type is primarily associated with major rivers, often located in old oxbows along the floodplain, or in depressions behind natural levees. These systems are subject to periodic flooding, may stay inundated for substantial periods of time, and may also receive groundwater enrichment and/or surface water from adjacent uplands. Characteristic species often include red maple (*Acer rubrum*), green ash (*Fraxinus pennsylvanica*), American elm (*Ulmus americana*), red elm (*Ulmus rubra*), pin oak (*Quercus palustris*), swamp white oak (*Quercus bicolor*), bitternut hickory (*Carya cordiformis*), black willow (*Salix nigra*), silky willow (*Salix sericea*), arrow-wood (*Viburnum recognitum*), silky dogwood (*Cornus amomum*), spicebush (*Lindera benzoin*), riverbank grape (*Vitis riparia*), elderberry (*Sambucus canadensis*), sensitive fern (*Onoclea sensibilis*), ostrich fern (*Matteuccia struthiopteris*), and smartweeds (*Polygonum* and *Persicaria* spp.). (Zimmerman, E. 2011. Pennsylvania Natural Heritage Program. Red Maple – Elm – Willow Floodplain Forest Factsheet. Available from: <http://www.naturalheritage.state.pa.us/Community.aspx?=16021> Date Accessed: March 17, 2015).

**Related types:** The other floodplain forest types, “Sycamore - (river birch) - box-elder floodplain forest” and “Silver maple floodplain forest” generally occur in areas that respond more quickly to changes in river level, and do not hold water for substantial periods of time following flooding.

**Range:** Entire state.

**SE Sycamore - (River Birch) - Box Elder Floodplain Forest:** This community type occurs along the floodplains of our midsize river systems that receive periodic or seasonal flooding. Although this is typically a palustrine community type, there may be examples that are terrestrial. The most characteristic tree species of this type are *Platanus occidentalis* (sycamore).

**Sycamore – Mixed Hardwood Floodplain Forest:** This community is primarily associated with intermediate and smaller tributaries on low to intermediate elevation islands and terraces. The presence of several tree species with low to moderate flood tolerance suggests the substrate is sufficiently coarse and the flow is sufficiently rapid to prevent significant development of anaerobic soil conditions. The substrate is

saturated or inundated annually from less than a week to as long as three months each year (typically more than 7 weeks each year). The substrate is usually coarse sand and gravel, often with inclusions of cobble-lined scour channels.

This community is clearly dominated by sycamore (*Platanus occidentalis*) in the forest canopy, but usually has significant cover of one or more other hardwood species. Typical canopy associates may include sugar maple (*Acer saccharum*) on smaller tributaries, silver maple (*Acer saccharinum*), and river birch (*Betula nigra*). The sub-canopy may be sparse to moderately dense, consisting of canopy species as well as hornbeam (*Carpinus caroliniana*). Typical shrubs may include spicebush (*Lindera benzoin*) and smooth alder (*Alnus serrulata*). On sites with a closed canopy, jewelweed (*Impatiens* spp.), clearweed (*Pilea pumila*), false nettle (*Boehmeria cylindrica*), wood nettle (*Laportea canadensis*), stinging nettle (*Urtica dioica*), ostrich fern (*Matteuccia struthiopteris*), wild germander (*Teucrium canadense*), jumpseed (*Persicaria virginianum*), Jack-in-the-pulpit (*Arisaema triphyllum*), and green-dragon (*Arisaema dracontium*) are common. With a more open canopy, goldenrods (*Solidago* spp.), deer-tongue grass (*Panicum clandestinum*), marsh fern (*Thelypteris palustris*), wingstem (*Verbesina alternifolia*), and riverbank wild-rye (*Elymus riparius*) dominate the herbaceous layer. The shrub and herbaceous layers are often heavily impacted by non-native plant species such as multiflora rose (*Rosa multiflora*), Morrow's honeysuckle (*Lonicera morrowii*), common privet (*Ligustrum vulgare*), Japanese barberry (*Berberis thunbergii*), reed canary-grass (*Phalaris arundinacea*), Japanese stiltgrass (*Microstegium vimineum*), Japanese knotweed (*Fallopia japonica*), dame's-rocket (*Hesperis matronalis*), and garlic-mustard (*Alliaria petiolata*). (Zimmerman, E. 2011. Pennsylvania Natural Heritage Program. Sycamore – Mixed Hardwood Floodplain Forest Factsheet. Available from: <http://www.naturalheritage.state.pa.us/Community.aspx?c=30019> Date Accessed: March 17, 2015).

**Sycamore Floodplain Forest:** The Sycamore Floodplain Forest community typically occurs on the floodplains of intermediate to large order streams and rivers of the Ohio River basin, subject to extended periods of inundation, ice floe, and high velocity flood events. This type is found along higher gradient, smaller tributaries within the Susquehanna and Delaware River Basins. The sites supporting this type vary from islands, low bars, and cobble levees to low terraces and back channels (sloughs). The substrate may remain saturated or inundated for extended periods of time during the growing season. The substrate varies from well drained coarse sand, gravel, or cobble on bars, levees and islands in the stream channel to finer textured silt-loam of the sloughs and low terraces where flooding velocity is much reduced. The majority of

stands appear to be roughly even-aged, suggesting the colonization of newly formed gravel/cobble bars after flood events. Where coarse sediment is accreting on the edge of existing sycamore stands, there may be several distinct cohorts of sycamore trees, with the oldest cohort furthest from the active stream channel. The community is characterized by a relatively open canopy dominated by sycamore (*Platanus occidentalis*). In the Ohio Basin, box-elder (*Acer negundo*) is often an important component of the understory. Silver maple (*Acer saccharinum*), is present, but not dominant, and river birch (*Betula nigra*), may be present in this type in the Susquehanna and Delaware River Basins. Other tree species, when present include red ash (*Fraxinus pennsylvanica*), black walnut (*Juglans nigra*), black willow (*Salix nigra*), and black maple (*Acer nigrum*). Common shrubs may include silky dogwood (*Cornus amomum*), gray dogwood (*Cornus racemosa*), ninebark (*Physocarpus opulifolius*), riverbank grape (*Vitis riparia*), and poison-ivy (*Toxicodendron radicans*). Herbaceous species diversity and cover varies greatly with the density of the canopy. On sites with a closed canopy, jewelweed (*Impatiens spp.*), clearweed (*Pilea pumila*), false nettle (*Boehmeria cylindrica*), wood-nettle (*Laportea canadensis*), great nettle (*Urtica dioica*), ostrich fern (*Matteuccia struthiopteris*), northern germander (*Teucrium canadense*), jumpseed (*Persicaria virginiana*), Jack-in-the-pulpit (*Arisaema triphyllum*), and green dragon (*Arisaema dracontium*) are often present. With a more open canopy, goldenrods (*Solidago spp.*), wingstem (*Verbesina alternifolia*), and riverbank wild-rye (*Elymus riparius*) dominate the herbaceous layer. The shrub and herbaceous layers are often heavily impacted by non-native plant species such as multiflora rose (*Rosa multiflora*), Morrow's honeysuckle (*Lonicera morrowii*), common privet (*Ligustrum vulgare*), Japanese barberry (*Berberis thunbergii*), reed canary-grass (*Phalaris arundinacea*), stiltgrass (*Microstegium vimineum*), Japanese knotweed (*Fallopia japonica*), dame's-rocket (*Hesperis matronalis*), and garlic mustard (*Alliaria petiolata*). (Zimmerman, E. 2011. Pennsylvania Natural Heritage Program. Sycamore Floodplain Forest Factsheet. Available from: <http://www.naturalheritage.state.pa.us/Community.aspx?=16025> Date Accessed: March 17, 2015).

**Related types:** The “Silver maple floodplain forest” occurs in a similar setting, but is distinguished by *Acer saccharinum* (silver maple) dominance. In backwater areas with standing water through much of the year, the “Red maple - elm - willow floodplain swamp” often occurs. Where the canopy becomes open, usually on islands or gravel bars, this type may grade into the “River birch - sycamore floodplain scrub.”

**Range:** Entire state.

**SM Silver Maple Floodplain Forest:** This community is most common on low terraces and levees of the floodplain and islands of large tributaries of the major drainages of Pennsylvania. Soils vary from moderately well-drained (scour zone stands, coarse sand, gravel and/or cobble substrate) to poorly drained (low flood flow velocity areas, sandy loam to silt loam substrates). Island stands tend to have the largest canopy trees on downstream ends of the island with trees becoming progressively smaller and younger towards the upstream end. The canopy of Silver Maple Floodplain Forests is strongly dominated by silver maple (*Acer saccharinum*), which may be the only canopy tree species present at a site. Other canopy trees, when present, include red maple (*Acer rubrum*), black willow (*Salix nigra*), box-elder (*Acer negundo*), American elm (*Ulmus americana*), and slippery elm (*Ulmus rubra*). River birch (*Betula nigra*) is present in the canopy of Silver Maple Floodplain Forests in the Susquehanna, Potomac, and Delaware River basins.

Shrubs may include silky dogwood (*Cornus amomum*), gray dogwood (*Cornus racemosa*), poison-ivy (*Toxicodendron radicans*), spicebush (*Lindera benzoin*), elderberry (*Sambucus canadensis*), and arrow-wood (*Viburnum recognitum*). Herbaceous species may include ostrich fern (*Matteuccia struthiopteris*), jewelweed (*Impatiens capensis*), pale jewelweed (*Impatiens pallida*), Turk's-cap lily (*Lilium superbum*), clearweed (*Pilea pumila*), rice cutgrass (*Leersia oryzoides*), sensitive fern (*Onoclea sensibilis*), Jack-in-the-pulpit (*Arisaema triphyllum*), green-dragon (*Arisaema dracontium*), stout woodreed (*Cinna arundinacea*), false nettle (*Boehmeria cylindrica*), common blue violet (*Viola sororia*), and jumpseed (*Persicaria virginianum*). Commonly occurring invasive plant species often include multiflora rose (*Rosa multiflora*), Morrow's honeysuckle (*Lonicera morrowii*), common privet (*Ligustrum vulgare*), Japanese barberry (*Berberis thunbergii*), Japanese stiltgrass (*Microstegium vimineum*), Japanese knotweed (*Fallopia japonica*), and garlic-mustard (*Alliaria petiolata*).

Forest quality varies considerably across the range of this community type in Pennsylvania. Most stands exhibit a moderately open understory and regeneration of overstory trees has been a concern in Silver Maple Floodplain Forests in the region due to changes in frequency and duration of flooding events and invasion of exotic invasive plants. (Zimmerman, E. 2011. Pennsylvania Natural Heritage Program. Silver Maple Floodplain Forest Factsheet. Available from: <http://www.naturalheritage.state.pa.us/Community.aspx?=16026> Date Accessed: March 17, 2015).

**Related types:** The "Sycamore - (river birch) - box-elder floodplain forest" occurs in a similar setting, but is dominated by a mix of species, rather than by *Acer saccharinum* (silver maple). In backwater areas with standing water throughout much of the year, the "Red maple - elm - willow floodplain swamp" often occurs. Where the canopy becomes open, usually on islands or gravel bars, this type may grade into the "River birch - sycamore floodplain scrub."

**Range:** Entire state—major river systems, main stem.

**SX Miscellaneous Palustrine/Floodplain Forest:** This code is intended to cover a variety of palustrine/floodplain forest community types. It should be used for forest communities whose composition is such that they do not qualify for any other forest community type. However, most palustrine/floodplain forest communities on State Forest lands will fall into one of the forest community types described above. This classification, as with any classification system, is an artificial scheme to categorize vegetative patterns in the landscape. Forests (unfortunately or fortunately) do not adhere to our attempts to classify them. Following are some examples of forest community types covered by this code (descriptions can be found at <http://www.naturalheritage.state.pa.us/>).

**Bitternut Hickory Floodplain Forest**

**Elm – Ash – Maple Lakeplain Forest**

**Green Ash – Mixed Hardwood Floodplain Forest**

**Red Maple – Magnolia Palustrine Forest**

**Sugar Maple – Mixed Hardwood Floodplain Forest**

**Sweetgum – Willow Oak Coastal Plain Palustrine Forest**

### **SITE, SIZE, STOCKING**

Site classes denote the quality of the growing site from a statewide perspective from good – medium - poor. Size denotes the diameters of trees. Stocking is used to determine if the forest community is fully stocked with trees. The appropriate site, size and stocking codes should follow the forest community type for all forest communities.

### **2016 UPDATE**

#### **Site Class**

Site classes are numbered 1 (the best), 2 and 3 (the poorest). Bureau of Forestry site classes are designated as follows:

- 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. In addition to the usual beech-

birch-maple-cherry of northern and Allegheny hardwoods, white pine, hemlock, ash and basswood are generally present. In the oak types where red oak and white oak along with hemlock form the major portion of the stand, the presence of tulip-tree (yellow poplar) and ash indicates Site 1. 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. In the northern and Allegheny hardwood types, Site 2 is primarily a beech-birch-maple-cherry mixture with shorter heights than on site 1. In the oak types, site 2 has a preponderance of red oak, black oak, white oak and, to a lesser extent, scarlet oak and chestnut oak. 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. Note that in certain community types, species such as ash, black cherry, white pine and pitch pine may assume a super-dominant position in the overstory canopy. These individuals should be excluded in evaluating the prevailing tree heights for assigning site class.

### **Size/Stocking**

Size/Stocking Classes are numbered 1 through 4 to represent stands ranging from large sawtimber (1), medium sawtimber (2), poletimber (3) to sapling stages or smaller (4) that are fully stocked. Size/stocking classes 5 through 8 are to be used for areas that have experienced a disturbance and as a result, are understocked. Use the fifty-percent stocking line on the appropriate stocking chart as a guide for determining whether or not an area should be designated as understocked (<50% and >30%). This determination is most challenging when it is unclear what constitutes the prevailing or manageable forested overstory layer. In these circumstances, one must first determine what the manageable stand component is (this may be a regenerating cohort or residual trees following a disturbance). Once it is determined what the manageable overstory is, the size/stocking is determined from it. Forest community types falling below the 30% stocking level should be delineated as Woodlands (O5). Bureau of Forestry Size/Stocking Classes are designated as follows:

Stand is > 50% stocked

- 1 Majority of the dominant and codominant trees are > 18" dbh.
- 2 Majority of the dominant and codominant trees are 12-18" dbh.
- 3 Majority of the dominant and codominant trees are 6-12" dbh.
- 4 Majority of dominant and codominant trees are < 6" dbh.

Stand is < 50% stocked with a manageable overstory

- 5 Majority of the dominant and codominant trees are > 18" dbh.
- 6 Majority of the dominant and codominant trees are 12-18" dbh.
- 7 Majority of the dominant and codominant trees are 6-12" dbh.
- 8 Majority of dominant and codominant trees are < 6" dbh.

### **Commercial / Non-Commercial Availability**

Commercial / Non-Commercial designation should follow the forest community type for all forest communities. This determination is based on current and future commercial availability. It includes all sites and/or size/stocking classes.

- C** Designated land classification unit for stands that possess, or have the potential to produce, enough value and wood volume to be operable for a timber sale operation.
- N** Designated land classification unit that does not, and does not have the potential to ever, have enough value and wood volume to be operable for a timber sale operation **OR** the stand is located in areas restricted to sale operations (areas such as natural areas, wild areas, some trail buffers, special resources or areas where aesthetics are highly regarded).

## TERRESTRIAL WOODLANDS / SHRUBLANDS

Terrestrial woodlands and shrublands are upland areas dominated by woody plant communities or by woody species. In the case of woodlands the area is dominated by trees that form less than 30% of the main canopy of the area. Terrestrial woodlands and shrublands will be classified using the following two-digit alphanumerical system for woodland / shrubland type. Terrestrial woodlands and shrublands should be a minimum of one acre or larger for delineation. **Note:** Code is the letter O followed by a one-digit number.

### CODE

### WOODLAND / SHRUBLAND TYPE

- O4 Sweet Fern Savannah:** Dominated by grass, fern, and sweet fern. Usually contains a shrub component, most often sweet fern. This type is present on the Allegheny Plateau, often a result of massive tree mortality and subsequent timber salvage operations.
- O5 Woodland:** Areas that contain naturally-occurring tree species greater than 15 feet in height that are currently less than thirty percent stocked with trees.
- O6 Orchards:** Planted orchard areas such as apple orchards, seed orchards, etc.
- O7 Scrub / Shrub:** Areas dominated by permanent or semi-permanent shrub or brush cover. These areas are sometimes maintained for wildlife habitat (e.g. scrub oak).

## PALUSTRINE WOODLANDS / SHRUBLANDS

Palustrine woodlands and shrublands are wetlands dominated by woody plant communities or by woody species. In the case of woodlands the area is dominated by trees that form less than 30% of the main canopy of the area. Palustrine woodlands and shrublands will be classified using the following two-digit alphanumerical system for woodland / shrubland type. Terrestrial woodlands and shrublands should be a minimum of one acre or larger for delineation. **Note:** Code is the letter U followed by a one-digit number or letter.

### CODE

### WOODLAND / SHRUBLAND TYPE

- U2 Scrub/Shrub:** Shrub-dominated wetlands that are saturated to the surface or flooded with water.

**UX Palustrine Woodland:** Wetlands that contain naturally-occurring tree species greater than 15 feet in height that are currently less than thirty percent stocked with trees.

### **TERRESTRIAL HERBACEOUS OPENINGS**

Terrestrial Herbaceous Openings are upland areas dominated by herbaceous plant communities. Terrestrial Herbaceous Openings will be classified using the following two-digit alphanumerical system for herbaceous opening type. Terrestrial herbaceous openings should be a minimum of one acre or larger for delineation. **Note:** Code is the letter O followed by a one-digit number.

#### **CODE**

#### **HERBACEOUS OPENING TYPE**

- O1 Natural herbaceous areas:** Old fields, upland meadows and other openings dominated by natural herbaceous vegetation.
- O2 Cultivated herbaceous areas:** Dominated by cultivated herbaceous vegetation (seeded or planted usually for habitat improvement).
- O3 Agricultural herbaceous areas:** Dominated by cultivated herbaceous vegetation (seeded or planted for agricultural purposes).
- OM Miscellaneous herbaceous areas:** Other herbaceous openings (e.g., lawns, golf courses, etc).

### **PALUSTRINE HERBACEOUS OPENINGS**

Palustrine Herbaceous Openings are vegetated wetlands that are dominated by herbaceous plant communities and that meet the three parameter (hydrology, hydric soils, and hydrophytes) approach for wetland determination. Palustrine Herbaceous Openings will be classified using the following two-digit alphanumerical system type. Palustrine Herbaceous Openings should be a minimum of one acre or larger for delineation.

#### **CODE**

#### **HERBACEOUS OPENING TYPE**

- U4 Emergent Wetland:** Characterized by emergent herbaceous vegetation (e.g. cattails, sedges, rushes, etc.) and saturated to the surface or flooded with water.

#### **PALUSTRINE COMPLEX**

- U3 Bog/Fen:** Poorly drained depression usually of glacial origin and usually underlain with peat deposits; exhibits distinctive vegetation zonation.

### **NON-VEGETATED OPENINGS**

Barren areas one acre or larger that contain little or no vegetation.

#### **CODE**

#### **NON-VEGETATED OPENING TYPE**

- O9 Rubble Land:** Land surface covered by stones and boulders and sparsely vegetated. Usually associated with talus slopes within the Ridge and Valley Ecoregion.

**OX** Other non-vegetated openings.

## **AQUATIC SYSTEM TYPES**

The Aquatic Systems classification includes both riverine and lacustrine systems and applies to areas of standing or flowing waters that are not considered palustrine wetlands. Aquatic Systems will be classified using the following two-digit alphanumerical system type.

### **LAKES AND PONDS**

<b><u>CODE</u></b>	<b><u>TYPE</u></b>
<b>P1</b>	<b>Human-made impoundment/pond.</b>
<b>P2</b>	<b>Natural lake or pond.</b>

### **WATERCOURSES**

Note: Some watercourses have several designations. The most restrictive designation should apply when streams have two or more classifications. See management zoning on page 13. Watercourses are designated by the letter “S” followed by a one digit number.

<b><u>CODE</u></b>	<b><u>TYPE</u></b>
<b>S1</b>	<b>Exceptional value waters.</b>
<b>S2</b>	<b>High quality waters.</b>
<b>S3</b>	<b>Perennial cold water streams.</b>
<b>S4</b>	<b>Wilderness trout streams.</b>
<b>S5</b>	<b>Warm water streams.</b>
<b>S6</b>	<b>Wild rivers.</b>
<b>S7</b>	<b>Scenic rivers.</b>
<b>S8</b>	<b>Recreational rivers.</b>
<b>S9</b>	<b>Modified recreational rivers.</b>
<b>S0</b>	<b>Pastoral rivers.</b>

## ANTHROPOGENIC SITES

### ROADS

All roads will be classified using the following two-digit alphanumerical types.

<u>CODE</u>	<u>TYPE</u>
Z1	<b>Public-Use Roads:</b> All roads open to the public for travel by licensed motor vehicles. Includes state highways, county highways, maintained township roads, State Forest and State Park roads.
Z2	<b>Drivable Trails:</b> Includes limited or no maintenance roads/trails open to the public for travel by licensed motor vehicles.
Z3	<b>Administrative Roads:</b> Roads that are for administrative use and not open to the public. Includes timber sale access roads. These roads may be open seasonally for public travel, e.g. hunting seasons.

### RIGHT-OF-WAYS

Right-of-Ways will be classified using the following two-digit alphanumerical types.

<u>CODE</u>	<u>TYPE</u>
Q1	<b>Pipeline</b> (natural gas, petroleum products, or water)
Q2	<b>Poleline</b> (electric, telephone, TV cable, etc.)
Q5	<b>Underground cable</b> (telephone, fiber optic, etc.)
Q6	<b>Antenna / Tower site</b>

### LEASED AREAS

Leased areas > one acre will be classified using the following two-digit alphanumerical type.

<u>CODE</u>	<u>TYPE</u>
L1	<b>Special Lease Areas</b> (golf course, airport, observatory, storage tanks, farm leases, etc.)

### MINERAL SITES

Mineral Sites > one acre will be classified using the following two-digit type.

<u>CODE</u>	<u>TYPE</u>
M1	Shale pit, Borrow pit, Quarry, Strip-mine, Spoils (not vegetated)
M5	Compressor site / Pump Station
M6	Well Site (gas, oil, water)
MX	Miscellaneous Mineral Sites

### RECREATION/CULTURAL

Recreation or cultural areas > one acre will be classified using the following two-digit alphanumerical type.

<u>CODE</u>	<u>TYPE</u>
Y1	State Forest Facility, Forest Headquarters, District Office, FireTower, Etc.
Y2	Picnic Area
Y3	Vista
Y4	Historical / Archeological Site
Y6	Designated Camping Area
Y7	Access and/or Parking Area
Y8	Miscellaneous (eg. Helispots)
Y9	Leased Camp Site
Y0	Leased Camp Site Colony

### DESIGNATED TRAILS

Designated trails will be classified using the following two-digit alphanumerical types.

<u>CODE</u>	<u>TYPE</u>
T0	Designated National Scenic Trail
T9	Designated State Forest Hiking Trail
T8	Designated Local District Trail (Multi-use)
T7	Designated Local District Trail (Specific-Use)

## **APPENDIX 1C ADJACENT LAND USE**

### **INTRODUCTION / PURPOSE**

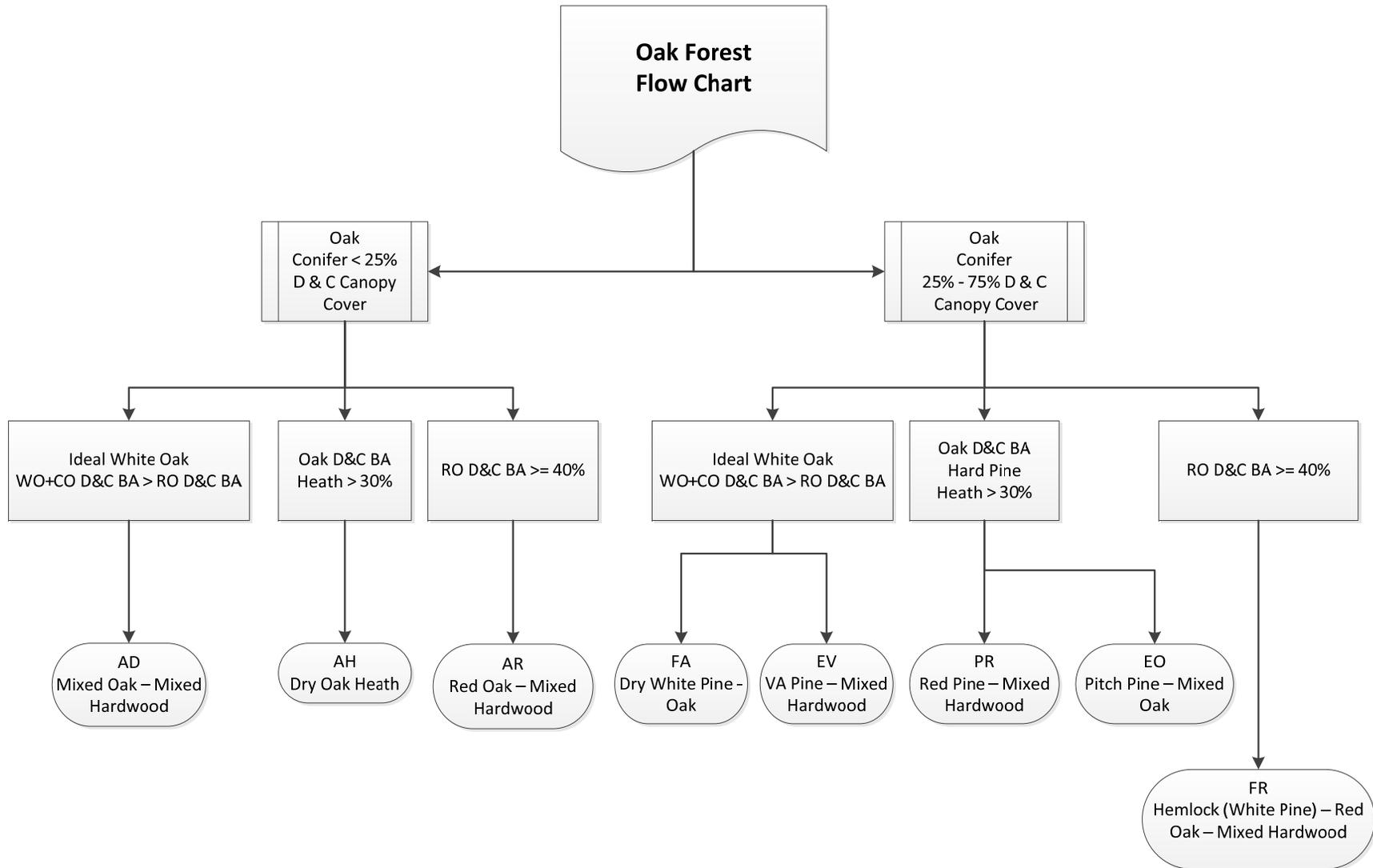
Lands adjacent to, or interior to, State Forest lands will be classified as to land use/cover. The demarcation of adjacent land use/cover will use the classification system developed by Anderson et. al. (U. S. Geological Survey Professional Paper 964; 1978). The classification will use Anderson's generalized first level with modifications. This system is used universally and is compatible with remote sensing techniques. The Wildland / Urban Interface designation is not included in the Anderson system. It is included as an option in the Bureau's land use/cover classifications listed below. These lands are defined as "areas where development and wildland fuels meet at a well-defined boundary". Classification of these lands will be accomplished through stereoscopic examination of aerial photographs.

The development of an ecosystem management approach to State Forest management involves looking beyond the borders of the State Forests. The delineation or demarcation of land use/cover adjacent and interior to State Forest lands is a logical first step to gaining an appreciation of the landscapes surrounding our forests. The following land use/cover classifications and/or codes should be used:

<b><u>CODE</u></b>	<b><u>LAND USE /COVER CLASSIFICATION</u></b>	<b><u>ACRES</u></b>
<b>1</b>	<b>Urban / Built-up Land</b>	<b>&gt; 25</b>
<b>2</b>	<b>Wildland / Urban Interface</b>	<b>&gt; 25</b>
<b>3</b>	<b>Agricultural Land</b>	<b>&gt; 25</b>
<b>4</b>	<b>Rangeland</b>	<b>&gt; 25</b>
<b>5</b>	<b>Forest Land</b>	<b>&gt; 25</b>
<b>6</b>	<b>Water</b>	<b>&gt; 5</b>
<b>7</b>	<b>Wetland (non-forest)</b>	<b>&gt; 5</b>
<b>8</b>	<b>Barren Land</b>	<b>&gt; 5</b>



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