

**Appendix 2**-Supporting plan documentation information.

1. Forest Harvesting Activities-Additional Sheets
2. Stand Level Reconnaissance Data Sheets
3. Stand Level Information-Additional Sheets
4. Forest Community Typing Document for the CAP 106 "Forest Management Plan" (FMP) to be used by all TSP's.

**Forest Harvesting Activities-To be completed prior to timber harvests. Identify which stand(s) you are describing your activities.**

*If a subset of the stand is being treated, the general area can either be described or identify the impacted areas on topographic map.*

**Harvesting:** Describe type of treatment: Even-aged: clearcut, thinning, shelterwood, seed tree, thin/harvest, crop tree; Uneven-aged: group select, single tree select, overstory removal, understory removal, cleaning, weeding, sanitation, salvage, etc. Include time of year, type of harvest; seed tree, multiage, sanitation, etc.

---

---

---

**Slash management** (leave slash at the stump, slash dispersal, slash height off ground, jackpot pile, whole tree skid, chipping, pulp, large woody debris, nutrient cycling)

---

---

---

**Post harvest activities** (grading and crowning, ditches, seeding roads and landings, E&S Plan, bridges, weed spray roadsides)

---

---

---

**Permits** (Please include a list of permits for which you applied, if necessary)

---

---

---

**Best Management Practices** (is there a wetland or stream within your harvest area, is it properly marked and are the appropriate laws being followed?)

---

---

---

**Monitoring** (how often do you plan on evaluating harvest units to ensure your overall forest management goals are being met?)

---

STAND LEVEL RECONNAISSANCE DATA

Landowner: \_\_\_\_\_ Stand # \_\_\_\_\_ Acres \_\_\_\_\_ Date: \_\_\_\_\_  
Slope: Flat Gentle Moderate Steep Aspect: N NE E SE S SW W NW top  
Soils: **Drainage** (VP-Very Poor, P-Poor, SP-Somewhat Poor, MW-Moderate Well, W-Well, VW-Very Well)

Series and Type \_\_\_\_\_ Drainage \_\_\_\_\_  
Series and Type \_\_\_\_\_ Drainage \_\_\_\_\_  
Series and Type \_\_\_\_\_ Drainage \_\_\_\_\_

Management \_\_\_\_\_  
History: \_\_\_\_\_

OVERSTORY CONDITIONS:

Dominant Forest Type: (Type, Site, Size, Stocking classes, Comm.?Non-Comm. \_\_\_\_\_  
Quality Timber Crop Potential: Poor Fair Good Very Good Excellent  
Insect and Disease Problems Past and Present: \_\_\_\_\_

UNDERSTORY CONDITIONS:

Common Trees, Shrubs, and Herbaceous Plants \_\_\_\_\_  
Non-Native and Native Invasive Spp.: \_\_\_\_\_  
Commercial Tree Regeneration Spp. \_\_\_\_\_  
Regeneration Density: Patchy Sparse Moderate Abundant  
Deer Impact: Very Low Low Moderate High Very High

WILDLIFE HABITAT:

ESTIMATED # LIVE AND DEAD CAVITY TREES/ACRE AND SNAGS.

- 1. Live with hole smaller than 5" \_\_\_\_\_
- 2. Live with hole larger than 5" \_\_\_\_\_
- 3. Dead with cavity \_\_\_\_\_
- 4. Standing dead snags \_\_\_\_\_

ESTIMATED COARSE WOODY DEBRIS/ACRE:

- 1. # Logs/Branches <12" Diameter \_\_\_\_\_
- 2. # Logs/Branches >12" Diameter \_\_\_\_\_

NATIVE MIDSTORY COVER: <25% 25-50% 50-75% >75%

ESTIMATED BRUSHPILES/DOWNED TREETOPS/ACRE \_\_\_\_\_

HARD MAST (e.g. from oaks, walnut, beech, maples, pines, ash, etc)

- 1. None Sparse Moderate Abundant

SOFT MAST (e.g from cherries, black gum, dogwood, sassafras, serviceberry, crabapple, hawthorn, viburnums, spicebush, blueberry, others)

1. None Sparse Moderate Abundant

LOW EVERGREEN COVER (ground level to 10' height)

1. Species Present \_\_\_\_\_, None Sparse Moderate Abundant

HIGH EVERGREEN COVER (taller than 10' height)

1. Species Present \_\_\_\_\_, None Sparse Moderate Abundant

WATER FEATURES AND ECOLOGICALLY SENSITIVE SITES: (stream buffers, spring seeps, boulders, rock cliffs, wolf trees, rare wildflowers, vernal ponds, beaver dams, bird rookery, non-timber forest products, etc.) \_\_\_\_\_  
\_\_\_\_\_

AESTHETICS: (fall color, vistas or creation thereof, unique trees, wildflower areas, etc.) \_\_\_\_\_  
\_\_\_\_\_

RECREATION: (existing trails or opportunities, waterways, birdwatching, types of motorized or passive recreation opportunities related to landowner goals, etc.) \_\_\_\_\_

**Stand Description-(From Reconnaissance Data Sheets)**

Stand \_\_\_\_\_ Acres \_\_\_\_\_ Forest Type \_\_\_\_\_

Objectives: \_\_\_\_\_

\_\_\_\_\_

**Current Description** (examples include tree species present/forest type, stand age, history, site index, elevation, slope, size class, stocking, etc.): \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Stand Management Recommendations:** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Stand Desired Future Stand Condition**

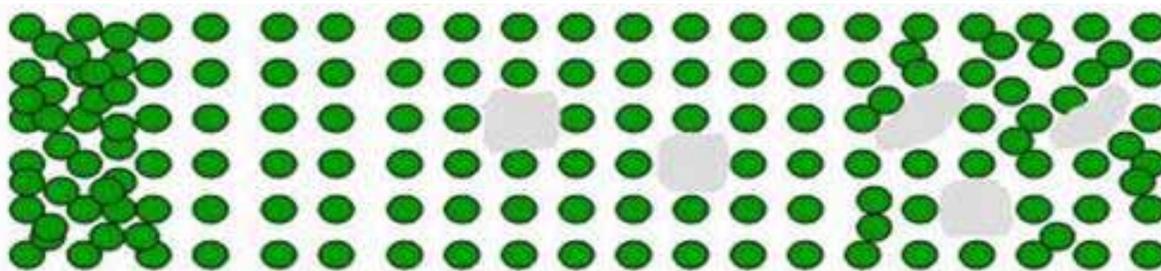
Desired future forest type (esp. site, size classes, and stocking) \_\_\_\_\_

Desired species to naturally regenerate \_\_\_\_\_

Desired species to plant (if applicable) \_\_\_\_\_

Bird's-eye view of desired future forest stand condition (check one)

- |                                     |  |  |  |
|-------------------------------------|--|--|--|
| <input type="checkbox"/> Wild stand | <input type="checkbox"/> Evenly spaced | <input type="checkbox"/> Evenly spaced with openings | <input type="checkbox"/> Variable density spaced with openings |
| <u>Some wildlife</u>                | <u>Maximizes growth</u>                | <u>Growth + regeneration</u>                         | <u>Some growth + regeneration + wildlife</u>                   |



Desired stand structure:



- One canopy layer    Two canopy layer    Three canopy

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

FOREST COMMUNITY TYPING DOCUMENT FOR THE CAP  
106 "FOREST MANAGEMENT PLAN" (FMP) TO BE USED BY  
ALL TSP'S.

## APPENDIX 1B

### *CAP 106 FMP LAND CLASSIFICATIONS (FOREST COVER TYPES)*

All acreage of private forest land will be assigned a land classification code. The land classification describes the dominant forest type 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:**

AD	Dry Oak – Mixed Hardwood Forest
AH	Dry Oak – Heath Forest
AR	Red Oak – Mixed Hardwood Forest
BB	Northern Hardwood Forest
BC	Black Cherry – Northern Hardwood Forest (Allegheny Hardwoods)
CC	Red Maple Forest
CS	Sugar Maple – Basswood Forest
DD	Aspen / Grey (Paper) Birch
EO	Pitch Pine – Mixed Oak Forest (Oak – Hard Pine)
EV	Virginia Pine – Mixed Hardwood Forest
FF	Hemlock (White Pine) Forest
FA	Dry White Pine (Hemlock) – Oak Forest
FB	Hemlock (White Pine) – Northern Hardwood Forest
FR	Hemlock (White Pine) – Red Oak – Mixed Hardwood Forest
FT	Hemlock - Tuliptree – Birch Forest
FM	Hemlock - Rich Mesic Hardwood Forest
GB	Black Gum Ridgetop Forest
LB	Black Locust Forest
MM	Mixed Mesophytic Forest
TM	Tuliptree – (Beech) – Maple Forest
PR	Red Pine – Mixed Hardwood
PP	Pine Plantation
PS	Spruce Plantation
PH	Hardwood Plantation
PX	Miscellaneous / Mixed Species Plantation
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
- Y9 Leased Camp Site
- Y0 Leased Camp Site Colony

## Trails:

### **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 (FOREST) TYPES

### TERRESTRIAL FORESTS

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-digit alphabetical system for forest community type, followed by a numerical digit for site, then a numerical digit for 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. Unique forest communities, less than five acres, may be delineated.

### CODE                      FOREST COMMUNITY TYPE

**AD**    **Dry 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. Common trees include *Quercus alba* (white oak), *Betula lenta* (sweet birch), *Carya cordiformis* (shellbark hickory), *Celtis occidentalis* (hackberry), *Acer rubrum* (red maple), *A. saccharum* (sugar maple), *Q. montana* (chestnut oak), *Q. velutina* (black oak), *Q. rubra* (northern red oak), *Carya glabra* (pignut hickory), *Fraxinus americana* (white ash), and *Tilia americana* (basswood). The shrub layer is perhaps more diagnostic. Characteristic shrubs include *Cornus florida* (flowering dogwood), *Carpinus caroliniana* (hornbeam), *Corylus cornuta* (beaked hazelnut), *Amelanchier arborea* (shadbush), *Cercis canadensis* (redbud), and *Ostrya virginiana* (hop-hornbeam). Ericaceous shrubs are uncommon, although *Kalmia latifolia* (mountain laurel) does occur on some sites. This type usually contains a somewhat richer herbaceous flora than the "Dry oak-heath" forest type (although restricted by moisture availability). Herbaceous species include *Smilacina racemosa* (false Solomon's-seal), *Uvularia sessilifolia* (wild oats), *Polygonatum biflorum* (Solomon's seal), *Asplenium platyneuron* (ebony spleenwort), *Desmodium* spp. (tick-trefoil), *Hieracium venosum* (rattlesnake weed), *Aralia nudicaulis* (wild sarsaparilla), *Carex pensylvanica* (a sedge), *Carex communis* (a sedge), and *Lysimachia quadrifolia* (whorled loosestrife).

Related types: The "Virginia pine - mixed hardwood forest" type sometimes occurs in association with this type (especially on calcareous shales) and is distinguished by the presence of a substantial conifer component (at least 25% relative cover). The "Dry oak - heath forest" occurs on more acidic sites and is distinguished from this by a clear dominance of ericaceous shrubs in the understory. The "Yellow oak - redbud woodland" type is more strongly calciphilic, with a clear dominance of calciphiles, is much more restricted in distribution, and generally has an open canopy.

Range: Entire state except Coastal Plain.

**AH** **Dry Oak - Heath Forest:** This is a fairly broadly defined type. These forests occur on xeric to moderately dry, acidic sites, often on shallow or sandy soils and/or steep slopes. The most characteristic tree species for this type is *Quercus montana* (chestnut oak), usually occurring with a mix of *Q. velutina* (black oak), *Q. coccinea* (scarlet oak), and/or *Q. alba* (white oak). Other tree species include *Sassafras albidum* (sassafras), *Nyssa sylvatica* (black-gum), *Betula lenta* (sweet birch), *Acer rubrum* (red maple), *Carya glabra* (pignut hickory), *Pinus rigida* (pitch pine), *P. virginiana* (Virginia pine), and *Pinus strobus* (eastern white pine). Total cover by conifers generally does not exceed 25% of the canopy. *Castanea dentata* (American chestnut) stump sprouts are not uncommon. The shrub layer is dominantly ericaceous; common species include *Kalmia latifolia* (mountain laurel), *Gaylussacia baccata* (black huckleberry), *Vaccinium pallidum* (lowbush blueberry), *V. angustifolium* (low sweet blueberry), *Viburnum acerifolium* (maple-leaved viburnum), 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 include *Maianthemum canadense* (Canada mayflower), *Carex pensylvanica* (Pennsylvania sedge), *Carex communis* (a sedge), *Chimaphila maculata* (pippissewa), *Epigaea repens* (trailing arbutus), *Gaultheria procumbens* (teaberry), *Aralia nudicaulis* (wild sarsaparilla), *Pteridium aquilinum* (bracken fern), and *Cypripedium acaule* (pink lady's-slipper).

**Related types:** The "Dry oak - mixed hardwood forest" type is similar but occurs on less acidic (and often less dry) sites and does not have an overwhelming dominance of heaths in the shrub layer. As one moves up-slope or toward a drier exposure, the evergreen component may increase and this type may grade into the "Pitch pine - mixed hardwood forest" type. Where the canopy becomes open, with trees over five meters high covering less than 60% of the site overall, this becomes the "Dry oak - heath woodland" type.

**Range:** Entire state.

**AR** **Red Oak - Mixed Hardwood Forest:** This broadly defined type includes much of Pennsylvania's hardwood-dominated forests occurring on fairly mesic sites, and is therefore quite variable in composition. *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), *C. ovata* (shagbark hickory), *Betula lenta* (sweet birch), *B. alleghaniensis* (yellow birch), *Fraxinus americana* (white ash), *Fagus grandifolia* (American beech), and/or *Liriodendron tulipifera* (tuliptree). Shrubs include *Viburnum recognitum* (northern arrow-wood), *V. dentatum* (southern arrow-wood), *V. acerifolium* (maple-leaved viburnum), *Amelanchier laevis* (smooth serviceberry), *A. arborea* (shadbush), *Kalmia latifolia* (mountain laurel), *Carpinus caroliniana* (hornbeam), *Ostrya virginiana* (hop-hornbeam), *Hamamelis virginiana* (witch hazel), and *Lindera benzoin* (spicebush). The herbaceous layer is highly variable. Representative species include *Uvularia sessilifolia* (wild-oats), *Smilacina racemosa* (false Solomon's-seal), *Podophyllum peltatum* (may-apple), *Chimaphila maculata* (pippissewa), *Gaultheria procumbens* (teaberry), *Medeola virginiana* (Indian cucumber-root), *Caulophyllum thalictroides* (blue

cohosh)<sup>3</sup>/<sub>4</sub> on richer sites, *Dryopteris* spp. (wood ferns), and *Dennstaedtia punctilobula* (hayscented fern).

Related types: The "Hemlock (white pine) - red oak - mixed hardwood forest" type is distinguished from this by the presence of at least 25% relative cover by hemlock and/or white pine. The "Northern hardwood forest" is distinguished by a greater percentage of birches, maples, and beech, and less oak.

Range: Entire state, although less common on the Unglaciaded Allegheny Plateau.

**BB** Northern Hardwood Forest : Dominant trees usually include *Fagus grandifolia* (American beech), *Acer rubrum* (red maple), *A. saccharum* (sugar maple), *Prunus serotina* (black cherry)<sup>3</sup>/<sub>4</sub> at less than 40% relative cover, *Betula lenta* (sweet birch), *B. alleghaniensis* (yellow birch), *B. papyrifera* (paper birch), *Q. rubra* (northern red oak), and *Fraxinus americana* (white ash). 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 canopy. *Rhododendron maximum* (rosebay) may be locally abundant. Other common shrubs include *Hamamelis virginiana* (witch-hazel), *Acer pensylvanicum* (striped maple), *Viburnum lantanoides* (witch-hobble), *Ilex montana* (mountain holly), *Amelanchier laevis* (smooth serviceberry), *A. arborea* (shadbush), and *Carpinus caroliniana* (hornbeam). The herbaceous layer is generally sparse and reflects a northern affinity; common components include *Maianthemum canadense* (Canada mayflower), *Trientalis borealis* (starflower), *Thelypteris novaboracensis* (New York fern), *Dryopteris carthusiana* (fancy fern), *Lycopodium lucidulum* (shining clubmoss), *Gaultheria procumbens* (teaberry), *Mitchella repens* (partridge-berry), *Aralia nudicaulis* (wild sarsaparilla), *Medeola virginiana* (Indian cucumber-root), and *Maianthemum canadense* (Canada mayflower).

Related types: If combined relative cover by conifers approaches or exceeds 25%, please read description for the "Hemlock (white pine) - northern hardwood forest." If cover by *Prunus serotina* (black cherry) approaches or exceeds 40% of canopy, please read description for the "Black cherry - northern hardwood forest" type.

Range: Glaciaded NE, Glaciaded NW, Pocono Plateau, Unglaciaded Allegheny Plateau.

**BC** Black Cherry - Northern Hardwood Forest: (Allegheny Hardwoods). This type is characterized by at least 40% *Prunus serotina* (black cherry) and is most characteristic of the Unglaciaded Allegheny Plateau. Common associates are *Acer rubrum* (red maple), *A. saccharum* (sugar maple), *Betula lenta* (sweet birch), *B. alleghaniensis* (yellow birch), *Fagus grandifolia* (American beech), and *Quercus* spp. (oaks), usually *Q. rubra* (northern red oak). *Pinus strobus* (eastern white pine) and/or *Tsuga canadensis* (eastern hemlock) may be present (at less than 25% relative cover). Shrubs 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 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* (wild-oats), *Brachyelytrum erectum* (brachyelytrum), *Maianthemum canadense* (Canada mayflower), and *Oxalis acetosella* (common wood-sorrel).

Related types: The "Northern hardwood forest" may contain *Prunus serotina* (black cherry) as a component, but it does not generally exceed 40% relative cover. This type is most characteristic of the Unglaciaded Allegheny Plateau.

Range: Glaciaded NE, Glaciaded NW, Unglaciaded Allegheny Plateau.

**CC** Red Maple Forest: This is generally an early- to mid-successional 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. Associate species 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 the upper through the lower slope. Accordingly, the associated species vary greatly. Some shrubs commonly present 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: The "Northern hardwood forest" type may contain a substantial amount of *Acer rubrum* (red maple), especially in younger stands. This type is not intended to include very young successional stands of northern hardwoods.

Range: Entire state.

**CS** Sugar Maple - Basswood Forest: In eastern Pennsylvania, this type occurs on rich rocky slopes (although it may have occurred on less steep sites previous to extensive logging that left these inaccessible remnants as our only remaining examples). In western Pennsylvania, this type occurs on a wide range of sites. Aside from *Acer saccharum* (sugar maple) and *Tilia americana* (basswood), other trees typically present include *Quercus rubra* (northern red oak), *Fraxinus americana* (white ash), *Liriodendron tulipifera* (tuliptree), *Betula alleghaniensis* (yellow birch), and *B. lenta* (sweet birch). Shrubs include *Lindera benzoin* (spicebush), *Hamamelis virginiana* (witch-hazel), and on richer sites *Asimina triloba* (pawpaw) and *Staphylea trifolia* (bladdernut). There is generally a rich vernal flora; species 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 include *Smilacina racemosa* (false Solomon's-seal), *Dryopteris marginalis* (evergreen wood fern), and *Botrychium virginianum* (rattlesnake fern).

Related types: The "Red oak - mixed hardwood forest" is usually dominated by oaks and hickories, and more often has heaths like *Kalmia latifolia* (mountain laurel) and *Gaultheria procumbens* (teaberry) in the understory. The "Tuliptree - (beech) - maple forest" type generally lacks *Tilia americana* (basswood) and occurs on gentle toeslopes rather than rocky slopes. In western Pennsylvania, this type may resemble depauperate examples of the "Mixed mesophytic forest" type.

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

**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 more northern sites, or *B. populifolia* (gray birch) and occasionally *B. lenta* (sweet birch). The aspen may be *Populus grandidentata* (large-toothed aspen), or *P. tremuloides* (quaking aspen). Associates include *Sassafras albidum* (sassafras), *Acer* spp. (maples), and *Prunus* spp. (cherry). This is an early successional forest type, commonly found on former agricultural land, in areas of ice scour along stream banks, and where there has been major disturbance resulting in areas of exposed mineral soil. This type may also result from forestry practices that maintain an early successional stage.

Related types: The "Northern hardwood forest" type may contain a substantial birch component. Many forest types may contain patches of aspen or birch in former canopy gaps; this community type is not intended to describe such small patches.

Range: Entire state.

**EO** Pitch Pine – Mixed Oak Forest: (Formerly Oak-Hard Pine) 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 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. *P. strobus* (eastern white pine), *P. pungens* (table-mountain pine), *P. virginiana* (Virginia pine), and less often *P. echinata* (short-leaf pine) or *P. resinosa* (red pine), contribute over 25% of the overstory. Hardwood associates may include any of the dry-site oaks including *Quercus montana* (chestnut oak), *Q. coccinea* (scarlet oak), *Q. velutina* (black oak), and *Q. alba* (white oak). Other tree species 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*, *V. pallidum* and *V. 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 pensylvanica* (Pennsylvania sedge), *Carex communis* (a sedge), and *C. rosea* (a sedge).

Related types: The “Dry oak - heath forest” is distinguished from this type in that it has less than 25% relative cover by conifers. The “Pitch pine - mixed hardwood woodland” has an open canopy, the woodland type may occur up-slope adjacent to this type. The “Serpentine pitch pine - oak forest” differs from this type in ecology and species composition. The serpentine type occurs only on serpentinite-derived soils. *Q. stellata* (post oak) and *Q. marilandica* (blackjack oak), which are not characteristic of the more common type, are found in the serpentine forest type. The understory of the serpentine type is generally dominated by *Smilax rotundifolia* (greenbrier) and/or *S. glauca* (catbrier).

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. *P. strobus* (eastern white pine), *P. rigida* (pitch pine), *P. pungens* (table-mountain pine), and less often *P. 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 pine (nearly pure stands). Hardwood associates vary; common associates include *Quercus rubra* (red oak), *Q. velutina* (black oak), *Q. coccinea* (scarlet oak), *Q. 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: The “Virginia pine - mixed hardwood shale woodland” has an open canopy and is found on dry shale slopes. The “Serpentine Virginia pine - oak forest” differs from this type in ecology and species composition. The serpentine type occurs only on serpentinite-derived soils. *Q. stellata* (post oak) and *Q. marilandica* (blackjack oak), which are not characteristic of the more common type, are frequently found in the serpentine forest type.

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 generally exceeds 75% of the canopy. Associate species include a variety of northern hardwoods and oaks. Typical representatives include *Betula lenta* (black birch), *B. alleghaniensis* (yellow birch), *Acer saccharum* (sugar maple), *A. rubrum* (red maple), *Quercus rubra* (red oak), *Q. velutina* (black oak), *Fagus grandifolia* (American beech), and *Liriodendron tulipifera* (tuliptree). Representative shrubs include *Rhododendron maximum* (rosebay), *Viburnum lantanoides* (witch-hobble), *V. acerifolium* (maple-leaved viburnum), and *Hamamelis virginiana* (witch-hazel). Typical herbs and creeping shrubs include *Maianthemum canadense* (Canada mayflower), *Mitchella repens* (partridge-berry), *Lycopodium* spp. (ground pine), *Gaultheria procumbens* (teaberry), *Thelypteris novboracensis* (New York fern), *Medeola virginiana* (Indian cucumber root), and *Polystichum acrostichoides* (Christmas fern).

Related types: If the conifer component is less than 75% relative cover, review the mixed conifer - broadleaf terrestrial forests.

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. On most sites, the conifer and the hardwood component both range between 25% and 75% of the canopy. The oak species most often associated with this type are *Quercus montana* (chestnut oak), and *Q. alba* (white oak), although *Q. velutina* (black oak), *Q. coccinea* (scarlet oak), or *Q. rubra* (northern red oak) may also occur. Other associated trees 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 cumber root) are typical. The successional status of this type seems variable, in some cases, especially on harsher sites, it appears relatively stable, in other cases it appears to be transitional.

Related types: If the total conifer cover is less than 25%, see the "Broadleaf terrestrial forests" types. This forest type shares several species with the "Hemlock (white pine) -red oak - mixed hardwood" forest type. The latter is more mesic; *Q. montana* (chestnut oak), *Pteridium aquilinum* (bracken fern) and *Aralia nudicaulis* (wild sarsaparilla) are more often associated with the dry type, while *Q. rubra* (red oak), *Podophyllum peltatum* (may-apple) and *Smilacina racemosa* (false Solomon's seal) are more characteristic of the mesic type.

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 and hardwoods each contribute between 25% and 75% of the canopy. Characteristic hardwood species include *Fagus grandifolia* (American beech), *Acer saccharum* (sugar maple), *A. rubrum* (red maple), *Betula lenta* (sweet birch), and *B. 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 include *Hamamelis virginiana* (witch-hazel), *Acer pensylvanicum* (striped maple), and Viburnums (*Viburnum* spp.). The herbaceous layer is generally sparse and reflects a northern affinity; common components 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: The "Northern hardwood forest" type has less than 25% combined relative cover by conifers. The "Hemlock (white pine) - red oak - mixed hardwood forest" type is generally dominated by a combination of various oaks—characteristically *Quercus rubra* (red oak), and *Tsuga canadensis* (eastern hemlock) and/or *Pinus strobus* (white pine). In the type being described here, the same conifers usually share dominance with *Fagus grandifolia* (American beech), *Betula* spp. (birches), and *Acer saccharum* (sugar maple). The understory species associated with this type are likewise more northern in affinity.

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 more than 25% relative 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 include *Viburnum acerifolium* (maple-leaved viburnum), *Rhododendron periclymenoides* (pinxter-flower), *Amelanchier laevis* (smooth serviceberry), *A. arborea* (shadbush), *Carpinus caroliniana* (hornbeam), *Ostrya virginiana* (hop-hornbeam), *Hamamelis virginiana* (witch-hazel), and *Lindera benzoin* (spicebush). Herbaceous species 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: The "Red oak - mixed hardwood forest" type has less than 25% combined relative cover by conifers. The type described here is generally dominated by a combination of various oaks—characteristically *Quercus rubra* (red oak), and *Tsuga canadensis* (eastern hemlock) and/or

*Pinus strobus* (eastern white pine). In the "Hemlock (white pine) - northern hardwood forest," the same conifers usually share dominance with *Fagus grandifolia* (American beech), *Betula* spp. (birches), and *Acer saccharum* (sugar maple). The understory species associated with the "Hemlock (white pine) - northern hardwood forest" type are likewise more northern in affinity.

Range: Entire state except the Coastal Plain.

**FT** Hemlock - Tuliptree - Birch Forest: The presence of tuliptree and a mix of somewhat more southern species distinguish this type from the "Hemlock/white pine - northern hardwood" type. This is generally a lower slope or cove type. *Tsuga canadensis* (eastern hemlock) usually contributes at least 25% of the canopy. *Liriodendron tulipifera* (tuliptree), *Betula alleghaniensis* (yellow birch), and *B. lenta* (black birch) are the most characteristic hardwood species. Other tree species commonly found on these sites are *Acer rubrum* (red maple), *A. saccharum* (sugar maple), *Quercus* spp. (oaks)¾ usually *Q. rubra* (northern red oak), as well as *Fagus grandifolia* (American beech), *Fraxinus americana* (white ash), *Prunus serotina* (black cherry), *Tilia americana* (basswood), *Pinus strobus* (eastern white pine), and in western Pennsylvania, *Magnolia acuminata* (cucumber-tree). Shrubs include *Hamamelis virginiana* (witch-hazel), *Rhododendron maximum* (rosebay) and others. The herbaceous layer is highly variable; characteristic species include *Maianthemum canadense* (Canada mayflower)¾ especially under hemlock, *Podophyllum peltatum* (may-apple), *Dryopteris marginalis* (evergreen wood fern), *Botrychium virginianum* (rattlesnake fern), *Arisaema triphyllum* (jack-in-the-pulpit), *Aster divaricatus* (white wood aster), and *Polystichum acrostichoides* (Christmas fern).

Related types: If hemlock contributes less than 25% of the canopy cover, read the description of the "Tuliptree - (beech) - maple forest." This type is in some ways intermediate between the "Hemlock (white pine) - northern hardwoods forest," which has a more northern species composition and range, and the "Hemlock - rich mesic hardwoods forest," which has a richer, more southern species composition and a more southerly range. This type is also closely related to the "Hemlock (white pine) - red oak forest," which usually occurs on dryer sites, and generally has *Quercus rubra* (red oak) as a major canopy component.

Range: Piedmont, Pittsburgh Plateau, Ridge and Valley.

**FM** Hemlock - Rich Mesic Hardwood Forest: These are species-rich, lower slope forests, reminiscent of the "Mixed mesophytic forest" type in the southwestern part of the state, but usually with a strong *Tsuga canadensis* (eastern hemlock) component. The hardwood species vary; typical representatives include *Liriodendron tulipifera* (tuliptree), *Fagus grandifolia* (American beech), *Quercus rubra* (northern red oak), *Acer rubrum* (red maple), *A. saccharum* (sugar maple), *Betula lenta* (sweet birch), *B. alleghaniensis* (yellow birch), *Fraxinus americana* (white ash), *Tilia americana* (basswood) and *Carya ovata* (shagbark hickory). Hemlock cover is often patchy. Under hardwood cover, the herbaceous diversity approaches that of the richer "Mixed mesophytic" type, while under dense hemlock cover, the herbaceous stratum reflects a more northern flora. *Magnolia tripetala*<sup>S</sup> (umbrella magnolia) is not uncommon. Other southern shrubs such as *Asimina triloba* (pawpaw) and *Staphylea trifolia* (bladdernut) may also occur, although *Rhododendron*

*maximum* (rosebay), *Hamamelis virginiana* (witch-hazel), and *Lindera benzoin* (spicebush) are more abundant on most sites. Herbaceous species include *Adiantum pedatum* (maidenhair fern), *Erythronium americanum* (trout-lily), *Anemone quinquefolia* (wood anemone), *Dicentra canadensis* (squirrel-corn), *D. cucullaria* (dutchman's-breeches), *Cimicifuga racemosa* (black snakeroot), *Geranium maculatum* (wood geranium), *Caulophyllum thalictroides* (blue cohosh), *Hepatica nobilis* (liverleaf), *Arisaema triphyllum* (jack-in-the-pulpit), *Allium tricoccum* (wild leek), *Sanguinaria canadensis* (bloodroot), *Corydalis flavula* (yellow fumewort), *Asplenium* spp. (spleenworts), *Botrychium virginianum* (rattlesnake fern), *Claytonia virginica* (spring-beauty), *Cardamine concatenata* (cut-leaved toothwort), *Mitella diphylla* (bishop's-cap), and *Asarum canadense* (wild ginger). In areas without a strong *Tsuga canadensis* (eastern hemlock) component, there may be complete annual litter turnover. This type may occur in a variety of lower slope/ravine situations, including some moist, often north-facing slopes in the Ridge and Valley.

Related types: This community type resembles a somewhat depauperate version of the "Mixed mesophytic forest" type, with the addition of *Tsuga canadensis* (eastern hemlock) usually with at least 25% relative cover. It is much richer in species composition than the most closely related mixed conifer/broadleaf forest type, the "Hemlock - tuliptree - birch forest." Species like *Magnolia tripetala*<sup>S</sup> (umbrella magnolia), *Asimina triloba* (pawpaw), *Staphylea trifolia* (bladdernut), *Corydalis flavula* (yellow fumewort), *Sanguinaria canadensis* (bloodroot), and *Dicentra* spp. (dutchman's breeches and squirrel corn) are more typical of this richer, more southern type.

Range: Piedmont, Pittsburgh Plateau, southeastern portion of Ridge and Valley.

**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), *Q. velutina* (black oak), and *Q. rubra* (red oak) are often present. The shrub layer is dominantly ericaceous; common species 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 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: This type is fairly uniform in composition and is restricted to ridgetops and high shoulders. The "Birch (black-gum) rocky slope woodland" occurs on talus or scree slopes and boulderfields, has an open canopy, and has a fairly wide range of possible associates depending on aspect and location.

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 usually the dominant tree. *Betula lenta* (black birch) is frequently codominant. Other associates vary; typical

representatives include *Acer rubrum* (red maple), the exotic *Acer platanoides* (Norway maple), *Sassafras albidum* (sassafras), various oaks (*Quercus* spp.), or *Prunus serotina* (black cherry). There is generally a dense graminoid understory due to the light penetration through the canopy. *Toxicodendron radicans* (poison ivy) is commonly abundant. Exotic species usually predominate; common representatives include *Lonicera japonica* (Japanese honeysuckle), *Ailanthus altissima* (tree-of-heaven), *L. 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: Other forest types may contain *Robinia pseudoacacia* (black locust), this type refers to sites where it is clearly dominant.

Range: Piedmont, Pittsburgh Plateau, Ridge and Valley.

**MM** Mixed Mesophytic Forest: This is specific to the southwestern part of the state and includes several species that find their northern and eastern limits in Pennsylvania. This is an extremely rich community type, which typically occurs on deep soils at a lower slope position. Dominant trees include *Liriodendron tulipifera* (tuliptree), *Acer saccharum* (sugar maple), *Fagus grandifolia* (American beech), *Tilia americana* (basswood), *Quercus rubra* (northern red oak), *Magnolia acuminata* (cucumber-tree), *Prunus serotina* (black cherry), *Fraxinus americana* (white ash), *Juglans nigra* (black walnut), *Carya ovata* (shagbark hickory), *Aesculus glabra* (Ohio buckeye), and *A. flava* (yellow buckeye). *Tsuga canadensis* (eastern hemlock) may occur in these forests, but is not characteristically a dominant. Shrubs include *Asimina triloba* (pawpaw), *Staphylea trifolia* (bladdernut), *Rhododendron maximum* (rosebay), *Magnolia tripetala*<sup>S</sup> (umbrella magnolia), *Cercis canadensis* (redbud), *Lindera benzoin* (spicebush), *Hydrangea arborescens* (wild hydrangea), and *Hamamelis virginiana* (witch-hazel). The herbaceous flora is extremely rich and includes such species as *Trillium grandiflorum* (white trillium), *T. erectum* (purple trillium), *T. sessile* (toadshade), *Erythronium americanum* (trout-lily), *Phlox divaricata* (wild blue phlox), *Anemone quinquefolia* (wood anemone), *Dicentra canadensis* (squirrel-corn), *D. cucullaria* (dutchman's-breeches), *Clintonia umbellulata* (speckled wood-lily), *Cimicifuga racemosa* (black snakeroot), *Geranium maculatum* (wood geranium), *Caulophyllum thalictroides* (blue cohosh), *Tiarella cordifolia* (foamflower), *Hepatica nobilis* (liverleaf), *Allium tricoccum* (wild leek), *Sanguinaria canadensis* (bloodroot), *Corydalis flavula* (yellow fumewort), *Botrychium virginianum* (rattlesnake fern), *Claytonia virginica* (spring-beauty), *Cardamine concatenata* (cut-leaved toothwort), *Mitella diphylla* (bishop's-cap), and *Asarum canadense* (wild ginger). Most of these systems have a complete, or nearly complete, annual litter turnover.

Related types: The "Hemlock - mesic hardwood forest" type usually has 25% or more relative cover by *Tsuga canadensis* (eastern hemlock), but is otherwise similar in ecology and species composition. The "Sugar maple - basswood forest" type is less species-rich than this type, often occurs on rocky slopes, and generally lacks the complete annual litter turnover that characterizes this type. The range of this community type is restricted to the Pittsburgh Plateau. Similar sites in other parts of the state most likely belong to either the "Sugar maple - basswood forest" type or the "Tuliptree - beech - maple forest" type.

Range: Pittsburgh Plateau.

**TM Tuliptree - (Beech) - Maple Forest:** These woods occur on fairly deep, not strongly acidic soils, at a mid- to lower-slope position. The most consistent tree species for this often very mixed type are *Acer rubrum* (red maple) and *Liriodendron tulipifera* (tuliptree). *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), *Carya tomentosa* (mockernut hickory), *C. ovata* (shagbark hickory), *Betula lenta* (sweet birch), *Tsuga canadensis* (eastern hemlock)  $\frac{3}{4}$  less than 25% relative cover  $\frac{3}{4}$  and in western Pennsylvania, *Magnolia acuminata* (cucumber-tree). Common shrubs include various viburnums, *Carpinus caroliniana* (hornbeam), *Cornus florida* (flowering dogwood), *Ostrya virginiana* (hop-hornbeam), *Hamamelis virginiana* (witch-hazel), and *Lindera benzoin* (spicebush). This type has different expressions in different parts of the state as well as according to disturbance history etc. 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), *D. canadensis* (squirrel corn), *Allium tricoccum* (wild leek), *Claytonia virginica* (spring-beauty) etc.

Related types: This type is closely related to the "Red oak - mixed hardwood forest" type. They share many species in common. The "Red oak - mixed hardwood forest" type is much more widespread, occurs across a broader ecological range, and is usually dominated by oaks and hickories. This type is much more restricted, generally occurring on toeslopes, or north-facing lower and midslopes. The dominance of beech, tulip, and maple and the near-absence of heaths, such as *Gaultheria procumbens* (teaberry) and *Kalmia latifolia* (mountain laurel), distinguish these forests from the oak-dominated type.

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 Plantations:** 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 Plantations:** *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 Plantations:** 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 Plantations:** 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 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)<sup>3/4</sup> 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) occurs in the understory and in openings; *Quercus ilicifolia* (scrub oak) is also present in openings. Low shrub species include *Vaccinium pallidum* (lowbush blueberry), *V. stamineum* (deerberry), and *Gaylussacia baccata* (black huckleberry). Herbaceous species 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 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 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 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)<sup>3/4</sup> usually a dominant, *Quercus falcata*<sup>S</sup> (southern red oak), *Q. phellos*<sup>S</sup> (willow oak), *Q. alba* (white oak), *Fagus grandifolia* (American beech), *Acer rubrum* (red maple), *Smilax rotundifolia* (greenbrier), *Leucothoe racemosa*<sup>S</sup> (fetterbush), *Lyonia mariana*<sup>S</sup> (stagger-bush), *Clethra alnifolia* (sweet pepper-bush), *Kalmia latifolia* (mountain laurel), and sometimes *Ilex opaca*<sup>S</sup> (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

Palustrine Forest Communities are wetlands that are dominated by tree species that form at least 30% of the main canopy of the area. Floodplain Forest Communities occur along rivers and streams that are periodically inundated by floodwaters. These communities are dominated by tree species that form at least 30% of the main canopy of the area.

Palustrine and floodplain forest communities will be classified using the following two-digit alphabetical system for forest community type, followed by a numerical digit for site, then a numerical digit for size and stocking class, followed by a alphabetical digit for commercial/noncommercial availability. Palustrine and floodplain forest communities should be a minimum of one acre or larger for delineation.

### CODE                      FOREST COMMUNITY TYPE

**UT**     **Black Spruce - Tamarack Peatland Forest** : *Picea mariana* (black spruce) and/or *Larix laricina* (tamarack) dominate this type. Other trees that may occur include *Betula populifolia* (gray birch), *Acer rubrum* (red maple), *Tsuga canadensis* (eastern hemlock), *Pinus strobus* (eastern white pine), and *Populus tremuloides* (quaking aspen). Shrub species include *Rhododendron viscosum* (swamp azalea), *Nemopanthus mucronatus* (mountain-holly), *Ilex verticillata* (winterberry), and *Vaccinium corymbosum* (highbush blueberry). Herbaceous species include *Carex trisperma* (a sedge), *C. disperma*<sup>S</sup> (a sedge), *Trientalis borealis* (starflower), *Osmunda cinnamomea* (cinnamon fern), *O. regalis* (royal fern), *Viola* spp. (violets), *Gaultheria hispidula*<sup>S</sup> (creeping snowberry) and *Coptis trifolia* (goldthread). Sphagnum occurs throughout. This community type may occur as part of the "Acidic glacial peatland complex."

Related types: Where canopy closure is less than 60%, this type becomes the "Black spruce - tamarack palustrine woodland." The open canopy of the woodland type allows for a much more extensive shrub layer¾ usually dominated by *Chamaedaphne calyculata* (leatherleaf)¾ 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. *Picea rubens* (red spruce) is always present, usually dominant or codominant. Other tree species include *Pinus strobus* (eastern white pine), *Tsuga canadensis* (eastern hemlock), *Acer rubrum* (red maple), *Betula populifolia* (gray birch), *B. alleghaniensis* (yellow birch), *Nyssa sylvatica* (black-gum), and occasionally *Abies balsamea* (balsam fir). *Rhododendron maximum* (rosebay) is common and often forms a dense understory. Other shrub species that may be present include *Viburnum cassinoides* (withe-rod), *Ilex verticillata* (winterberry), *Vaccinium corymbosum* (highbush blueberry), and *Nemopanthus mucronatus* (mountain holly). There is usually a pronounced mound and pool microtopography. Characteristic herbs occurring on mounds include *Osmunda cinnamomea* (cinnamon fern), *Viola* spp. (violets), *Mitchella repens* (partridge-berry), *Maianthemum canadense* (Canada mayflower), *Coptis trifolia*

(goldthread), *Cornus canadensis* (bunchberry), *Carex trisperma*, and other sedge species. The bryophyte layer is usually well developed and dominated by sphagnum.

Related types: Where canopy closure is less than 60%, 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 codominated by *Tsuga canadensis* (eastern hemlock). The canopy may also contain a mixture of other conifers, e.g. *Picea rubens* (red spruce), *Larix laricina* (tamarack), and *Pinus strobus* (eastern white pine). Hardwoods may contribute up to 25% of the tree stratum; common species include *Acer rubrum* (red maple), *Betula alleghaniensis* (yellow birch), and *Fraxinus nigra* (black ash). There is generally a pronounced mound and pool topography. 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. *Rhododendron maximum* (rosebay) is often present, sometimes quite dense. *Viburnum cassinoides* (withe-rod), *Rhododendron viscosum* (swamp azalea), *Ilex verticillata* (winterberry), and *Vaccinium corymbosum* (highbush blueberry) are also commonly associated with this type. Herbs include *Osmunda cinnamomea* (cinnamon fern), *Symplocarpus foetidus* (skunk-cabbage), *Onoclea sensibilis* (sensitive fern), *Mitchella repens* (partridge-berry), *Maianthemum canadense* (Canada mayflower), *Coptis trifolia* (goldthread), *Viola* spp. (violets), *Dalibarda repens* (false-violet), *Trientalis borealis* (star-flower), and various grasses and sedges. There may be a strong bryophyte component, usually dominated by sphagnum.

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. *Tsuga canadensis* (eastern hemlock) contributes between 25% and 75% of the canopy. Other conifer species that may occur with hemlock include *Pinus strobus* (eastern white pine), *Picea rubens* (red spruce), and *Larix laricina* (tamarack). The most common hardwood species are *Betula alleghaniensis* (yellow birch), *Acer rubrum* (red maple), *Fraxinus nigra* (black ash), *Nyssa sylvatica* (black-gum), and *Betula populifolia* (gray birch). *Rhododendron maximum* (rosebay) often forms a dense understory; other shrubs include *Vaccinium corymbosum* (highbush blueberry), *Ilex verticillata* (winterberry), *Rhododendron viscosum* (swamp azalea) and *Viburnum cassinoides* (withe-rod). Herbaceous species include *Osmunda cinnamomea* (cinnamon fern), *Carex folliculata* (a sedge), *Viola* spp. (violets), *C. trisperma* (a sedge), *Symplocarpus foetidus* (skunk-cabbage), *Veratrum viride* (false hellebore), *Onoclea sensibilis* (sensitive fern), and *Aster*

*puniceus* (purple-stemmed aster). The bryophyte layer is usually well developed and dominated by sphagnum.

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. This community type is most typical of the Unglaciated Allegheny Plateau, although isolated occurrences may be found elsewhere. The substrate is usually shallow organic matter over mineral soil. There is generally some groundwater enrichment in these systems. *Picea rubens* (red spruce), sometimes in combination with other conifers, contributes between 25% and 75% of the canopy. Other conifer species that may occur include *Tsuga canadensis* (eastern hemlock) *Pinus strobus* (eastern white pine), and *Larix laricina* (tamarack). The most common hardwood species are *Betula alleghaniensis* (yellow birch), *Acer rubrum* (red maple), *Fraxinus nigra* (black ash), *Nyssa sylvatica* (black-gum), and *Betula populifolia* (gray birch). Shrubs include *Nemopanthus mucronatus* (mountain holly), *Vaccinium corymbosum* (highbush blueberry), *Ilex verticillata* (winterberry), *Rhododendron viscosum* (swamp azalea) and *Viburnum cassinoides* (withe-rod). Herbaceous and creeping shrub species include *Coptis trifolia* (goldthread), *Osmunda cinnamomea* (cinnamon fern), *Onoclea sensibilis* (sensitive fern), *Carex folliculata* (a sedge), *C. trisperma* (a sedge), *Viola* spp. (violets), *Gaultheria hispida* (creeping snowberry), and *C. disperma*<sup>S</sup> (soft-leaved sedge). The bryophyte layer is usually well developed and dominated by sphagnum.

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** Bottomland Oak - Hardwood Palustrine Forest: These are palustrine forests characterized by the presence of *Quercus palustris* (pin oak) and/or *Q. bicolor* (swamp white oak), often with *Acer rubrum* (red maple), *Ulmus americana* (American elm), *Nyssa sylvatica* (black-gum), and *Fraxinus nigra* (black ash). Shrubs include *Lindera benzoin* (spicebush), *Vaccinium corymbosum* (highbush blueberry), *Dirca palustris* (leatherwood), *Viburnum recognitum* (northern arrow-wood), and *V. dentatum* (southern arrow-wood). Herbs include *Impatiens* spp. (jewelweed), *Thelypteris palustris* (marsh fern), *Polygonum sagittatum* (arrow-leaved tearthumb), *P. arifolium* (halberd-leaved tearthumb), and *Agrimonia parviflora* (southern agrimony).

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 base-rich groundwater. The substrate is usually mineral soil with a thin layer of organic matter. Calciphiles characterize this community type. The dominant trees are usually *Acer rubrum* (red maple) and *Fraxinus nigra* (black ash). Associates include *Quercus bicolor* (swamp white oak), *Nyssa sylvatica* (black-gum), and *Ulmus americana* (American elm). Common understory species include *Rhamnus alnifolia* (alder-leaved buckthorn), *Physocarpus opulifolius* (ninebark), *Spiraea latifolia* (meadowsweet), *Ilex verticillata* (winterberry), *Alnus serrulata* (smooth alder), *Vaccinium corymbosum* (highbush blueberry), and *Rhododendron viscosum* (swamp azalea). Common herbs include *Osmunda regalis* (royal fern), *Carex stricta* (tussock sedge), *C. lacustris* (lakebank sedge), *Symplocarpus foetidus* (skunk cabbage), *Viola* spp. (violets), and *Onoclea sensibilis* (sensitive fern). Most calciphilic species associated with this type have moderate to high light requirements, and thus are found in openings. These species include *Conioselinum chinense*<sup>S</sup> (hemlock parsley), *Trollius laxus*<sup>S</sup> (spreading globeflower), *Carex interior* (inland sedge), *C. flava*<sup>S</sup> (yellow sedge), *C. leptalea* (bristly-stalked sedge), *Cypripedium calceolus* var. *parviflorum*<sup>S</sup> (small yellow lady's-slipper), *C. reginae*<sup>S</sup> (showy lady's-slipper), *Geum rivale* (water avens), and *Epilobium strictum*<sup>S</sup> (downy willow-herb).

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 *Acer rubrum* (red maple) and/or *Nyssa sylvatica* (black-gum). Other trees, e.g. *Betula alleghaniensis* (yellow birch), *Pinus strobus* (eastern white pine), *Tsuga canadensis* (eastern hemlock), *Quercus bicolor* (swamp white oak) *Q. palustris* (pin oak), or *Salix nigra* (black willow), may also occur. The shrub layer is variable and may include *Vaccinium corymbosum* (highbush blueberry), *Ilex verticillata* (winterberry), *Alnus* spp. (alder), and *Cornus* spp. (dogwoods). Herbs include *Symplocarpus foetidus* (skunk-cabbage), *Viola* spp. (violets), *Osmunda cinnamomea* (cinnamon fern), *Carex* spp. (various sedges), and *Onoclea sensibilis* (sensitive fern).

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.

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 include *Acer rubrum* (red maple), *Fraxinus pennsylvanica* (red ash), *Ulmus americana* (American elm), *U. rubra* (red elm), *Quercus palustris* (pin oak), *Q. bicolor* (swamp white oak), *Carya cordiformis* (bitternut hickory), *Salix nigra* (black willow), *S. sericea* (silky willow), *Viburnum recognitum* (northern arrow-wood), *Cornus amomum* (red-willow), *Lindera benzoin* (spicebush), *Vitis riparia* (frost grape), *Sambucus canadensis* (American elder), *Onoclea sensibilis* (sensitive fern), *Matteuccia struthiopteris* (ostrich fern), and *Polygonum* spp. This community type is part of the “River bed - bank - floodplain complex.”

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) and *Acer negundo* (box-elder), often with *Acer rubrum* (red maple), *A. saccharinum* (silver maple), *Ulmus americana* (American elm), *Ulmus rubra* (red elm), *Fraxinus pennsylvanica* (red ash), and *Salix nigra* (black willow). *Betula nigra* (river birch) is a common component of these sites in eastern Pennsylvania, but rarely occurs in the Ohio River drainage. Common shrubs include *Salix sericea* (silky willow), *Cornus amomum* (red-willow), *C. racemosa* (swamp dogwood), *Vitis riparia* (frost grape), *Lindera benzoin* (spicebush), and *Toxicodendron radicans* (poison-ivy). Exotic shrubs such as *Rosa multiflora*<sup>1</sup> (multiflora rose), *Lonicera japonica*<sup>1</sup> (Japanese honeysuckle), and *Lonicera morrowii*<sup>1</sup> (Morrow's honeysuckle) are common. Herbs include *Impatiens capensis* (jewelweed), *I. pallida* (pale jewelweed), *Pilea pumila* (clearweed), *Laportea canadensis* (wood-nettle), *Polygonum hydropiper*<sup>1</sup> (common smartweed), *Urtica dioica* (great nettle), *P. virginianum* (jumpseed), *Microstegium vimineum*<sup>1</sup> (stilt grass), *Polygonum cuspidatum*<sup>1</sup> (Japanese knotweed), and *Alliaria petiolata*<sup>1</sup> (garlic mustard). This community type is part of the “River bed - bank - floodplain complex.”

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:** These forests occur along larger rivers with a well-developed floodplain. Although this is typically a palustrine community type, there are examples that are terrestrial. Aside from *Acer saccharinum* (silver maple), which is usually dominant, other trees include *Acer rubrum* (red maple), *Salix nigra* (black willow), *Betula nigra* (river birch), *Acer negundo* (box-elder), *Ulmus americana* (American elm), and *U. rubra* (red elm). Shrubs include *Cornus amomum* (red-willow), *C. racemosa* (swamp dogwood), *Toxicodendron radicans* (poison-ivy), *Lindera benzoin* (spicebush), *Sambucus canadensis* (American elder), *Viburnum recognitum* (northern arrow-wood). Exotic shrubs, such as *Rosa multiflora*<sup>1</sup> (multiflora rose), *Lonicera japonica*<sup>1</sup> (Japanese honeysuckle), and *Lonicera morrowii*<sup>1</sup> (Morrow's honeysuckle), are common. Herbs include *Impatiens capensis* (jewelweed), *I. pallida* (pale jewelweed), *Pilea pumila* (clearweed), *Polygonum hydropiper*<sup>1</sup> (common smartweed), *P. virginianum* (jumpseed), *Microstegium vimineum*<sup>1</sup> (stilt grass), *Polygonum cuspidatum*<sup>1</sup> (Japanese knotweed), and often *Alliaria petiolata*<sup>1</sup> (garlic mustard). This community type is part of the “River bed - bank - floodplain complex.”

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<sup>3</sup>/<sub>4</sub> 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.

**Red maple - Magnolia Coastal Plain Palustrine Forest:** This community type is largely restricted to low-lying areas of the Coastal Plain, with outliers occurring in the Piedmont and South Mountain sections. The dominant trees are *Acer rubrum* (red maple), *Magnolia virginiana*<sup>S</sup> (sweet-bay magnolia), *Nyssa sylvatica*, (black-gum), *Liquidambar styraciflua* (sweet-gum), and *Quercus bicolor* (swamp white oak). Shrubs include *Clethra alnifolia* (sweet pepperbush), *Leucothoe racemosa*<sup>S</sup> (fetter-bush), *Ilex verticillata* (winterberry), *I. laevigata* (smooth winterberry), *Vaccinium corymbosum* (highbush blueberry), *Rhododendron viscosum* (swamp azalea), and *Viburnum nudum* (possum-haw). The herbaceous layer is often sparse; species include *Triadenum virginicum* (marsh St.-John's-wort)<sup>¾</sup> in openings, *Viola* spp. (violets), *Osmunda regalis* (royal fern), *Osmunda cinnamomea* (cinnamon fern), and other ferns, sedges, and sphagnum.

Related Types: The upland forest type often associated with this is the "Sweet gum - oak Coastal Plain forest." In Pennsylvania, both of these types are specific to the Coastal Plain. The presence of *Magnolia virginiana*<sup>S</sup> (sweet-bay magnolia), *Liquidambar styraciflua* (sweet-gum), and other coastal plain species distinguish this type from other red maple palustrine forests.

*Range: Coastal Plain, Piedmont, South Mountain.*

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.

Note: Superscript "I" next to the scientific name indicates that the species is not native to Pennsylvania. Superscript "S" next to the scientific name indicates a species of concern.

### *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.

CODE

SITE CLASS

- 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 tuliptree (yellow poplar) and ash indicates Site 1. Dominant and co-dominant trees have a projected merchantable main stem of > 50 feet at maturity (> three 16-foot logs). Total tree heights average > 80 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. 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 co-dominant trees have a projected merchantable main stem of 30-40 feet at maturity (2-2½ 16-foot logs). Total tree heights average > 65 feet but < 80 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 co-dominant trees have a projected main stem less than 30 feet at maturity (< two 16-foot logs). Pitch pine and white pine may yield 30+ feet of projected main stem at maturity (two 16-foot logs). Total tree heights average < 65 feet at maturity.

**CODE**

**SIZE / STOCKING CLASS**

- 1 Majority of the dominant and co-dominant trees are > 18" Dbh and > 50% stocked.
- 2 Majority of the dominant and co-dominant trees are 12-18" Dbh and > 50% stocked.
- 3 Majority of the dominant and co-dominant trees are 6-12" Dbh and > 50% stocked.
- 4 Majority of dominant and co-dominant trees are < 6" Dbh and > 50% stocked.
- 5 Majority of the dominant and co-dominant trees are > 18" Dbh and < 50% stocked.
- 6 Majority of the dominant and co-dominant trees are 12-18" Dbh and < 50% stocked.
- 7 Majority of the dominant and co-dominant trees are 6-12" Dbh and < 50% stocked.
- 8 Majority of dominant and co-dominant trees are < 6" Dbh and < 50% stocked.

Size/stocking classes 5 through 8 are to be used for areas that have experienced heavy mortality and are grossly understocked. Use the fifty-percent stocking line on the oak-stocking chart as a guide for determining whether or not an area should be designated as understocked. Appropriate stocking charts can be referenced to determine basal area / stocking equivalents. Total species composition should be used to determine stocking levels. Forest community types falling below the 30% level should be delineated as Woodlands (O5).

**NOTE:** Each forest community type should consist of a total of four digits. For example, AR11 denotes; AR (Red Oak – Mixed Hardwood Forest), 1 (Site1), 1 (Size/Stocking Class 1).

All other land classification units will consist of two digits: t; land classification type –2 digits. For example, O2 denotes; O2 (Cultivated Herbaceous Area).

Commonly used forest types in Pennsylvania include the following: AD, AR, AH, CC, BB, TM, FF, FR, FA, BC, and DD. Other types represented for terrestrial and upland areas may also appear on the landscape. Care should be taken by the forester to correctly identify each forested stand by the most appropriate type present in this classification document.

## 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.

<u>CODE</u>	<u>WOODLAND / SHRUBLAND TYPE</u>
-------------	----------------------------------

- |    |  |
|----|--|
| 04 | <b>Sweet Fern Savannah:</b> 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. |
| 05 | <b>Woodland:</b> Areas that contain naturally-occurring tree species greater than 15 feet in height that are currently less than thirty percent stocked with trees.  |
| 06 | <b>Orchards:</b> Planted orchard areas such as apple orchards, seed orchards, etc.   |
| 07 | <b>Scrub / Shrub:</b> 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.

<u>CODE</u>	<u>WOODLAND / SHRUBLAND TYPE</u>
-------------	----------------------------------

- |    |   |
|----|---|
| U2 | <b>Scrub/Shrub:</b> Shrub-dominated wetlands that are saturated to the surface or flooded with water.   |
| UX | <b>Palustrine Woodland:</b> 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 alphanumeric 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

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

### 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.

<u>CODE</u>	<u>TYPE</u>
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.

