



# *T*errestrial Forests



*The Hemlocks State Forest Natural Area, Perry County. Photograph by Staff of the Pennsylvania Science Office of The Nature Conservancy.*



*Elk Run Woods, Sullivan County. Photograph by Staff of the Pennsylvania Science Office of The Nature Conservancy.*



## CONIFEROUS TERRESTRIAL FORESTS

### 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* (sweet 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 noveboracensis* (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, see the mixed conifer broadleaf terrestrial forest section.

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

**Selected references:** Braun 1950, Nichols 1935.

**[Crosswalk:** Smith's "Northern Conifer Forest," TNC's *Tsuga canadensis* - *Pinus strobus* Forest Alliance, SAF's White pine-hemlock (22) and Eastern hemlock (23).]

## CONIFER – BROADLEAF TERRESTRIAL FORESTS

### Serpentine pitch pine - oak forest

This community type is part of the "Serpentine barrens 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 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)—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 serpentine-derived soils and shares many species with this type. The Virginia pine type is dominated by a mixture of *Pinus virginiana* and various oaks. *P. 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 barrens complex."

**Range:** Piedmont.

**Selected references:** Latham 1992, Roger Latham-personal communication, PNFI field surveys.

**[Crosswalk:** Smith's "Eastern Serpentine Barren" (in part), TNC's *Quercus falcata* - *Quercus alba* Forest Alliance, SAF's Pitch pine (45).]

### Serpentine Virginia pine - oak forest

This community type is part of the "Serpentine barrens 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* (wild 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 community. The pitch pine community is dominated by a mixture of *Pinus rigida* and various oaks. *P. 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 barrens complex."

**Range:** Piedmont.

**Selected references:** Latham 1992, Roger Latham-personal communication, PNDI field surveys.

**[Crosswalk:** Smith's "Eastern Serpentine Barren" (in part), TNC *Pinus virginiana* - *Quercus (alba, stellata, falcata, velutina)* Forest Alliance, *Pinus (echinata, taeda, virginiana)* Forest Alliance, *Pinus virginiana* / *Quercus marilandica* Community, SAF's Virginia pine (79).]

### 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 pitch pine. In the absence of fire, pitch 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 (pallidum, 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 community.

The "Serpentine pitch pine - oak forest" differs from this community 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). For a more detailed explanation of the ecology of serpentine barrens, see the description of the "Serpentine barrens complex."

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

**Selected references:** Hunter and Swisher 1983, Illick and Aughanbaugh 1930, Reschke 1990.

**[Crosswalk:** Smith's "Xeric Central Hardwood - Conifer Forest," TNC's *Pinus (rigida, echinata)* - *Quercus* Forest Alliance, SAF's Pitch pine (45).]

### Virginia pine - mixed hardwood forest

This community type most often occurs as a post-agricultural forest type on sand or silt loams, in the southeastern portion of the state. 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) or *P. resinosa* (red pine) contribute at least 25% of the overstory. Although this is typically a mixed type, some areas may be strongly dominated by pine. Hardwood associates vary; common species include *Quercus rubra* (red oak), *Q. velutina* (black oak), *Q. coccinea* (scarlet oak), *Q. alba* (white oak), *Prunus serotina* (wild 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. If the total conifer component is below 25%, consult the "Broadleaf terrestrial forest" section.

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. For a more detailed explanation of the ecology of serpentine barrens, see the description of the "Serpentine barrens complex."

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

**Selected references:** Hunter and Swisher 1983, Eyre 1980.

**[Crosswalk:** Smith's "Xeric Central Hardwood - Conifer Forest," TNC's *Pinus virginiana* - *Quercus* (*alba*, *stellata*, *falcata*, *prinus*, *velutina*) Forest Alliance, SAF's Virginia pine-oak (78).]

### Dry white pine (hemlock) oak forest

This community 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* (wild 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, in other cases it appears to be transitional.

**Related types:** If the total conifer cover is less than 25% of the canopy, see the "Broadleaf terrestrial forests" section. 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.

**Selected references:** Braun 1950, Eyre 1980.

**[Crosswalk:** Smith's "Dry - Mesic Acidic Central Forest," TNC's *Pinus strobus* - *Quercus* (*rubra*, *alba*, *velutina*) Forest Alliance and *Tsuga canadensis* - *Pinus strobus* (dry) Forest Alliance, SAF's White pine - chestnut oak (51).]

### 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* (black 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* (moosewood), and *Viburnum* (*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 noveboracensis* (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" community 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), *Tsuga canadensis* (eastern hemlock) and/or *Pinus strobus* (white pine). In the community 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 community are likewise more northern in affinity.

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

**Selected references:** Braun 1950, Nichols 1935, Whitney 1990a, 1990b.

**[Crosswalk:** Smith's "Northern Hardwood - Conifer Forest," TNC's *Tsuga canadensis* - *Pinus strobus* Forest Alliance. If split, *Tsuga canadensis* (mesic) Forest Alliance, SAF's Hemlock - yellow birch (24).]

### 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 supracanopy (*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* (sweet 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.

**Selected references:** Braun 1950, Eyre 1980.

**[Crosswalk:** Smith's "Dry - Mesic Acidic Central Forest" (in part), TNC's *Tsuga canadensis* - *Pinus strobus* Forest Alliance, SAF's White pine - northern red oak - red maple (20).]

### 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* (sweet 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)—usually *Q. rubra* (northern red oak), as well as *Fagus grandifolia* (American beech), *Fraxinus americana* (white ash), *Prunus serotina* (wild 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)—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 often occurs on dryer sites, and



generally has *Quercus rubra* (red oak) as a major canopy component.

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

**Selected references:** Braun 1950, Eyre 1980.

**[Crosswalk:** Smith's "Dry - Mesic Acidic Central Forest," TNC's "*Tsuga canadensis* (mesic) Forest Alliance, *Tsuga canadensis* - *Fagus grandifolia* Community, SAF's Yellow poplar eastern hemlock (58).]

### Rich hemlock - mesic hardwoods 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), *Maianthemum canadense* (Canada mayflower), *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.

**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* (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.

**Selected references:** Braun 1950, PNDI field surveys.

**[Crosswalk:** Smith's "Mesic Central Forest" (in part), TNC's *Tsuga canadensis* (mesic) Forest Alliance, SAF's Eastern hemlock (23) and Yellow poplar - white oak - northern red oak (59).]

## BROADLEAF TERRESTRIAL FORESTS

### Dry oak - heath forest

This is a fairly broadly defined community 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 forest 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* (pipissewa), *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."

**Range:** Entire state.

**Selected references:** Braun 1950, Sneddon, Anderson, and Metzler 1996.

**[Crosswalk:** Smith's "Xeric Central Hardwood Forest," TNC's *Quercus - Ericaceae* Forest Alliance and *Quercus (prinus, coccinea, velutina)* Forest Alliance, SAF: most of Chestnut oak (44), and parts of Northern red oak (55) and White oak - black oak - northern red oak (52).]

### 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 pennsylvanica* (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.

**Selected references:** Braun 1955, Monk, 1mm, and Potter 1990, Pearson 1974, 1979.

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

**[Crosswalk:** Smith's "Dry-Mesic Calcareous Central Forest," "Xeric Central Hardwood Forest," TNC's *Quercus (prinus, rubra) - Carya* Forest Alliance and parts of *Carya -Fraxinus - Quercus* Forest Alliance, although the latter is generally richer and more mesic, SAF's White oak - black oak - northern red oak (52).]

### Red oak - mixed hardwood forest

This broadly defined community 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 arrowwood), *V. dentatum* (southern arrowwood), *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* (pipissewa), *Gaultheria procumbens* (teaberry), *Medeola virginiana* (Indian cucumber-root), *Caulophyllum thalictroides* (blue cohosh)—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.

**Selected references:** Braun 1955, Gordon 1941, Harshberger 1904, Pearson 1974, 1979.

**[Crosswalk:** falls between Smith's "Dry - Mesic Acidic Central Forest" and "Mesic central forest," TNC's *Quercus rubra* - *Acer saccharum* Forest Alliance (mostly) and *Quercus (prinus, rubra)* - *Carya* Forest Alliance (to a lesser extent), SAF's Northern red oak (55).]

### Northern hardwood forest

Dominant trees usually include *Fagus grandifolia* (American beech), *Acer rubrum* (red maple), *A. saccharum* (sugar maple), *Prunus serotina* (wild black cherry)—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* (moose-wood), *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 exceeds 25%, please read description for the "Hemlock (white pine) - northern hardwood forest." If cover by *Prunus serotina* (wild black cherry) 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.

**Selected references:** Braun 1950, Illick and Frontz 1928, Lindsey and Escobar 1976.

**[Crosswalk:** Smith's "Northern Hardwood (Broadleaf) Forest," TNC's *Acer saccharum* - *Betula alleghaniensis* - *Fagus grandifolia* Forest Alliance, SAF's Sugar maple - beech - yellow birch (24).]

### Black cherry - northern hardwood forest

This forest type is characterized by at least 40% relative cover by 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* (moose-wood), *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 noveboracensis* (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* (wild black cherry) as a component, but it does not generally exceed 40% relative cover. This forest type is most characteristic of the Unglaciaded Allegheny Plateau.

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

**Selected references:** Hough and Forbes 1943, Marquis 1975.

**[Crosswalk:** Smith's "Northern Hardwood (Broadleaf) Forest," TNC's *Acer saccharum* - *Betula alleghaniensis* - *Fagus grandifolia* Forest Alliance, *Acer saccharum* - *Betula alleghaniensis* - *Prunus serotina* Community, SAF's Black cherry - maple (28).]

### 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 *Q. 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)—less than 25% relative cover 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 more widespread, occurs across a broader ecological range, and is usually dominated by oaks and hickories. This type is 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.

**Selected references:** Pearson 1974, PNDI field surveys.

**[Crosswalk:** falls between Smith's "Dry-mesic acidic central forest" and "Mesic central forest", TNC's *Fagus grandifolia* - *Acer saccharum* (*Liriodendron tulipifera*) Forest Alliance, SAF's Yellow poplar (57) (in part), also some non-oak dominated portions of Yellow poplar white - oak (59).]

### 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.

**Selected references:** Eyre 1980, Harker et al. 1993.

**[Crosswalk:** Smith's "Talus Slope Forest," TNC's *Acer saccharum* - *Fraxinus americana* - *Tilia americana* Forest Alliance and *Acer saccharum* - *Fraxinus americana* - *Ulmus americana* Forest Alliance, *Acer saccharum* - *Liriodendron tulipifera* - *Fraxinus americana* - *Staphylea trifolia* Community, SAF's Sugar maple - basswood (26).]

### 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 that 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* (wild 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* (squirrelcorn), *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.

**Selected references:** Braun 1950, Harker et al. 1993, PNDI field surveys

**[Crosswalk:** Smith's "Mesic Central Forest" (in part), TNC's *Liriodendron tulipifera* - *Tilia americana* var. *heterophylla* - *Aesculus flava* - *Acer saccharum* Forest Alliance, SAF's Yellow-poplar - white oak - northern red oak (59)—richer examples.]

### 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*<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> (fetter-bush), *Lyonia mariana*<sup>s</sup> (stagger-bush), *Clethra alnifolia* (sweet pepperbush), *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*<sup>s</sup> (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.

**Selected references:** Heckscher 1994, Smith 1991.

**[Crosswalk:** Smith's "Coastal plain forest" (in part), TNC's *Quercus* - *Fagus grandifolia* - *Ilex opaca* Forest Alliance, *Quercus* - *Fagus grandifolia* / *Podophyllum peltatum* Community, SAF's White oak (53) (in part).]

### Red maple (terrestrial) 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* (wild black cherry), and other hardwoods. Because *Acer rubrum* (red maple) has such a 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), and *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.

**Selected reference:** Abrams 1998.

**[Crosswalk:** Smith - no crosswalk, TNC - no crosswalk, SAF's Red maple (108).]

### Black-gum ridgetop forest

This community 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* is the dominant species; *Betula lenta* (sweet 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 wide range of possible associates depending on aspect and location.

**Range:** Ridge and Valley.

**Selected references:** Daniel Devlin—personal communication.

**[Crosswalk:** none.]

### Aspen/gray (paper) birch forest

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

community 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.

**[Crosswalk:** Smith's "Young Miscellaneous Forest," TNC's *Populus tremuloides* Forest Alliance, SAF's Aspen (16) and Gray birch - red maple (19).]

### 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* (sweet birch) is frequently codominant. Other associates vary; typical representatives include *Acer rubrum* (red maple), the exotic *Acer platanoides*<sup>1</sup> (Norway maple), *Sassafras albidum* (sassafras), various oaks (*Quercus* spp.), or *Prunus serotina* (wild 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*<sup>1</sup> (Japanese honeysuckle), *Ailanthus altissima*<sup>1</sup> (tree-of-heaven), *L. morrowii*<sup>1</sup> (Morrow's honeysuckle), *Berberis thunbergii*<sup>1</sup> (Japanese barberry), *Alliaria petiolate*<sup>1</sup> (garlic mustard), *Polygonum perfoliatum*<sup>1</sup> (mile-a-minute), *Microstegium vimineum*<sup>1</sup> (stilt grass), *Poa pratensis*<sup>1</sup> (Kentucky bluegrass), *Dactylis glomerata*<sup>1</sup> (orchard grass), and *Holcus lanatus*<sup>1</sup> (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.

**Selected references:** Eyre 1980.

**[Crosswalk:** Smith's "Young Miscellaneous Forest," TNC -no crosswalk, SAF's Black locust (50).]