Chapter 3

Terrestrial Woodlands

Wayne County. Photograph by Staff of the Pennsylvania Science Office of The Nature Conservancy.

Red spruce rocky summit, State Game Lands 57, Wyoming County. Photograph by Jean Fike.

CONIFEROUS TERRESTRIAL WOODLANDS

Pitch pine - heath woodland

This is a woodland community type that occurs on rocky ridge-tops, on sandy soils, or both. A similar type occurs on serpentinite-derived soils on the Piedmont (see related types section below). Soils for this community are acidic; conditions are dry. Trees are drought-stressed and of small stature. *Pinus rigida* (pitch pine) is usually the dominant tree, although in southern Pennsylvania, *P. virginiana* (Virginia pine), and *Pinus pungens* (Table-mountain pine) may accompany or replace *P rigida. Pinus resinosa* (red pine) may also occur on some sites. Hardwoods may be present but do not contribute more than 25% of the tree layer. Hardwood associates include *Nyssa sylvatica* (black-gum), *Sassafras albidum* (sassafras), *Betula lenta* (sweet birch), *Quercus montana* (chestnut oak), *Q. coccinea* (scarlet oak), *Betula populifolia* (gray birch), and *Acer rubrum* (red maple). *Pinus strobus* (eastern white pine) may also occur but is not common. Various shrubs, mostly ericads, form a low shrub layer. Characteristic species include *Gaylussacia baccata* (black huckleberry), *Vaccinium angustifolium* (low sweet blueberry), *V. pallidum* (lowbush blueberry), *Aronia melanocarpa* (black chokeberry), *Comptonia peregrine* (sweet-fern), *Gaultheria procumbens* (tea-berry), and *Kalmia angustifolia* (sheep laurel). Scattered *Q. ilicifolia* (scrub oak) may be present but is not dominant. Herbaceous species include *Pteridium aquilinum* (bracken fern), *Carex pensylvanica* (Pennsylvania sedge), *Carex communis* (a sedge), *Schizachyrium scoparium* (little bluestem), *Deschampsia flexuosa* (common hair-grass), *Melampyrum lineare* (cow-wheat), *Danthonia spicata* (poverty grass), *Lespedeza* spp. (bush-clovers), and *Aralia nudicaulis* (wild sarsaparilla). *Cladonia* spp. and *Cladina* spp. (reindeer lichens) are also very common. This community may occur as part of the "Ridgetop acidic barren complex."

Related types: This type may contain scattered *Q. ilicifolia* (scrub oak), but sites where *Q. ilicifolia* becomes the dominant shrub should be classified as "Pitch pine -scrub oak woodland". If the hardwood component of the canopy exceeds 25% relative cover, see the "Pitch pine - mixed hardwood woodland" type. The pine-dominated type here often occurs adjacent to and upslope of the more mixed type. On the Piedmont, on areas of serpentine geology, a similar dry pine type occurs with many of the same dominants. For sites in this ecoregion of unknown geology, please read both descriptions.

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

Selected references: Illick and Aughanbaugh 1930, Schweitzer and Rawinski 1987.

[Crosswalk: Smith's "Ridgetop Dwarf-tree Forest" (in part), "Appalachian Sand Barren" (in part), TNC's *Pinus rigida / Vaccinium* Woodland Alliance, SAF's Pitch pine (45).**]**

Pitch pine - scrub oak woodland

This is a woodland community type that occurs on rocky ridge-tops, on sandy soils, or both. Soils for this community are acidic; conditions are dry. Trees are drought-stressed and of small stature. *Pinus rigida* (pitch pine) is usually the dominant tree, although in southern Pennsylvania, *P. virginiana* (Virginia pine), and *P. pungens* (Table-mountain pine) may accompany or replace *P rigida. P. resinosa* (red pine) may also occur on some sites. Hardwoods may be present but do not contribute more than 25% of the tree layer. Hardwood associates include *Nyssa sylvatica* (black-gum), *Sassafras albidum* (sassafras), *Betula lenta* (sweet birch), *Quercus montana* (chestnut oak), *Q. coccinea* (scarlet oak), *B. populifolia* (gray birch), and *Acer rubrum* (red maple). *Pinus strobus* (eastern white pine) may also occur but is not common. *Quercus ilicifolia* (scrub oak) forms a dense understory. Various shrubs, mostly ericads, often form a low shrub layer. Characteristic species include *Gaylussacia baccata* (black huckleberry), *Vaccinium angustifolium* (low sweet blueberry), *V. pallidum* (lowbush blueberry), *Aronia melanocarpa* (black chokeberry), *Comptonia perigrina* (sweet-fern), and *Gaultheria procumbens* (teaberry). Herbaceous species include *Pteridium aquilinum* (bracken fern), *Carex pensylvanica* (Pennsylvania sedge), *C. communis* (a sedge), *Oryzopsis* spp. (ricegrass), *Schizachyrium scoparium* (little bluestem), *Deschampsia flexuosa* (common hairgrass), *Melampyrum lineare* (cow-wheat), *Danthonia spicata* (poverty grass), *Aristida dichotoma* (three-awn), and *Aralia nudicaulis* (wild sarsaparilla). This community may occur as part of the "Ridgetop acidic barren complex."

Related types: If the hardwood component of the canopy exceeds 25% relative cover, see the "Pitch pine - mixed hardwood woodland" type. The pine-dominated type here often occurs adjacent to and upslope of the more mixed type. If the shrub layer is dominated by ericaceous shrubs rather than *Quercus ilicifolia* (scrub oak), consult the description for the "Pitch pine - heath woodland."

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

Selected references: Illick and Aughanbaugh 1930, Schweitzer and Rawinski 1987.

[Crosswalk: Smith's "Ridgetop Dwarf-tree Forest" (in part), "Appalachian Sand Barren" (in part), TNC's *Pinus rigida / Quercus ilicifolia* Woodland Alliance, *Pinus rigida/Quercus ilicifolia/Aronia melanocarpa* Community, SAF's Pitch pine (45).**]**

Red spruce rocky summit

This type is known in the state from only one example, in Wyoming County, Northeastern Pennsylvania. The site is north-facing on fractured bedrock at an elevation of about 2200 ft. Woody species occur in pockets of soil that have accumulated in cracks in the bedrock. There are extensive areas of bare or lichen-encrusted rock. Aside from *Picea rubens* (red spruce), tree species include *Betula populifolia* (gray birch), *Pinus rigida* (pitch pine), *P. resinosa* (red pine), *P. strobus* (eastern white pine), *Tsuga canadensis* (eastern hemlock), and *Acer rubrum* (red maple). Trees are small in stature and shaped by exposure to wind and ice. Shrubs include *Gaylussacia baccata* (black huckleberry), *Vaccinium pallidum* (lowbush blueberry), *Aronia melanocarpa* (black chokeberry), *Sorbus americana* (American mountain-ash), *Ilex montana* (mountain holly), and *Kalmia angustifolia* (sheep laurel). Herbaceous species include *Carex pensylvanica* (Pennsylvania sedge), *Carex communis* (a sedge), *Deschampsia flexuosa* (common hairgrass), *Maianthemum canadense* (Canada mayflower), and *Melampyrum lineare* (cow-wheat). *Cladonia* spp and *Cladina* spp. (reindeer lichens), and crustose lichens are abundant. This community type is part of the "Ridgetop acidic barrens complex."

Related types: The Pennsylvania example of this community type lacks the fir component of spruce balds found both farther north in the Adirondacks (balsam fir), and farther south in the Blue Ridge (Fraser fir).

Range: Glaciated NE.

Selected references: PNDI field surveys.

[Crosswalk: TNC's *Picea rubens* Woodland Alliance, *Picea rubens — Vaccinium angustifolium* Community, SAF's Red spruce (32).**]**

Pitch pine - rhodora - scrub oak woodland

This community is part of the "Mesic till barren complex." This is a unique group of communities restricted to the southern Pocono Plateau. The barren-like vegetation does not appear to be a response to droughty or nutrient-poor soils. The same deep, fine-loamy Illinoian till on which it occurs also underlies the adjacent forests (Latham et al. 1996). The origin of the barrens, and the processes responsible for their persistence and distribution are not known, but fire appears to be a critical factor.

Please see the description of the "Mesic till barrens complex" for more information. Included here are all areas of the complex with at least 10% cover by trees, mostly*Pinus rigida* (pitch pine) and *Acer rubrum* (red maple). *Rhododendron canadense* (rhodora) and *Quercus ilicifolia* (scrub oak), with a mixture of *Vaccinium angustifolium* (low sweet blueberry) and *Kalmia angustifolia* (sheep laurel), dominate the shrub layer. The most abundant species in the herbaceous and creeping shrub layer are *Carex pensylvanica* (Pennsylvania sedge), *Oryzopsis racemosa* (ricegrass), *Rubus hispidus* (swamp dewberry), *Pteridium aquilinum* (bracken fern), and *Gaultheria procumbens* (teaberry). Other species include *Amianthium muscaetoxicum* (fly-poison), *Aster umbellatus* (flat-topped aster), *Calamagrostis cinnoides* (reedgrass), and the globally rare species *Carex polymorpha*[S] (variable sedge) and *Lygodium palmaturn*[S] (climbing fern).

Related types: This type is superficially similar to the much more common "Pitch pine - scrub oak woodland" type. Location, mesic soil conditions, and the importance of rhodora in the shrub layer distinguish this highly restricted community type. See the description of the "Mesic till barren complex" for a more detailed ecological description.

Range: Pocono Plateau.

Selected references: Davis et al. 1991, Latham et al. 1996.

[Crosswalk: Smith's "Mesic Scrub Oak - Heath - Pitch Pine Barrens" (in part), TNC's *Pinus rigida* Seasonally Flooded (sic.) Woodland Alliance, *Pinus rigida - Quercus ilicifolia - Rhododendron canadense* Community, SAF's Pitch pine (45).**]**

CONIFER - BROADLEAF TERRESTRIAL WOODLANDS

Pitch pine - mixed hardwood woodland

This community type occurs on dry, sandy, acidic soils. *Pinus rigida* (pitch pine) contributes between 25% and 75% relative cover. *Pinus pungens* (Table-mountain pine) or P *resinosa* (red pine) may also occur on some sites. Hardwood associates include *Quercus montana* (chestnut oak), *Q. coccinea* (scarlet oak), *Q. velutina* (black oak), *Nyssa sylvatica* (black-gum), *Sassafras albidum* (sassafras), *Betula lenta* (sweet birch), *B. populifolia* (gray birch), and *Acer rubrum* (red maple). The shrub layer may be entirely composed of low shrubs like *Vaccinium angustifolium* (low sweet blueberry), *V. pallidum* (lowbush blueberry), *Comptonia perigrina*

(sweet-fern), and *Gaylussacia baccata* (black huckleberry), or may have an additional layer of taller shrubs like *Kalmia latifolia* (mountain laurel), *V. corymbosum* (highbush blueberry), and *Quercus ilicifolia* (scrub oak). Herbaceous species include *Pteridium aquilinum* (bracken fern), *Deschampsia flexuosa* (common hair-grass), *Danthonia spicata* (poverty grass), *Epigaea repens* (trailing arbutus), *Gaultheria procumbens* (teaberry), *Melampyrum lineare* (cow-wheat), *Carex pensylvanica* (Pennsylvania sedge), *C. communes* (a sedge), *Oryzopsis* spp. (ricegrass), *Aralia nudicaulis* (wild sarsaparilla). Lichens such as *Cladonia* spp. and *Cladina* spp. (reindeer lichens) are abundant in some areas. This community may occur as part of the "Ridgetop acidic barren complex."

Related types: This type is similar to and may grade into the "Pitch pine - scrub oak woodland" community. This type is distinguished from the pine type by having at least 25% of the tree stratum contributed by hardwoods. Likewise, this type is distinguished from the "Dry oak -heath woodland" community by its greater pine component—at least 25% relative cover. The canopy is generally less open than in the "Pitch pine - scrub oak woodland" type, and often occurs adjacent downslope of that type on somewhat less dry or more sheltered sites. See the "Ridgetop acidic barren complex" description for more information.

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

Selected references: Illick and Aughanbaugh 1930, Schweitzer and Rawinski 1987.

[Crosswalk: Smith's "Ridgetop Dwarf-Tree Forest" (in part), TNC's *Quercus (coccinea, velutina) - Pinus rigida* Woodland Alliance, *Quercus (coccinea, velutina) - Pinus rigida - Schizachyrium scoparium* Community, SAF's Pitch pine (45).**]**

Virginia pine - mixed hardwood shale woodland

This community type occurs on dry (typically acidic) shale slopes with a more or less southerly exposure. Although the overall character is that of a woodland, there may be herbaceous openings and sparsely vegetated areas within the woodland matrix. *Pinus virginiana* (Virginia pine), sometimes in combination with *P. strobus* (eastern white pine), *Juniperus virginiana* (red-cedar), or *P. pungens* (Table-mountain pine), contributes between 25% and 75% relative cover. Hardwood associates include *Fraxinus americana* (white ash), *Quercus montana* (chestnut oak), *Q. rubra* (red oak), *Q. velutina* (black oak), *Q. stellata* (post oak), *Carya glabra* (pignut hickory), *C. ovalis* (sweet pignut hickory), and *C. ovata* (shagbark hickory). The shrub layer includes such species as *Amelanchier arborea* (shadbush), *Gaylussacia baccata* (black huckleberry), *Vaccinium stamineum* (deerberry), and *Quercus ilicifolia* (scrub oak). The herbaceous layer is generally sparse; species include *Schizachyrium scoparium* (little bluestem), *Panicum linearifolium* (panic-grass), *Carex pensylvanica* (Pennsylvania sedge), *Danthonia spicata* (poverty grass), *Deschampsia flexuosa* (hairgrass), *Penstemon hirsutus* (beard-tongue), *Heuchera americana* (alum-root), *Cunila origanoides* (common dittany), *Aster cordifolius* (blue wood aster), and *Hieracium venosum* (rattlesnake-weed). Lichens such as *Cladonia* spp. and *Cladina* spp. (reindeer lichens) are abundant in some areas.

Related types: The "Red-cedar - mixed hardwood rich shale woodland" type also occurs on steep shale slopes. This type generally has a sparser herbaceous layer, and tends to be less open. More data are needed on substrate chemistry, but it appears that this type is more typically associated with acidic shales.

Range: Ridge and Valley and maybe Glaciated NE.

Selected references: Berdine 1998, PNDI field surveys.

[Crosswalk: *Pinus virginiana* Woodland Alliance, and *Quercus (rubra, prinus) - Pinus (strobus, virginiana)* Woodland Alliance, SAF's Virginia pine - oak (78).**]**

Red-cedar - mixed hardwood rich shale woodland

This is a woodland community type occurring on steep, south-facing slopes of thinly bedded, often calcareous, weathering shales. These sites are actively eroding, and very dry, at least at the surface. Surface temperatures are seasonally extremely high. Although the overall aspect is that of a woodland, there may be herbaceous openings and sparsely vegetated areas within the woodland matrix. Characteristic trees include *Juniperus virginiana* (red-cedar), *Fraxinus americana* (white ash), *Quercus montana* (chestnut oak), *Q. muhlenbergii* (yellow oak), *Q. stellata* (post oak), *Carya ovata* (shagbark hickory), *C. glabra* (pignut hickory), and *C. ovalis* (sweet pignut hickory). Other characteristic woody species include *Rhus aromatics* (fragrant sumac), *Amelanchier arborea* (shadbush), *Celtis tenuifolia* (dwarf hackberry), *Rosa carolina* (pasture rose), *Rhus copallina* (shining sumac), and *Parthenocissus quinquefolia* (Virginia creeper). This community type is characterized by a relatively dense, diverse herbaceous layer. Herbaceous species include *Danthonia spicata* (poverty grass), *Deschampsia flexuosa* (common hairgrass), *Panicum linearifolium* (panic grass), *Andropogon gerardii* (big bluestem), Schizachyrium

scoparium (little bluestem), *Helianthus divaricatus* (rough sunflower), *Carex pensylvanica* (Pennsylvania sedge), *Phlox subulata* ssp. *subulata* (moss-pink), *Antennaria virginica*[S] (shale-barren pussytoes), *Solidago bicolor* (silver-rod), *Hedyotis longifolia* (bluets), *Melica nitens*[S] (tall melic grass), *Cunila origanoides* (common dittany), and *Viola pedata* (birdfoot violet). Endemic or near-endemic species include *Oenothera argillicola*[S] (shale-barren evening-primrose), *Phacelia dubia* (scorpion-weed), *Calystegia spithamaea* spp. *purshiana* (low bindweed), *Senecio antennarifolius*[S] (shale-barren ragwort), and *Trifolium virginicum*[S] (Kate's-mountain clover). Lichens such as *Cladina* spp. and *Cladonia* spp. (reindeer lichens) may be abundant on more exposed portions of these sites.

Related types: The "Red-cedar - prickly pear shale shrubland" also occurs on shale slopes, but in Pennsylvania is generally restricted to slopes above the Delaware River in the Northeastern part of the state, and lacks the endemic species which characterize this community type. The "Virginia pine - mixed hardwood shale woodland" type also occurs on shales, but is not generally as rich in endemic species as is this type. More research is needed on the relationship between substrate chemistry and vegetation on Pennsylvania shale barrens, but it appears that this type occurs on more base-rich shales than do the other two shale barren community types.

Range: Ridge and Valley.

Selected references: Berdine 1998, Dix 1990, Henry 1954, Platt 1951, Keener 1983, PNDI field surveys.

[Crosswalk: Smith's "Appalachian Shale Barren - Central Appalachian subtype," TNC's *Juniperus virginiana -(Fraxinus americana, Ostrya virginiana)* Woodland Alliance, *Juniperus virginiana - Fraxinus americana -Carya glabra / Carex pensylvanica - Chelianthes lanosa* Woodland, SAF's Eastern red-cedar (46).**]**

BROADLEAF TERRESTRIAL WOODLANDS

Dry oak - heath woodland

This community type occurs on dry, acidic soils. Dominant trees include *Quercus montana* (chestnut oak), *Q. coccinea* (scarlet oak), *Q. velutina* (black oak), *Nyssa sylvatica* (black-gum), *Sassafras albidum* (sassafras), *Betula lento* (sweet birch), *Betula populifolia* (gray birch), and *Acer rubrum* (red maple). *Pinus strobus* (eastern white pine) and *P. rigida* (pitch pine) or occasionally other dry-site pines may be present but contribute less than 25% of the tree stratum. The structure of the shrub layer is variable; it may be composed entirely of low shrubs like *Vaccinium angustifolium* (low sweet blueberry), *V. pallidum* (lowbush blueberry), *Gaylussacia baccata* (black huckleberry), and *Comptonia peregrina* (sweet-fern), or there may be an additional layer of taller shrubs like *Kalmia latifolia* (mountain laurel), *Quercus ilicifolia* (scrub oak), and V *corymbosum* (highbush blueberry). Typical herbaceous species include *Pteridium aquilinum* (bracken fern), *Carex pensylvanica* (Pennsylvania sedge), *C. communis* (a sedge), *Oryzopsis* spp. (ricegrass), *Maianthemum canadense* (Canada mayflower), *Aralia nudicaulis* (wild sarsaparilla), *Gaultheria procumbens* (teaberry), and *Epigaea repens* (trailing arbutus). This type often occurs downslope adjacent to the "Pitch pine - mixed hardwood woodland" type, or along lower ridgetops or on other dry sites. This community may occur as part of the "Ridgetop acidic barren complex."

Related types: This type often occurs along a soil-moisture gradient between the "Pitch pine - mixed hardwood woodland" type and the "Dry oak - heath forest" type. It is distinguished from the former by a lack of substantial conifer component (less than 25% relative cover) and from the latter by having an open canopy (less than 40% cover by trees).

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

Selected references: Davis et al. 1990, 1991.

[Crosswalk: Smith's "Ridgetop Dwarftree Forest" (in part), TNC's *Quercus rubra - Quercus prinus* Woodland Alliance, SAF's parts of Chestnut oak (44), Northern red oak (55) and White oak - black oak- northern red oak (52).**]**

Birch (black-gum) rocky slope woodland

This community type most often occurs on talus, scree or other rocky slopes. Although most typical of slopes, it may also occur on benches, ridgetops, or boulderfields. Birch, usually *Betula lenta* (sweet birch) or less commonly *B. papyrifera* (paper birch), *B. populifolia* (gray birch), or *B. alleghaniensis* (yellow birch), is nearly always present. Either birch or *Nyssa sylvatica* (black-gum) may be dominant. Associated tree species include *Tsuga canadensis* (eastern hemlock), *Acer rubrum* (red maple), *Carya glabra* (pignut hickory), *Quercus montana* (chestnut oak), *Q. alba* (white oak), *Q. velutina* (black oak), and *Q. coccinea* (scarlet oak). Other woody species include *Kalmia latifolia* (mountain laurel), *Viburnum acerifolium* (maple-leaved viburnum), *Hamamelis virginiana* (witch hazel), *Ribes* spp., *Vitis* spp., *Toxicodendron radicans* (poison ivy), and *Parthenocissus quinquefolia* (Virginia-creeper). The herbaceous layer is

sparse; representative species include *Dryopteris marginalis* (common wood fern), *Polypodium virginianum* (rock polypody), *Woodsia obtusa* (blunt-lobed woodsia), and *Asplenium platyneuron* (ebony spleenwort). There are often rich bryophyte and lichen assemblages associated with these communities. The composition of this type is variable and often responds to aspect. On north-facing slopes, *Tsuga canadensis* (eastern hemlock) may become dominant. More information is needed to determine if such variation warrants additional types.

Related types: The "Black-gum ridgetop forest" may have an open canopy in places, but is characteristic of ridgetops rather than scree or talus slopes. Where the canopy is becoming closed, this type may grade into a variety of forest types.

Range: Pittsburgh Plateau, Ridge and Valley.

[Crosswalk: Smith's "Talus Slope Forest"- much modified, TNC - no crosswalk, SAF - no crosswalk.**]**

Yellow oak - redbud woodland

This community type represents the high-pH range of the moderately dry mixed oak woodlands. This woodland type is characterized by the consistent presence of calciphilic species. *Quercus muhlenbergii* (yellow oak) is nearly always present, often dominant or codominant. Associate tree species include *Quercus montana* (chestnut oak), *Q. alba* (white oak), *Nyssa sylvatica* (black-gum), *Acer saccharum* (sugar maple), *Fraxinus americana* (white ash), *Tilia americana* (basswood), *Carya ovalis* (sweet pignut hickory), *C. glabra* (pignut hickory), and *Juniperus virginiana* (red-cedar). Aside from *Cercis canadensis* (redbud), characteristic shrubs include *Ostrya virginiana* (hop-hornbeam), *Rhus aromatica* (fragrant sumac), *Celtis occidentalis* (hackberry), *Viburnum rafinesquianum* (downy arrow-wood), and *Cornus florida* (flowering dogwood). Herbs include *Aquilegia canadensis* (wild columbine), *Senecio obovatus* (groundsel), *Bouteloua curtipendula*[S] (side-oats gramma), and *Asclepias quadrifolia* (four-leaved milkweed).

Related types: In areas where the canopy becomes more open, this type may grade into the "Red cedar - redbud shrubland." Sufficiently large herbaceous openings may support the "Side-oat gramma grassland" or "Calcareous opening/cliff" types. As soil conditions become less dry and the canopy closes, this woodland type may grade into the "Dry oak - mixed hardwood forest" type.

Range: Pittsburgh Plateau, Ridge and Valley.

Selected references: PNDI field surveys.

[Crosswalk: Smith's "Dry-Mesic Calcareous Central Forest," TNC's *Acer saccharum - Quercus muhlenbergii* Forest Alliance, SAF - no crosswalk.**]**

Great Lakes Region scarp woodland

This community type is specific to the extremely steep, actively eroding lakeshore-bluff and creek-wall slopes along Lake Erie. The dominant aspect is that of a woodland (between 10% and 60% cover by trees over 5 meters tall), although some sites are forested and others are more open. Physiognomic differences generally reflect different seral stages in this very dynamic system. Common woody species include *Acer saccharum* (sugar maple), *Carpinus caroliniana* (hornbeam), *Ostrya virginiana* (hop-hornbeam), *Juniperus virginiana* (red-cedar), *Salix* spp. (willows), *Rhus typhina* (staghorn sumac), *Corn us rugosa* (round-leaved dogwood), and *Amelanchier arborea* (shadbush). Herbaceous species include *Aster cordifolius* (heart-leaved aster), *Thalictrum dioicum* (early meadow rue), *Dryopteris marginalis* (marginal wood fern), *Equisetum arvense* (common horsetail), and the exotic species *Tussilago farfara*[I] (coltsfoot). This community type has a somewhat different species composition on bluffs that front Lake Erie than on creek-wall scarps (Charles Bier, personal communication). More data are needed to determine if they warrant separation. This community type is part of the "Great Lakes Region scam complex."

Related types: The lake sediment scams also contain areas where the substrate is saturated by groundwater seepage. These areas are actively "slumping" and support a combination of herbaceous and woody vegetation. These small wetlands are described in the palustrine section under "Great Lakes Region scarp seep."

Range: Great Lakes Region.

Selected references: Kline 1993, PNDI field surveys.

[Crosswalk: Smith's "Eastern Great Lakes Bluff/Cliff Community," TNC - no crosswalk, SAF -no crosswalk.**]**

Great Lakes Region bayberry - cottonwood community (also a shrubland type)

In Pennsylvania this community type occurs only on Presque Isle. This community type is dominated by a mixture of trees and shrubs. Characteristic species include *Myrica pensylvanica* (bayberry), *Amelanchier* spp. (shadbush), *Salix* spp. (willows), *Cornus* spp. (dogwoods), *Populus deltoides* (cottonwood), and the exotic

species *Betula pendula*[1] (European white birch) and *Lonicera morrowii*[2] (Morrow's honeysuckle). Herbaceous species include *Sorghastrum nutans* (Indian grass), *Rumex acetosella*[3] (sheep sorrel), *Panicum uirgatum* (switch grass), *Schizachyrium scoparium* (little bluestem), *Carex tonsa* (a sedge), and *C. muhlenbergii* (a sedge). This type includes both shrubland and woodland physiognomy. Because of the extremely dynamic nature of this system, a variety of successional stages are maintained in a complex mosaic. This community type is part of the "Great Lakes Region beach - dune - sandplain complex."

Related types: Because of the extremely dynamic nature of this system, the hydrology, physiognomy, and species composition of these sites may shift dramatically over short periods of time. Lake level changes, storm action, and shifting sands cause this community type to
intergrade in space and time with the "Great Lakes Region dry sandplain," the "Great Lakes Region palustrine sandplain," "Great Lakes Region bayberry -mixed shrub palustrine shrubland" and, to a lesser extent, "Great Lakes Region sparsely vegetated beach." For more information on the ecology these community types, see the description of the "Great Lakes Region beach - dune - sandplain complex."

Range: Great Lakes Region.

Selected references: Bissell and Bier 1987.

[Crosswalk: Smith's "Eastern Great Lakes Dune Community," TNC - no crosswalk, SAF - no crosswalk (the Cottonwood (63) type is closest).**]**