Hemlock – Mixed Hardwood Palustrine Woodland

System: Palustrine
Subsystem: Woodland
PA Ecological Group(s): Basin Wetland

Global Rank: G5
State Rank: S4

General Description

This describes a group of wetland woodlands 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. The canopy is relatively open (< 60% canopy cover) and Eastern hemlock (*Tsuga canadensis*) contributes between 25% and 75% of the canopy. Other conifer species that may occur with hemlock include eastern white pine (*Pinus strobus*), red spruce (*Picea rubens*), tamarack (*Larix laricina*), and pitch pine (*Pinus rigida*). The most common hardwood species are yellow birch (*Betula alleghaniensis*), red maple (*Acer rubrum*), black ash (*Fraxinus nigra*), blackgum (*Nyssa sylvatica*), and gray birch (*Betula populifolia*). Rosebay (*Rhododendron maximum*) often forms a dense understory; other shrubs include highbush blueberry (*Vaccinium corymbosum*), winterberry (*Ilex verticillata*), swamp azalea (*Rhododendron viscosum*), mountain holly (*Kalmia latifolia*), maleberry (*Lyonia ligustrina*), leatherleaf (*Chamaedaphne calyculata*), sheep laurel (*Kalmia angustifolia*), and witherod (*Viburnum cassinoides*). Herbaceous species include cinnamon fern (*Osmunda cinnamomea*), sedges (e.g., *Carex folliculata*, *Carex trisperma, Carex prasina, Carex leptalea*), rushes (*Juncus* spp.), violets (*Viola* spp.), skunk-cabbage (*Symplocarpus foetidus*), false hellebore (*Veratrum viride*), sensitive fern (*Onoclea sensibilis*), partridge-berry (*Mitchella repens*), gold-thread (*Coptis trifolia*), Canada mayflower (*Maianthemum canadense*), crested wood fern (*Dryopteris cristata*), and purple-stemmed aster (*Symphyotrichum puniceum*). The bryophyte layer is usually well developed and may be dominated by sphagnum.

Rank Justification

Uncommon but not rare; some cause for long-term concern due to declines or other factors.

Identification

- Occurs on saturated soils in basins or depressions on the fringe of inundated areas
- Occurs as a community within a beaver inundated wetland complex, often transitional between hemlock-mixed hardwood palustrine forest and shrub or graminoid wetland
- Canopy cover < 60%
- Hummock and hollow microtopography
- Co-dominance of Eastern hemlock (usually less than 30 feet tall) in the canopy with eastern white pine, red spruce, tamarack, yellow birch, red maple, black ash, black-gum, and gray birch of similar height
- Key tree species may persist in the inundated portions of the depressions/basins by growing on hummocks

Characteristic Species

Trees

- Eastern hemlock (*Tsuga canadensis*)
- Eastern white pine (*Pinus strobus*)
- Red spruce (*Picea rubens*)
- Tamarack (*Larix laricina*)
- Yellow birch (*Betula alleghaniensis*)
- Red maple (*Acer rubrum*)
- Black ash (*Fraxinus nigra*)
- Blackgum (*Nyssa sylvatica*)
- Gray birch (*Betula populifolia*)

Shrubs

- Rosebay (*Rhododendron maximum*)
- Highbush blueberry (*Vaccinium corymbosum*)

- Winterberry (*Ilex verticillata*)
- Mountain laurel (*Kalmia latifolia*)
- Maleberry (*Lyonia ligustrina*)
- Leatherleaf (*Chamaedaphne calyculata* var. *angustifolia*)
- Sheep laurel (*Kalmia angustifolia*)
- Swamp azalea (*Rhododendron viscosum*)
- Witherod (*Viburnum cassinoides*)

Herbs

- Cinnamon fern (*Osmunda cinnamomea*)
- Sedge (*Carex folliculata*)
- Violets (*Viola* spp.)
- Sedge (*Carex folliculata*)
- Sedge (*Carex trisperma*)
- Sedge (*Carex leptalea*)
- Sedge (*Carex prasina*)
- Sedge (*Carex bromoides*)
- Skunk cabbage (*Symplocarpus foetidus*)
- False hellebore (*Veratrum viride*)
- Sensitive fern (*Onoclea sensibilis*)
- Creeping snowberry (*Gaultheria hispidula*)
- Partridge-berry (*Mitchella repens*)
- Goldthread (*Coptis trifolia*)
- Canada mayflower (*Maianthemum canadense*)
- Purple-stemmed aster (*Symphyotrichum puniceum*)
- Crested shield fern (*Dryopteris cristata*)

- Northern wood-sorrel (*Oxalis acetosella*)

Bryophytes

- *Sphagnum* spp.
- *Polytrichum* spp.
- *Thuidium* spp.
- *Mnium* spp.
- *Pleurozium* spp.
- *Hypnum* spp.

International Vegetation Classification Associations:

Hemlock - Hardwood Swamp (CEGL006226)

NatureServe Ecological Systems:

North-Central Appalachian Acidic Swamp (CES202.604)

Origin of Concept

Fike, J. 1999. Terrestrial and palustrine plant communities of Pennsylvania. Pennsylvania Natural Diversity Inventory. Harrisburg, PA. 86 pp.

Pennsylvania Community Code

UB : Hemlock – Mixed Hardwood Palustrine Forest

Similar Ecological Communities

If the conifer component is less than 25% of the canopy, the community is classified as one of several broadleaf palustrine woodland community types. Hemlock – Mixed Hardwood Palustrine Woodlands differ from Hemlock – Mixed Hardwood Palustrine Forests in that Hemlock – Mixed Hardwood Palustrine Woodlands have a more open canopy (< 60% canopy cover) and typically a denser shrub layer as well as seedlings and sapling of tree species.

Fike Crosswalk

Hemlock – Mixed Hardwood Palustrine Woodland

Conservation Value

This community can host a number of rare plant species including soft-leaved sedge (*Carex disperma*), log fern (*Dryopteris celsa*), Clinton's wood fern (*Dryopteris clintoniana*), glade spurge (*Euphorbia*

purpurea), creeping snowberry (*Gaultheria hispidula*), lesser rattlesnake-plantain (*Goodyera repens*), kidney-leaved twayblade (*Listera smallii*), bristly black currant (*Ribes lacustre*), and swamp red currant (*Ribes triste*).

This community also serves as a buffer for sediment and pollution runoff from adjacent developed lands by slowing the flow of surficial water causing sediment to settle within waterways associated with this wetland community. Hemlock – Mixed Hardwood Palustrine Woodlands provide habitat cover for ruffed grouse (*Bonasa umbellus*), turkey (*Meleagris gallopavo*), and snowshoe hare (*Lepus americanus*). This community also serves as a buffer for sediment and pollution runoff from adjacent developed lands into streams by slowing the flow of surficial water causing sediment to settle within this wetland.

Threats

Hemlock – Mixed Hardwood Palustrine Woodlands are threatened by habitat alteration, deposition (sedimentation, agricultural runoff), and alterations to the hydrological regime (flooding due to beaver dams, lowering of water tables). Clearing and development of adjacent land can lead to accumulation of agricultural run-off and pollution, sedimentation, and insolation/thermal pollution. Eastern hemlock communities are threatened by hemlock woolly adelgid (*Adelgis tsugae*) infestations. *A. tsugae* is an exotic pest insect that feeds on the twigs of the eastern hemlocks causing defoliation, bud mortality, and, eventually, tree mortality within as little as four years (Young et al. 1995). As tree mortality occurs, light availability increases due to the widening of canopy gaps and provides opportunities for the colonization of invasive plant species within the understory (Orwig and Foster 1998).

Management

A natural buffer around the wetland should be maintained in order to minimize nutrient runoff, pollution, and sedimentation. The potential for soil erosion based on soil texture, condition of the adjacent vegetation (mature forests vs. clearcuts) and the topography of the surrounding area (i.e., degree of slope) should be considered when establishing buffers instead of relying on a pre-established distance for buffer width. The buffer size should be increased if soils are erodible, adjacent vegetation has been logged, and the topography is steep as such factors could contribute to increased sedimentation and nutrient pollution. Direct impacts should be avoided (e.g., roads, trails, filling of wetlands) and low-impact alternatives (e.g., elevated footpaths, boardwalks, bridges) should be utilized in situations where accessing the wetland cannot be avoided. Care should also be taken to control and prevent the spread of invasive species within the wetland. Alterations to groundwater sources should be minimized. This is a successional type therefore acreage and occurrences will fluctuate with time depending on the level and frequency of disturbance in a given watershed or region.

Research Needs

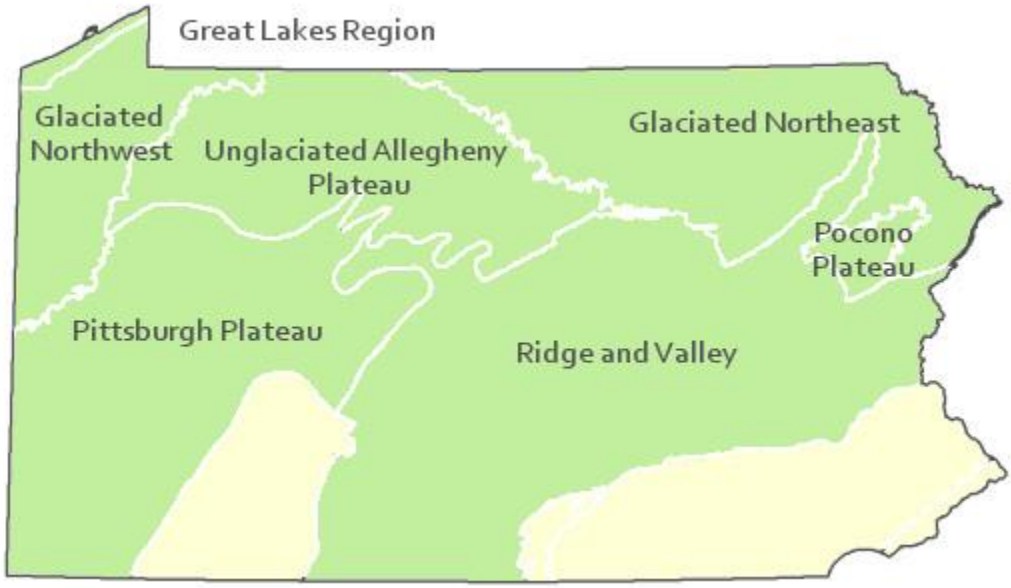
Variations may occur at eco-regional levels. There is a need to collect plot data to characterize variations and guide further classification of this community type. Various successional trajectories may occur depending on the type and frequency of disturbance. Understanding the dynamics of this community type will help to understand the community's persistence as a distinct type or as a short-lived

successional stage. Community changes following hemlock defoliation from wooly adelgid infestations should also be studied.

Trends

The relative trend for this community is likely decreasing due to hemlock mortality resulting from wooly adelgid infestations. Hemlock – Mixed Hardwood Palustrine Woodlands were probably less common but have increased due to flooding from beaver activity in some areas of Pennsylvania (which benefits this community), although it may have declined in some areas due to wetland draining/filling, alterations to groundwater discharge, and clearing of the adjacent lands leading to sedimentation. This community is successional and will most likely advance to closed-canopy forest wetlands unless maintained to have an open canopy.

Range Map



Pennsylvania Range

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

Global Distribution

Unknown

References

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